Index for Attachments to the Information Request-ORS Comments for DDMI's Depositing Processed Kimberlite in Pits and Underground (EA1819-01) (Part 3 of 3)

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PR#86

March 2019

OUR YOUTH, OUR FUTURE: MONITORING OUR LAND, WATER, FISH AND AIR

Report of the Diavik Diamond Mine Aquatic Effects Monitoring Program Traditional Knowledge Study

Bobby Algona, Regan Adjun, Mason Beaverho, Ernest Boucher, Doris Terri Enzoe, Nancy Kadlun, Eric Marlowe, Wayne Langenhan, Jonas Sangris, Zach Sangris, Julie Wedzin
with Joanne Barnaby, Colleen English, Peter Huskey, Kathy Mai, Natasha Thorpe

Thorpe Consulting Services

Disclaimer

The document does not represent the results of community consultation. It is subject to the "No Prejudice" clauses of Article II, Section 2.1 of the *Environmental Agreement for the Diavik Diamond Project.* The document represents the work of the AEMP TK Program participants and does not necessarily reflect the views of any Party to the *Environmental Agreement.*

Suggested Citation:

Thorpe Consulting Services Ltd. 2019. Our Youth, Our Future: Monitoring Our Air, Water, Land and Fish. Report of the Diavik Diamond Mine Aquatic Effects Monitoring Traditional Knowledge Program. Prepared by Natasha Thorpe and Joanne Barnaby with support from Colleen English and Kathy Mai. Vancouver, BC.

Cover Photo:

Front: Zach Sangris

Middle (L to R): Kyla Gray, Colleen English, Jonas Sangris, Julie Wedzin, Nancy Kadlun, Bobby Algona, Peter Huskey

Back (L to R): Eric Marlowe, Ernest Boucher, Doris Terri Enzoe, Wayne Langenhan, Mason Beaverho, Regan Adjun, Natasha Thorpe, Joanne Barnaby, Hilda Reimer, Kathy Mai

Dedication

Our youth, our future . . . the land is yours to care for

Executive Summary

This report brings together results from traditional knowledge and scientific knowledge shared during a camp held near the Diavik Diamond Mine at Lac de Gras, NWT during the summer of 2018. These efforts were part of the Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) Study established by Diavik Diamond Mines (2012) Inc. (DDMI) with five Indigenous parties to their Environmental Agreement: Kitikmeot Inuit Association; Łutsel K'e Dene First Nation; North Slave Métis Alliance; Tłı̨chǫ Government; and Yellowknives Dene First Nation. The companion deliverable to this report is a video-documentary entitled *Our Youth, Our Future: Monitoring our Land, Water, Fish and Air* which was filmed and produced by aRTLeSS Collective 2018 (vimeo.com/artlesscollective/3wefishtodayforfishtomorrow). The authors advise that it is important to consider this report in conjunction with the video and vice versa. The combination of this report and a video-documentary provide a legacy for participants and the tools to share results with their communities. Further, they provide a record to track aquatic health over time.

The primary objective of the 2018 camp remained the same as the 2015 and 2012 programs, specifically, to facilitate a two-way flow of information, resources, and knowledge between TK holders and scientists regarding the health of fish and water in Lac de Gras. A secondary objective was to meet regulatory requirements for monitoring aquatic environmental health. As in 2012 and 2015, key components of the AEMP TK Program continue to be:

1. Communications and Engagement
2. Watching Fish: Fish Palatability and Texture Studies
3. Watching Water: Water Quality and Quantity Studies
4. Elder Interviews and Teachings
5. Excursions (Trips)
6. Documentaries

Following a Planning Session held in May 2018, Elders, youth and scientists gathered at the community-camp near the Diavik Mine for five days in early to evaluate the health of fish and water in Lac de Gras. A total of 36 fish were caught from two locations (35 lake trout, 1 lake whitefish). When evaluating the fish during processing, people generally described the fish as healthy with typical gills, tissue, skin, scales, hearts, livers, pipes, eggs. Size, shape and tissue rebound were also mostly rated typical. Camp participants tasted four lake trout that they baked, boiled, fried, and grilled. The descriptions provided on the taste of each fish were positive and included: good, very good, healthy and typical. However, compared to previous years, participants suggested that the number of fish with cysts and worms (parasites) appeared to have increased. While some people recognized that parasites occur naturally and are present in fish within their communities, there was still an interest in trying to understand why fish in 2018 appeared to have more cysts than expected. During the Verification Session in December, results of documented cysts from previous years were compared with 2018 and did not show an increase. To date, systematic documentation of cyst presence was not done consistently; however, henceforth, more care will be given to tracking this indicator.

In addition to assessing fish health, traditional knowledge and science were used together to evaluate water quality. Camp participants considered water quality as part of the entire ecosystem wherein water is the common thread and considered the main source of life. From this perspective, camp participants deduced that water quality was good by virtue of observing water clarity; movement; temperature; vegetation; fish activity; and taste. Two sampling locations were selected, one near the lakeshore and another in deeper water. A tasting test was carried out whereby water samples were tested as tea, boiled then cooled and tested cold direct from Lac de Gras. The location of where the samples were taken made a big difference such that water "taken too close to the land" was "fishy" or "swampy" whereas water collected at depth in open water was much preferred. Water collected at the surface wasn't as tasty as deeper water. Still, the consensus was that the water is healthy. Water quality results from scientific analysis and TK support the same general conclusion that the water remains "good" in Lac de Gras. When asked, participants responded that they do not have any concerns or worries about water in Lac de Gras at this time.

As in previous years, semi-directed interviews provided opportunity for Elders and youth to elaborate on their insights around health fish and water in Lac de Gras. Although the weather precluded much boat travel this year, participants made a short excursion to the Narrows between Lac de Gras and Lac du Sauvage. Returning to this important caribou crossing and cultural site was a powerful experience that inspired much storytelling. Throughout the interviews and excursions, Elders shared important teachings, reflected on the past and spoke to the challenges facing youth and communities today. As in past camps, factors of success included the bridging between Nations, generations and disciplines. The importance of sharing and maintaining traditional laws as well as the strength of youth stood out as key threads throughout the camp. Other themes that surfaced during storytelling, interviews and campfire discussions centred around the healing power of the land, the importance of relationships, and powerful women. As in past camps, concerns about mining and environmental change continued to be shared. Finally, people asserted their continued interest in formally reclaiming their traditional roles and responsibilities as guardians and advancing community-based monitoring initiatives across their territories. Not only does monitoring provide a source of employment, but also it supports people in getting out on the land. The AEMP TK Program provides one vehicle to assist people in this guardianship role.

In conclusion, results from scientific analysis of both the fish inspection and water tests support observations made by TK holders that the present status of the fish and water in Lac de Gras is good. Participants acknowledged Diavik's efforts to keep the fish and water healthy and expressed interest in seeing this monitoring camp continue long into the future after Diavik is gone.

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Acknowledgements

The Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) Study initiative—including this report, the accompanying film and the processes throughout—would not have been possible without generous logistical and financial support from Diavik Diamond Mines (2012) Inc. (DDMI). We gratefully acknowledge those who continue to support participants in the Aquatic Effects Monitoring Program TK Study. This program support results in a cross-cultural, cross-generational and cross-disciplinary approach to better understanding fish and water in the Lac de Gras area.

The generosity expressed by Elders through their words, advice, teachings and spirit was matched in intensity by the curiosity, respect, willingness and enthusiasm demonstrated by participating youth. We appreciate the many individuals (profiled in the following section) who came together to make these connections possible. In addition to camp participants, several 'behind the scenes' people helped with arranging community participants, securing logistics, making phone calls, interpreting, translating, and providing other support. Without this, the engagement of both Elders and youth would not have been possible. Thank you to Georgina Chocolate, Narcisse Chocolate and Morris Martin who participated in the May Planning Session but were unable to attend the August camp due to extraneous circumstances; their words and contributions are still shared in this report. Finally, thanks to the families back home who went without their loved ones for several days so that they could participate in this initiative.

aRTLeSS Collective film-makers Jay Bulckaert, Craig Kovatch and Andrew Silke showed their tremendous skill once again. Fisheries biologist Kathy Mai supported the TK team while also leading the fisheries work, providing a strong example of how to appreciate two worlds. Our thanks go to many others who remain missed or un-named: our heartfelt gratitude is sent your way.

Finally, the following Diavik employees were instrumental in making this project a success: Kyla Gray, Shelby Skinner, Atiken Hehn, Jane Quackenbush, Sean Sinclair, Mark Nelson, Jessica Kozian, Andy Hutchinson, Steve Woods and Ed Wolff. Lisa Alexander and Jeffrey Parrott helped with special requests and logistics when the group visited the mine. Others from Discovery Mining Services including Rod Davidson, Uyaraai Kameemalik, Cliff Henry, Hilda Reimer, Juliana Iyra-Davesne, Mathieu Beaudoin and Malcolm McLean worked together to make sure the camp was set up, ran smoothly and, most importantly, that everyone was well fed!

Quana! Koana! Masıcho! Mársıcho! Ması! Thank you!

Years ago when they discovered diamonds, around 1992, way before that, people were trapping up here. I always remember my Dad used to say that one year they had a white fox, one pelt was $1,000. So the all the elders went up North around here all over. And they say they drive their dogs on the hill and they see a white rock, they said. You go on it, just like grabbing their sleigh. Makes big groove in the sleighs. I guess in those days they were driving over diamonds! It is hard, eh? So they didn't know that though, driving right over the diamonds.
– Jonas Sangris, Interview, August 3, 2018

The whole camp was a learning experience. We are all like a big family. All these different nations, different people. It was an amazing experience.
- Zach Sangris, Daily Notes, August 6, 2018

If I was saying it in my own language, maybe my voice would be stronger.
- Terri Enzoe, Verification Session, December 6, 2018

I'm very thankful for the meeting here. All this discussion that we have. We're talking about TK and our TK is becoming stronger . . . we had a good discussion and we walked on the barrenlands and it looked beautiful and we went on the boat and we need to keep the young people coming. They may not know everything but we hope they learn from everything with our TK and knowledge so that they can go on the land.
- Julie Wedzin, Verification Session, December 7, 2018

That AEMP that's taking place is not only for us but for the youth of future generations and we walk in the footsteps of our ancestors who were in their snowshoes.
- Jonas Sangris, Verification Session, December 7, 2018

Author Biographies

Elders

Bobby Algona

I was born and raised here, specifically around Pellatt Lake and Contwoyto Lake area. I have been living there most of my life when I was healthy. Throughout those years I was raising my own family there. All my children were weaned in Pellatt Lake and taught by my mother and grandmother and father. They were taught how to live off the land for the well-being of the whole family. Through the community I have been asked to come up here and I have accepted and I have been coming ever since. This is my third time up here. I thank Diavik for giving me a chance to be in my own homeland around Lac de Gras area. Throughout those years of experience with Diavik I have done a lot of environmental work. Wolverine monitoring, bird surveys, and DNA collecting and caribou surveys as well. When I couldn't get out on the land, I worked in the environmental department learning about what the department did in their labs as well. I did work with them collecting water samples as well.

Ernest Boucher

I was born in Łutselk'e on the Snowdrift River. All I did was trapping and camping since I was a kid. When I grew up, I started working on my own trapping and commercial fishing. In the good old days in the 50s and 60s. I have two kids, a girl and a boy that I raised. I think the camp was really beautiful but we have been wind-bound for two days. It was good to see old friends, especially the guy sat opposite me.

Doris Terri Enzoe

I had four kids. One daughter and three boys. I lost my son. He was 32 years old when I lost him about 3 years ago. He is one of my 'going out on the land' people. So now with my third boy, we go out on the land all the time. Hunting for wild food for our families. We give food away if we kill caribou or muskox or moose. I do traditional knowledge for my First Nation. I go out on the land or in the community with the elders. I do a lot of sewing – beadwork and embroidery. I make purses and sell them. Being out here is one of the most beautiful places to be. Especially on the Barrenlands. A week out here without technology is good. When I am out here, I am stress free. I am away from everything. Fresh air, fresh water. It doesn't matter if it is rainy or windy. I don't worry about the weather when I go out here. Caribou is our first priority but now it is really hard to get.

Nancy Kadlun

I was at the camp three years ago. It is good to be back and learn more. Especially about removing otoliths from fish. I love coming to the camp so my grandchildren and others will learn from what we do here. For example, so they know in the future how important the air, water and land are to our lives and that it must be preserved, because we cannot live healthily without good water and clean water. Animals need clean land as well. We live off animals. Berries grow on clean land. Without us elders coming here we would not know whether the land, water, fish and animals will be healthy in the future.

Since we are surrounded by mines, we would like to constantly teach the young people so that our future is as healthy as today. Thanks to Diavik for this opportunity.

Wayne Langenhan

I am an expert fire tender. I came to camp to tend the fire. Sometimes, according to some people, I didn't do a good enough job. (However, the consensus was he did a great job!) The original purpose of me coming here was to tie knots but the youth were more interested in doing other things. They wanted to fish and pick berries. I have used my knots for tying down gear in a sleigh. I wish the weather had been better so the youth could have done more things.

Jonas Sangris

I was raised on the land. I am really strong on culture. I am Dene. I have my own Dene law. These are things that I believe in. I try to help people and work for my people so they can make a better life for themselves. A life away from the government.

In this context, I believe that the thing that is still very strong is the Treaty. My great grandfather made the treaty. Everything that is on the land. We shall not be restricted to all the rules. That is what the elders knew and believed in. They had a really tough life before the white people came. The caribou fed and clothed them. That was their life-style. Now the government is coming out with all sorts of policies. I always remember events of the past. In 1987-1988 Mr. Thomson tried to get all the First Nations to be the same. It didn't matter what band you came from, one melting pot and the people in the melting pot had to follow the system. The chiefs told him to get out of town. He wanted to divide us. The government said we were all together. In the 1990's the Dene Nation fell apart. Anyway, that was what the government wanted. They wanted to take the Dene law from us. We had a treaty with the Queen. The Dene leaders said the treaty will last as long as the sun shines. It was settled as a self-government through the AIP. They gave up their treaty rights for some little rights. The two regions the Tłı̨chǫ region and the Behchokǫ̀ region. He believes that the Treaty will last forever. Now the federal government are taking it piece by piece. Like no more humane trapping. You have to do quick-kill. People don't like it. So now a lot of people don't trap anymore. Also the gun law. You have to have a permit and a license to have a gun now. It makes the First Nations look like criminals. Now you have to have a license or a permit. They are trying to restrict the First Nations under their policies. They say that people need a permit to chop wood. They want devolution from the Federal to the NWT government. We have a Treaty with the federal government. Devolution was part of Land and Resources i.e., the mines. That is our land where the mines are. They are making billions.

This camp is a really good camp. We are checking water and the fish. It is so they just don't go ahead and dump where they want. Good cook and good people.

We came out here with an axe and a knife and it was -40 degrees. But they survived. That's why you have to pay attention. In 1984 I was at a meeting in Délı̨nę (Fort Franklin). The chief asked me to come with him and he was listening to a translator. All the things came true that he said. Dene don't need paper. We will die under a pile of paper. He also said the world will be ruled by numbers as is the case now with phones and computers etc. The chief also said to teach your kids to survive in the bush. He said that soon you will have to walk to the middle of the Great Bear Lake to find water. He said that we First Nations have everything. All four elders repeated the same pieces of information. This repetition was so the listener doesn't forget what was said.

Julie Wedzin

My name is Julie Wedzin and I am from Behchokǫ. When I first got a phone call asking me to come on this fish and water sampling trip, I was kind of hesitant to come because I didn't know what to expect. I was a bit afraid. At the same time, I wanted the experience because I had never been to this area in my lifetime. I am really pleased that I made the decision to come on this trip. As a young woman with my children I had to go into the Wekweeti area. That is as far as I went. This is the first time I have come this far into the tundra. I am impressed with the fish and water sampling and the amount of work that is done. I am really thankful that I came here. I like being amongst the young people. The group here they work very well together. The youth are watching the elders doing everything in a traditional and a scientific learning way. This is learning for all their lives. When we look on the land it is very beautiful and we are thankful. On our excursion on the boat trip it was a very good experience. It would have been good to see a caribou on the shore. In Wekweeti area there is a treeline that ends and the hunting begins. I have been hunting with my late husband. That was my only experience on the tundra. We would travel in that area with the boat on the lake and if we see the caribou, we would harvest the caribou. We would harvest four caribou and load it on the boats and return to our camps. We would return to the community Wekweeti where the people had settled. During the fall when the caribou came down into the treeline, people would visit and we would share our harvested meat – the caribou. During that time the elders knew where the good fishing spots were. We would ask them where the good spots were. Then we would get our fish and dry it to keep it for a long time. During that time my late husband and I took our dog team and moved to Behchokǫ. I have been to Wekweeti only once since then, during the annual assembly meeting. The community has been upgraded since I visited and today there is electricity and everything has been upgraded and improved.

Where I live now is Frank's Channel, I put out the nets with my boat and check them twice daily. Then people come to me for fish. I would give it generously.

Youth

Regan Adjun

I was born in Yellowknife but I grew up in Kugluktuk. I am 22 years old. I finished high school in 2014. I grew up hunting with my grandfather and my parents. I love the outdoors – hunting fishing and travelling on the land. I have my own boat and fish for Arctic char, lake trout, white fish and cod. I like all physical activities keeping me fit and active. Camping is one of my favorite things. I also like to learn about different cultures. This camp gave me the opportunity to do these things.

Mason Beaverho

I was born in Yellowknife and raised in Whatì. There is a huge lake so I was always out on the lake as a young boy with my uncle and my grandpa. I love being out on the land. But I get sick and cold so that takes the fun out of it.

I have never been out on the tundra before. It reminds me of what my uncle and grandpa said about when they hunted for caribou. They wouldn't be in tents like this. Since I've grown up, I haven't been out on the land because my mum said I had to catch up on my education. Being out on the land isn't popular in our community. My goal is to travel the lands in the Tłı̨chǫ region.

Before I came here, I was in White Beach Point on Great Slave Lake. We set nets there and took water samples. There are sink holes on the Great Slave Lake that disturb the sand on the bottom and make the water not clear. We tasted the water and the fish. At White Beach Point I told the elders that I wanted to travel the land like my ancestors. When the elders talk about the land, I don't know the places they are talking about. I want to see the land and be just like them going out there.

I love being outdoors and I am really happy that I got selected to come on this camp. Last time I was here in the winter I saw lots of caribou on the lake. I was hoping to see more wildlife but nothing. But it is cold right now. They were talking at Diavik about climate change. This is what this coldness is. I heard that there are wolves at the airport.

I feel a lot better now and being out here makes me feel like I should go fishing and go out on the land. But in 2018 you need to find work to make a living. Before, people used to use the land. It isn't used so much today. Now it seems like the land isn't worth much. When I was a kid my grandfather had a room full of furs that he sold to Hudson's Bay. He had a picture of himself holding a lynx and I think that I would like to be like him. Since some deaths happened in my family, I feel lost. My grandma passed away in 2014 and I feel so sad that I have lost my way.

I feel like a warm welcome when I'm out here because this is where my ancestors were. Not many youth get to do this. My grandfather knows where all the graves in Whatì are located. I want to know where they are so I can pass on that knowledge. My grandfather went to a cabin in March but I had to work. I wanted to know where my grandfather grew up before he moved to Whatì. I haven't lived like my grandfather lived. I get jealous because I would like to live like that. I hope that things work out for my Tłı̨chǫ people and other people and I hope that the future I get to see what things are like now. The caribou are going much more north than this. I hope the land is the way that I see it now for future generations. I don't believe that the land belongs to my ancestors. I believe it belongs to the future. We can't do anything about the environment and try and preserve it for the future. It is my goal to travel the land. Today we have to use motorboats and skidoos to go from one destination to another. They need gas, which costs money. Dogs and canoes just need fish and your arms.

Eric Marlowe

I am a good fisherman. Without the fish that I was able to catch getting enough fish for sampling would have been very difficult. I have four brothers and one sister. I am from 'the place of small fish' - Łutsel K'e. I have lived there most of my life. I hope to be a fishing guide. I am looking for a short and sweet woman.

Zach Sangris

I am from N'dilo. I believe that times are changing and that both traditional and scientific knowledge is a factor in our lives and our future lives for the generations soon to come. I also love to talk and hear about traditional stories whether it's about medicine power or how our people use to live back in the day. My great grandfather taught me so much back when I was real young about 7 or 8 years old. He brought me out to the land and he gave me, a piece of string, a can of beef stew, a match and a few snares with an ax to survive for 3 days out on the land alone. I am here today so I believe he was teaching me survival techniques for me in case of emergencies. That's all I've got say but I believe that it's very important for the new generation to know that times are changing and we have to adapt to that change before we run out of our traditional ways of life.

Facilitators, Biologists, Supporters

Joanne Barnaby

Joanne has a passion for the land. It is her greatest passion. She got that from her elders. Her first experience with something different was when she was 9 years old. Her family moved from Fort Providence to Pine Point, which is a mining community. So the very next day she went to school and all the kids were white. They started sniffing the air and she realized that the smell was from her coming straight out of fish camp. She was so upset that she went running home. And she begged her family to go back to Fort Providence. Her mum and dad agreed and she had two years reprieve. Then she went back to Pine Point. This move really impacted her life. She started going to meetings with elders and chiefs. When she was 11 she became politically active. When she was 14 she started working part-time to fight the pipeline. At the time it was the largest industrial proposal in Canada. The Berger Commission held public enquiries in every community up and down the valley and Judge Berger recommended a moratorium to allow time for new treaties and aboriginal rights to be resolved. This was in the 70s. The

chiefs asked Joanne to set up a cultural organization in 1986. She did that for a number of years. She established a traditional knowledge program. She introduced the idea of traditional knowledge to the UN. The Brundtland Commission recognized TK as being a legitimate source of knowledge on which global decisions regarding the environment should be made. After she helped set up the Dene Cultural Institute, she realized that she missed doing the real work. She left that job and went on her own. She loves it.

Since she has been involved in this camp. The first thing she did with Diavik was cross-cultural training. It was work that she took very seriously. So did Diavik. She thus developed relationships with people in the company. She put over 600 people through this training. It addressed racism. A lot of emphasis was placed on the value of the land. It has influenced Diavik's attitude. They take this work very seriously and they are accountable back to the elders. It's not simple; it is not perfect. Sometimes they agree and sometimes they don't. When they don't accept one of the elder's recommendations, they provide a full explanation that you know is the truth and they will explain why. Joanne can live with that.

She also does self-government negotiations. Her role is to facilitate community input into the process of negotiating self-government.

Natasha Thorpe

Natasha Thorpe specializes in integrating Indigenous knowledge and western science in a resource management context. Natasha works primarily in Arctic and western Canada in the fields of environmental assessment, environmental change, capacity-building, and engagement. Over the last few years, Thorpe Consulting Services has brought together five Aboriginal signatories to develop and implement ways to integrate traditional knowledge into mine monitoring and closure planning in both meaningful and practical ways. The Diavik Diamond Mine Aquatic Effects Monitoring Program represents one of these successes. Natasha feels blessed to work alongside one of her mentors, Joanne. She is a lifelong learner, trying to absorb all the rich lessons shared by the Elders. Natasha enjoys working with youth and is happiest spending time with her two children.

Ms. Thorpe holds an MRM (Resource Management) from Simon Fraser University, and has studied Indigenous knowledge systems under the guidance of many Elders for over 20 years.

Colleen English

Colleen English has worked in the mining industry for 20 years. She specializes in environmental management and monitoring, and Indigenous community relations. She strives to find creative and practical methods for integrating traditional knowledge and western science that meet the needs of resource management companies and Indigenous communities. As a former DDMI employee, she was accountable for revitalizing the Aquatic Effects Monitoring Program Traditional Knowledge Study in 2011/2012 and continued to lead this program on Diavik's behalf in 2015 and 2018.

Kathy Mai

Kathy Mai came to the camp for the first time. She is a fisheries biologist and has worked as such on the west coast of North America for the past 24 years. She was employed by Washington Department of Fish and Wildlife for fifteen years. During this time, she conducted research on salmon and sturgeon, including tagging, monitoring and aging of fish. She managed the fisheries work on the Mount St. Helens National Monument for twelve years. This included long-term monitoring of the bull-trout population – a species closely related to the lake trout found in Lac du Gras. Since coming to Canada in 2008, Kathy has worked for various consultants and First Nations conducting fish monitoring on the Columbia, Thompson and Skeena rivers. Research on lakes included Arrow Lakes, Lake Okanagan, Shuswap Lake, Babine Lake and Williston Reservoir. Prior to working in fisheries, Kathy was a cross-cultural liaison for United Nations High Commissioner for Refugees (UNHCR). Her work included advocacy for minority populations in transit camps and in countries of re-settlement.

Interpreter

Peter Huskey

I come from Behchokǫ, born and raised. I have been interpreting since 2005 for the Tłı̨chǫ government. I enjoy my work because it takes me places. I love my language. I love coming back to this place. From the stories my mom told me I learned that my great-grandfather took Dr. Wheeler and Frank Russel, an archeologist from the Smithsonian, on a muskox expedition hunt. My Uncle was born on east island where the Diavik mine exists today. I appreciate that they are doing the fish sampling and water sampling in the traditional knowledge and the scientific way is the way to monitor the fish and the water. It brings the five signatories together, a unique opportunity to work together. So I am very happy and pleased to be part of the camp as an interpreter to help the elders and the youth to participate together. This is my two minutes of fame!!

Video-Documentary Specialists: aRTLeSS Collective

Jay Bulckaert

Jay successfully ran his own production company, COLLECTIVE9 since 2007 before teaming up with Pablo from aRTLeSS Media. As with many things in the North, he has had to learn to be a jack-of-all-trades within the industry meaning that writing, producing, directing, shooting and editing are everyday tasks for him on almost any project he takes on. He has made a commitment to working collectively with the best and brightest the North has to offer.

Jay is also a writer and has been published in UpHere Magazine, Ascent Magazine, Edge YK Magazine and VICE Magazine. He is the creator of the Dead North Film Festival challenge and a founding member of the NWT Professional Media Association.

Jay is the aRTLeSS Collective Senior Editor / Post Production Supervisor and Chief Pilot / Safety Coordinator for UAV Aerial Operations.

Craig Kovatch

Craig has been a camera operator in the north on and off for just over 25 years. But it's been in the last 8-10 years that things have taken off. Social media has played a huge part in that. He has been a camera operator or Director of Photography on short films, documentaries, music videos, commercials, reality/life style TV shows to name a few. A key project for Craig has been as Director of Photography on the film Three Feathers produced by the South Slave Divisional Education Council. The film was shot in four different languages: English, Chipewyan, Cree and South Slavey. The result is a version of the film presented in each language. It is an incredible film to be a part of that highlights the diversity of Canada's North. Craig also shoots stock footage of the North: the NWT is a treasure trove of scenic beauty you won't find anywhere else.

Diavik Staff

Kyla Gray

I work for Diavik as the Environmental Coordinator. I have been with Diavik for four years. This is my first time at the TK camp. I am very excited to have been given the opportunity to participate. It has been great meeting the elders and youth from all the communities. I have learned lots. What I am taking away from this experience is having a greater understanding of the importance of taking the traditional knowledge alongside the scientific knowledge and working together to ensure the environment is taken care of.

We are proud to present our words, expertise, insights and observations contained within this report of the Aquatic Effects Monitoring Program held at Lac de Gras from August 2 to 6, 2018. We are the care-takers of this land. Quviahuktugut havaaptingnik auyaq, Aagasimi, 2018 mi Imarmik Atulirniagut Munaqhiyut Havaangit, katimahimayugut uvani Lac de Gras mi ilihimaptingnik uqaugigapta uyaraqhiuqtinut pimmaritquplugu imaq nunalu. Goyatı t'à naxìts'ats'edı gha mahsì ts'ı̨wǫ, asìı k'èts'ezhǫ ghà, nàowo k'èts'ezhǫ ghà eyıts'ǫ dìı la tı yìì tıch'àadìı nàdè wexòedı weghǫ dìı nı̨htł'è weyìì àtł'è, August 2-6 ts'ǫ̀, 2018 Ek'atì dìı weghǫ łegèadì, ndè wexòets'ıhdı dǫ ts'ı̨lı̨.

Signed this 7th day of December, 2018, in Yellowknife, NT. Atiliuqhimayut ublumi Disaippa 7 mi, Yalunaimi. Dìı 7th Dzę̨ę̀ k'e Tatı Zaà, 2018, Sǫǫ̀mbak'è, Edzanèk'e.

Abbreviations and Acronyms

AEMP	Aquatic Effects Monitoring Program
DDMI or Diavik	Diavik Diamond Mines (2012) Inc.
DFO	Department of Fisheries and Oceans
EMAB	Environmental Monitoring Advisory Board
IQ	Inuit Qaujimajatuqangit
KIA	Kitikmeot Inuit Association
LDG	Lac de Gras
LKDFN	Łutsel K'e Dene First Nation
NSMA	North Slave Métis Alliance
TG or Tłı̨chǫ	Tłı̨chǫ Government
TK	Traditional Knowledge
YKDFN	Yellowknives Dene First Nation

1.0 Introduction

1.1 Background

The Diavik Diamond Mine operates on Ek'a Tua/ ɔek'atì / Emakyuak / Imaryuaq / Ek'atı / Lac de Gras, approximately 300 km northeast of Yellowknife, Northwest Territories. For generations, Indigenous people have used this area for subsistence fishing and hunting, shown in Figure 2.1-1.

During the Environmental Assessment for the mine, and documented in the Comprehensive Study Report, Indigenous groups expressed concern that in-lake mining activities may adversely affect fish in Lac de Gras. In response, and as per subsection 35(2) 9 of the *Fisheries Act*, Diavik Diamond Mines (2012) Inc. (DDMI) in cooperation with Fisheries and Oceans Canada (DFO) and the five affected Indigenous organizations, developed a fish palatability and texture study to be carried out regularly on Lac de Gras according to both traditional knowledge and scientific knowledge. This became the foundation for the Aquatic Effects Monitoring Program (AEMP) TK Study.

A baseline palatability study was initiated in August 2002 to assist in detecting changes in the quality of the fish and to provide data for future comparison (DDMI 1998). This study involved catching, processing, tasting, assessing, and testing fish by the Indigenous groups whose traditional territories include Lac de Gras. In addition to this work carried out by community members, scientific analyses were conducted to evaluate sediment and water quality while fish samples were taken to monitor fish populations and indices of fish health. In 2012, the methods were redesigned and expanded to include more discussion, consideration, documentation, and integration of Traditional Knowledge (TK) as well as community consultation and engagement. The study was conducted each year between 2002 and 2007, and then every three years from 2009 through 2018. This work has been led by Hatfield Consultants Ltd. (DDMI 2003), the Environmental Monitoring Advisory Board (EMAB 2005; 2006; 2007) (Golder Associated Ltd. (Golder 2009) and Thorpe Consulting Services (TCS 2013; TCS 2015) on behalf of DDMI.

The scope of work in 2018 echoed that of 2012 and 2015 to include:

1. Planning session held in at the Trapper's Lake Spiritual Centre near Yellowknife on May 15 – 16, 2018, where participants reviewed the 2015 video, evaluation results and recommendations, field forms and fish processing procedures, and planned details for the upcoming camp.
2. AEMP TK Camp held on Lac de Gras from August 2 – 6, 2018.
3. Post-camp Verification Session held in Yellowknife on December 6 - 7, 2018 to review an earlier draft of the current report and rough cut of the video-documentary; provide input into report and video format and titles; and to make recommendations for improvements for 2021.

Figure 1.1-1 Map of Diavik Diamond Mine and Indigenous Communities

During the Planning Session, participants expressed their satisfaction with the approach taken in 2015 and recommended that the 2018 program follow the same format, with only minor changes to the nature of youth engagement and some of the tools developed to document knowledge. During the post-camp verification meeting held in December 2018, participants affirmed that they would like to see a similar approach continued for 2021 and beyond:

1.2 Objectives

The primary objective of the program was to facilitate a two-way flow of information, resources, and understandings between TK holders and scientists regarding the health of fish and water in Lac de Gras. The following methods were used to realize this objective:

1. Provide a forum for information exchange between community members, scientists and DDMI particularly around mining and environmental issues;
2. Engagement and capacity building opportunities for communities;
3. Community involvement in, and understanding of DDMI's monitoring programs;
4. Record relevant Indigenous cultural and language references, customs and stories;
5. Facilitate Elder-youth, cross-cultural and cross-discipline exchange;
6. Collect, record, discuss and verify shared TK;
7. Collect data in a standardized way such that data sets are comparable across years;
8. Include TK interviews relating to both water and fish; and
9. Identify and monitor indicators of water quality and fish health from a TK perspective.

While there are multiple documented scientific indicators for fish health (e.g., mercury levels in tissue) and water quality (e.g., pH and total suspended solids), it is not surprising that an analogue from a TK perspective (e.g., presence of cysts in fish, water that is "good for tea") is not as well documented. Accordingly, the AEMP TK Program provides a unique forum where TK plays a central role in strengthening the current monitoring program and better preparing DDMI, communities and others for managing resources during operations, closure and post-closure. Further, the AEMP TK Program format and results can be used for future guardianship programs led by Indigenous communities.

A key secondary objective of the AEMP TK Program was to meet requirements set out in the Fisheries Authorization for Works or Undertaking Affecting Fish Habitat (SC98001) (www.dfo-mpo.gc.ca/pnw-ppe/reviews-revues/application-eng.html) and is specific to the requirements listed below [underlining added for emphasis].

> ***9.1*** *Within two years of the issuance of this Authorization DDMI shall, in cooperation with DFO and affected First Nations groups, develop and conduct a 'Fish Palatability and Texture Study' to ensure that fish palatability and texture is not degraded by mining activities. Once the study methods have been finalized, testing shall be conducted to determine pre-mining conditions. Additional testing at a frequency of once every five years shall be conducted thereafter, unless DFO receives complaints of effects on fish palatability and/or texture in writing. In this case the frequency of testing shall increase as directed by DFO.*

9.1.1 *Fish tissue metal analysis shall be conducted prior to the fish being utilized for this study.*

9.2 *Where practical sampling of fish shall be coordinated with the monitoring of fish populations and indices of health as per Section 10.0, with the goal of reducing the number of fish sacrificed.*

9.3 *DDMI shall submit a report on the results of this study each year after the studies are conducted, unless otherwise agreed to by DFO.*

9.3.1 *Such reports shall also suggest mitigative measures which will be implemented by DDMI if the results show that palatability and/or texture of fish is being degraded by mining activities.*

1.3 Indigenous Group Participation

Each of the five parties to Diavik's Environmental Agreement selected Elders, youth and an interpreter (as required) to attend the camp:

- Kitikmeot Inuit Association (KIA)
- Łutsel K'e Dene First Nation (LKDFN)
- North Slave Métis Alliance (NSMA)
- Tłı̨chǫ Government (TG or Tłı̨chǫ)
- Yellowknives Dene First Nation (YKDFN)

Further to recommendations voiced during the 2015 AEMP TK Camp (see Section 5.0: Evaluation and Recommendations and TCS 2015), each party was encouraged to select both female and male Elder participants.

Georgina Chocolate, Narcisse Chocolate and Morris Martin attended the May Planning Session, but were unable to attend the August AEMP TK Camp. However, all of the Elders that participated in the August AEMP TK Camp attended the December Verification Session. In addition, Georgina Chocolate participated in the December Verification Session.

Collection of TK and facilitation of the study was conducted by Natasha Thorpe, Joanne Barnaby, Kathy Mai, and Colleen English (formerly with DDMI, now an independent consultant with C&E Consulting). Young people that attended from the communities also assisted in recording TK shared by the Elders. The aRTLeSS Collective film crew included Jay Bulckaert from Yellowknife, NT and Craig Kovatch of Hay River, NT. Onsite camp support from the DDMI Environment crew included Kyla Gray (Environmental Coordinator and health and safety (H&S) representative for the camp) who stayed at the camp for the duration of the study, as well as the following individuals who visited the camp intermittently and helped with boat shuttles, logistics and more: Atiken Hehn, Shelby Skinner, and Sean Sinclair.

1.4 Indigenous Terminology

Several important place names and terms for fish parts in each Indigenous language helped guide the discussions (see Table 2.4-1).

Table 1.4-1 Indigenous Terms for Fish Parts

Indigenous Terms for Fish Parts									
Indigenous Dialect	**Gills**	**Heart**	**Liver**	**Fin**	**Gall Bladder**	**Pyloris**	**Stomach**	**Guts**	**Scales**
Inuinnaqtun (old spelling / new spelling)	mahik	omat (uummat)	tingok (tinguk)	huluk	hongak (hungaq)	nigvik	akiagok (aqiaruq)	hunagak (hunagaq)	kapihik
Wıìlıìdeh Yatıì	łıwek'aà	łıwedzeè	łıwewò	łıwet'aà	łıwetł'òò	łıwets'ıì	łıwebò	łıwets'ıį	łıwet'ıì
Tłı̨chǫ Yatıì	łıwek'aà	łıwedzeè	łıwewò	łıwet'aà	łıwetł'òò	łıwets'ıì	łıwebò	łıwets'ıì	łıwet'ıì
Dené Sǫłıné	łuek'és	łuezıé	łueddhër	łuegháyé	łuetł'ézé	łue ts'ı	łuebér	łuechane	łuegǫ́dhé

Indigenous Terms for Fish Parts								
Indigenous Dialect	**Eggs**	**Head**	**Kidney**	**Swim Bladder**	**Intestine**	**Muscle**	**Skin**	**Anus**
Inuinnaqtun (old spelling / new spelling)	hovak (huvak)	niaquq	taktonak (taqtuk)	mamingoyak	ingaloak (ingaluaq)	nokik (nukik)	amik (amiraq)	Itik (itiq)
Wıìlıìdeh Yatıì	łıwek'į	łıwekwì	łıwets'oo	łıwet'ahsò	łıwets'ıì	łıwekwǫ̀	łıwet'ıì	łıwetsǫ̀
Tłı̨chǫ Yatıì	łıwek'į	łıwekwì	łıwets'oo	łıwet'ahsò	łıwets'ıì	łıwekwǫ̀	łıwet'ıì	łıwetsǫ̀
Dené Sǫłıné	łuek'uné	łuetthí	łuéts'ézé	n/a	łuéts'ıé	łuett'ı	łuedhéth	łuetthël

Note: Terms provided by interpreters during the 2015 December Verification Session and reviewed in Inuinnaqtun by Gwen Angulalik and Margo Kadlun; Wıìlıìdeh Yatıì by Maro Sundberg; Tłı̨chǫ Yatıì by Margaret Mackenzie and Dené Sǫłıné by Bertha Catholique.

Related Dene terms can be found in: http://www.ssdec.nt.ca/ablang/ablanguage/chiptionary/Chipewyan%20Dictionary.pdf; http://www.ssdec.nt.ca/ablang/ablanguage/lkchipdictionary/Chipewyan_Dictionary-Linked/Chipewyan_Dictionary.pdf; and Inuinnaqtun terms from: http://nbes.ca/wp-content/uploads/2014/03/inuinnaqtun_english_dictionary.pdf.

Although spellings differ in various sources, names for Lac de Gras include:

- EKatı or ʔek'adı, in Tłı̨chǫ Yatıì (Dogrib)
- Ek'atı in Wıìlıìdeh Yatıì
- Ek'a Tua in or Dënesųłiné / Dené Sǫłıné (Chipewyan)
- Emakyoak / Imaryuaq in Inuinnaqtun

This report consists of seven sections, including:

- Section 1.0—Introduction
- Section 2.0—Approach and Methods
- Section 3.0—Observations from Watching Fish and Water
- Section 4.0—Lessons

- Section 5.0—Storytelling, Traditional Knowledge, Reflections and Observations
- Section 6.0—Evaluation and Recommendations
- Section 7.0—Closing
- Section 8.0—References

The raw data (e.g., notes of activities, interviews, ratings, comments, discussions, and observations) collected before, during and after the AEMP TK Program/Camp as well as signed informed consent and photo release forms and completed evaluation forms are contained in the appendices of the full version of this report. Notes from the AEMP TK Camp were reviewed and verified by camp participants on the last day of camp during a site visit to the Diavik mine. It was not possible to verify notes from the Verification Session held in Yellowknife from December 6-7, 2018 so these are included in draft form. Photo collages and quotes from the planning and camp activities have been inserted throughout the report to illustrate key activities, interactions, concepts and themes.

The companion deliverable to this report is a video-documentary entitled *Our Youth, Our Future: Monitoring our Land, Water, Fish and Air* (aRTLeSS Collective 2018). The proposed video format was discussed with participants during the Planning Session and during the camp while a fine cut of the video was reviewed and finalized with participant input during the Verification Session. Note that the camp participants and authors of this report advise that it is important to consider this report in conjunction with the video and vice versa. The video can be viewed at: vimeo.com/artlesscollective/ouryouthourfuture.

2.0 Approach and Methods

2.1 Overview

The AEMP TK Program is grounded in a community-driven approach based on direction from Elders and traditional knowledge holders. The program continues to evolve and adapt to lessons learned from previous years, responding to community feedback. Communities have contributed to aquatic monitoring through several *Fish Palatability and Texture Studies* (2002, 2003, 2004, 2005, 2006, 2007, 2009, 2012, 2015) and *Water Quality Studies* (2004, 2005, 2006) (herein, Studies) and two film documentaries: 5 Days, 2 Ways, 1 Camp (Roaming Pictures et al. 2013: https://vimeo.com/62748395) as well as We Fish Today for Fish Tomorrow (aRTLeSS Collective 2015: vimeo.com/artlesscollective/wefishtodayforfishtomorrow) .

Through ongoing iterations of the program approach and format, community members have expanded the role of TK in aquatic monitoring during mine operations as well as in closure and post-closure. For example, feedback from participants and TK researchers in 2012 and 2015 led to slight changes in the forms used for documenting fish and water tasting, as discussed below.

As illustrated in Figure 3.1-1, key components of the 2018 AEMP TK Program approach included:

1. Communications and Engagement
2. Watching Fish: Fish Palatability and Texture Studies
3. Watching Water: Water Quality and Quantity Studies
4. Elder Interviews and Teachings
5. Excursions (Trips)
6. Documentaries

Capacity-building, communications and engagement continued to be critical and thus both permeated and surrounded all components of the AEMP TK Program. Watching water (fish palatability and texture studies) combined with watching water (the water quality studies) were at the core of the program. Participant interviews, excursions and a video documentary explored overall fish and water health as well as key topics of interest to participants.

Figure 2.1-1 Key Components of the AEMP

Capacity Building, Communications and Engagement

While youth training and capacity building has always been a key priority of the AEMP, Elders consulted in the Planning Session preferred youth to participate directly in fish and water processing as well as interviews rather than in filming. The Elders explained that having to film activities divided the attention and responsibilities of the youth in the field where the priority should be learning traditional skills from their Elders. Accordingly, a training program in video-documentary was not carried out as in 2012 and 2015. Instead, capacity building efforts focused on TK research methods (e.g., interviewing and note-taking skills), and scientific sampling methods for fish (e.g., tissues, fork length, weight, sex).

Throughout all phases of the AEMP, care was given to documenting and communicating TK according to standard and accepted protocols surrounding intellectual property rights and TK protocols specific to the five Indigenous groups. For example, protocols around respect such as feeding the fire and paying the water were taught by Elders and followed by participants. Elders encouraged youth to use tobacco in ceremony and to take a few moments to honour one another and the land wherever possible. Research protocols were also important. For example, prior to participating in AEMP activities, participants were either read aloud the informed consent form or given time to read it to themselves. Questions or concerns were addressed before all parties signed the agreement. Copies of these forms are included in Appendix 1.

Communications and engagement were frequent in the months leading up to the camp, throughout the camp and after the camp in order to allow participants to lead the approach and methods. For example, multiple emails and phone calls were made to participating groups asking for input and check-in sessions were held several times each day during the camp to allow for discussions, brainstorming and joint decision making on activities, protocols and priorities.

Watching: Fish Palatability and Texture Studies and Water Quality and Quantity Studies

Participants continued to test and refine TK indicators for healthy fish and water in the monitoring program, based on forms that were developed for the 2012 program.

Since they started in 2002, the Fish Palatability and Texture Studies were designed to document and incorporate TK of fish. This same standardized Fish Tasting form (Appendix 8) was used again in 2018 so that the multi-year data could be standardized and compared. However, based on feedback from Elders and other community members during community meetings held in the winter of 2011 and spring of 2012, the form was expanded to include possible questions about TK indicators. Thus, the original palatability and texture form was used in conjunction with the Fish Field Form (Appendix 7) and filled out through an interview process whereby youth assisted with semi-directed interviews with the Elders (Huntington 2000).

In carrying out the 2018 work, challenges in implementing a systematic approach to determining fish palatability and texture were experienced and discussed. In particular, inclement weather meant that most fish were caught from the dock at camp instead of in nets set at various locations in the lake. Likewise, water sampling locations changed due to safety concerns while on the water. Recognizing these challenges and finding solutions together are just some of the ways in which the group collaborated.

Feedback from participants in 2015 led to changes in the format of the *TK of Fish Field Form* in 2018 to make it easier to fill out while in the field (Appendix 4). No changes were made to the *Fish Tasting Form* (Appendix 4).

Likewise, the format of the *TK of Water Field Form* was changed to make it easier to fill out and to add the option of tasting 3 types of water: tea, boiled and cooled and fresh (Appendix 5). The *Water Tasting Form* was also modified (Appendix 5) for ease and readability.

Interviews, Excursions and the Video Documentary

Interviews held throughout the camp formed the narrative of the video-documentary and allowed for each Elder to have one-on-one time to speak on matters of importance. In addition to these interviews, each Elder provided their comments and expertise during fish and water sampling. Storytelling while on excursions supplemented the data collection taken in camp. Production of a video-documentary is a key deliverable of the AEMP TK Program that aims to include as many community members as possible in a user-friendly and engaging way

2.1.1 AEMP TK Program Phases Overview

The process of the AEMP TK Program is comprised of three key phases:

- Planning Session
- AEMP TK Camp
- Verification Session

Each of these phases is outlined in Table 2.1-1 and discussed in the following Sections.

Table 2.1-1 2018 Activities, Data, Purpose and Outcomes

Dates	Event	Data	Purpose	Outcome(s)
May 15 to 16, 2018	Planning Session for AEMP TK Camp in Yellowknife	• Planning Session Agenda and Presentations (Appendix 2) • Daily Notes of Planning Session (Appendix 3) • Fish Inspection Forms from Planning Session (Appendix 4)	• Review what happened in 2015 AEMP TK Camp • Plan for next camp in August 2018 • Practice processing fish	• Agreed on priorities and activities for 2018 AEMP TK Camp • Reviewed methodology (e.g., considered tasting tea and water instead of just tea) • Practiced documenting information on forms and in notes • Addressed initial questions and concerns (e.g., youth to focus on AEMP activities rather than filming)
August 2 to 6, 2018	AEMP TK Camp at Lac de Gras (Daily Schedule in Appendix 5)	• Daily Notes of AEMP TK Camp (Appendix 6) • Fish Inspection Forms (Appendix 7) • Fish Palatability Forms (Appendix 8) • Water Quality Forms (Appendix 5) • Interview Transcripts (Appendix 6) • Breakout Session Transcripts (Appendix 6) • Evaluation Forms (Appendix 3)	• Collection of TK and scientific data on health of fish and water • Elder-youth connection and knowledge exchange • Intercultural experience and exchange (including ceremonies, and storytelling) • Teach youth important lessons (see Table 3.3-1)	• Completed Fish Field Forms • Completed Water Field Forms • Completed Fish Palatability Rating Forms • Provided comments and observations as part of Tea Test • Shared stories and cultural experiences • Taught lessons in building a drying rack, knife sharpening, making bannock, identifying plants, making and using jiggers • Completed excursion to the Narrows
December 6 to 7, 2018	Verification and Finalization Meeting in Yellowknife	• Verification Session Agenda and Presentations (Appendix 7) • Daily Notes of Verification Session (Appendix 7) • Signed Verification Forms (Appendix 7)	• Present and seek feedback from communities to support finalization of report • Gather evaluative feedback to plan for 2021 activities • Present and review fine cut documentary video with communities	• Finalized video and report • Documented questions, comments, and revisions of results • Corrected, verified, and finalized TK contributions • Completed 2018 studies and activities evaluation process • Prepared recommendations for future AEMP activities

2.2 Planning Session

A key element of success in the AEMP TK Program is to have a two-day Planning Session where participants can meet one another before going on-site not only so that they get to know one another, but also so that they review results from previous camps and share thoughts about future camp agendas, activities, logistics and lessons to teach. Thus, a Planning Session was held in Yellowknife from May 15-16, 2018. The Planning Session agenda and presentation are included in Appendix 2 along with key ideas developed and results from the evaluation. The following Elders participated in the Planning Session:

- Bobby Algona, Nancy Kadlun (Kitikmeot Inuit Association)
- Doris Terri (Terri) Enzoe (Łutsel K'e Dene First Nation)
- Wayne Langenhan (North Slave Métis Alliance)
- Narcisse Chocolate, Julie Wedzin, Georgina Chocolate (Tłı̨chǫ Government)
- Jonas Sangris, Morris Martin (Yellowknives Dene First Nation)

The Planning Session began with an overview presentation outlining previous camp activities, outcomes and evaluation results. Next, the group discussed the protocols around the main elements of the camp: testing and tasting both water and fish, key elements of interviews and possible trips/excursions. The group made a key change to the water sampling protocols in response to recommendations from past participants: to taste water in addition to tea, specifically, water straight out of the lake (i.e., unboiled) and water boiled then cooled. They recommended that water sampling take place at least twice with one location in deep/clean water and another at the North Inlet discharge and, if possible, near the ice road. A suggestion to collect ice late in the season so that people could taste water at the camp was noted.

Session participants also discussed the fish sampling protocols and practiced preparing and inspecting fish (provided by Shawn Buckley of Hay River) and using the fish and water quality field forms. Along with filleting knives, one participant brought an electric filleting knife which turned into a great moment of teasing and laughter. A suggestion to add more organs to the fish form was made and the form was subsequently revised.

Participants voiced their ongoing support for one-on-one interviews and did not make any suggestions to change the interview format other than requesting more youth participation. There was some debate as to what possible trips / excursions that camp participants might take ranging from walks to explore vegetation adjacent to the camp to boat trips to the Narrows or around East Island. There was a very strong interest expressed in visiting the Narrows.

After reviewing the protocols and making suggestions about the camp agenda and excursions, the group then considered previous feedback about the AEMP. The AEMP is founded on an intensive evaluation process whereby participants discuss and complete an evaluation form for every meeting, Planning Session, workshop or on-the-land camp. Results from this evaluation process feed into ongoing efforts to respond to community direction and modify the AEMP process accordingly. During the Planning

Session, recommendations shared during the evaluation process for the camps held in 2012 and 2015 were reviewed and new suggestions put forth. Together, this input helped the group to better prepare for the August camp.

Responses to the question "do you feel there was anything missing from the camp?" asked during the 2015 camp evaluation were reviewed in detail. In particular, the group discussed the importance of more youth involvement; more time for an optional on the land activity; and eating more fish, berries and working with the cook to teach some dishes to the youth. Participants provided recommendations on how the upcoming camp should be carried out ranging from small suggestions through to possible locations where fishnets should be set and a trip to the Narrows. A request for broader distribution of the video was made.

Participants spoke of the importance of youth and their desire to teach youth as much as possible and to encourage them to have more of a role on screen in the video-documentary. Elders also felt strongly about discouraging youth from having digital devices at the camp so that they could be less distracted. In the words of anonymous participants who completed an evaluation form during the Planning Session:

> In the future, we are teaching the young people so they can learn and teach the younger people after them. So that in the future our young people can learn how to say prayers and be strong in spiritual way of our traditions, language. Me, as an Elder, need to teach more about drugs and alcohol and to teach them about this too in the future.
> - Anonymous, Planning Session, May 16, 2018

> I would like to share more for the upcoming camp. Share Elders knowledge, trails, plants, medicine and caribou programs . . . Circle talk in the evenings. Show more youth working on cutting up fish. The youth can tell stories of their own experience . . .. Tell the youth to talk to Elders, ask a lot of questions.
> - Anonymous, Planning Session, May 16, 2018

During the Verification Session, participants again discussed the importance of speaking in their Indigenous languages. It was expressed that teachings in English aren't as powerful:

> If I was saying it in my own language, maybe my voice would be stronger than in English.
> - Terri Enzoe, Verification Session, December 6, 2018

Finding ways to support and encourage youth dominated much of the discussion during the Planning Session and is testament to the deep caring Elders have for their youth and for the future.

> During the winter months I teach the youth how to check nets and how to tie and untie the rope and put the fishnets out. I continue to teach those things. It will be good for the youth that are involved today to learn as much as they can for these elders. That is what we are here for, to learn from one another. It would be good for the youth to learn how to make dry fish. I better keep some stories for tomorrow. You'll be laughing.
> – Julie Wedzin, Daily Notes, August 2, 2018

Elders volunteered to teach the following sessions at the camp and delegated who would teach which lesson:

- Plants and traditional medicines
- Plant habitats and connections/links to wildlife
- Tying knots
- Preparing fish with a focus on “learning by doing” as well as proper ways to store and freeze fish
- Traditional rules and protocols around respect and caring for the land, water, earth
- Reading the sky, clouds, predicting weather, safety
- Tool making (jiggers)
- Knife sharpening, making bannock, and using jiggers

2.3 AEMP TK Camp

2.3.1 Overview

The 2018 AEMP TK Camp was carried out from August 2 through 6, 2018 on the southeast side of Lac de Gras approximately 2 km from the Diavik mine site (Figure 3.3-1).

Participants who attended the camp on the shore of Lac De Gras were as follows (where E = Elder; Y = Youth and I = Interpreter):

- Bobby Algona (E), Nancy Kadlun (E), Regan Adjun (Y)—Kitikmeot Inuit Association
- Ernest Boucher (E), Doris (Terri) Enzoe (E), Eric Marlowe (Y)—Łutsel K'e Dene First Nation
- Wayne Langenhan (E)—North Slave Métis Alliance
- Julie Wedzin (E), Mason Beaverho (Y), Peter Huskey (I)—Tłı̨chǫ Government
- Jonas Sangris (E), Zachary Sangris (Y) - Yellowknives Dene First Nation

Although one youth from each group was invited, only four youth were available to participate.

As expected, the day-to-day schedule at the AEMP TK Camp was revised based on weather conditions, (Appendix 3). Key events carried out during the camp included:

- Checking, sampling and tasting fish (fish health and palatability) according to TK indicators and science (Appendix 4)
- Checking, sampling and tasting water (water quality and taste) according to TK indicators and science (Appendix 5)
- Excursions on-the-land and to the Narrows (Appendix 6)
- Recording a video-documentary
- Carrying out interviews (Appendix 6)
- Honouring cultural practices and ceremonies
- Preparing for health and safety.

Notes of daily activities and interviews are provided in Appendix 6.

Figure 2.3-1 Camp Life Photo Collage

2.3.2 Watching Fish: Checking and Tasting Fish

The Fish Palatability and Texture Studies for the 2018AEMP TK Program considered both TK and scientific sampling in a manner consistent with AEMP sampling procedures and previous AEMP TK studies, with modifications as noted. Elders participated in collecting both scientific and TK information.

The TK component focused on traditional means of measuring fish health such as the girth, colour of the gills, firmness, presence of deformities, cysts or parasites. Indicators of healthy fish according to TK were documented using the Fish Quality Form (Appendix 4). Fish were cooked and tasted as another means of evaluating health.

The scientific component included fork length and weight, samples required under the regulatory licensing, and appropriate analytes were compared to fish consumption guidelines.

2.3.2.1 Setting and Retrieving Nets

Inclement weather resulted in safety concerns that meant that camp participants were unable to use multiple net sets to catch fish, as had been done in previous years. Instead, there was only one net set of a 3.5-inch nylon gill net, 50 metres (m) in length for approximately six hours on the fourth day of the camp. To compensate for the inability to set nets, most fish were caught were by rod and reel off the dock adjacent to the camp (summarized in Table 3.3-1 and shown in Figure 3.3-1).

Table 2.3-1 Net Setting and Retrieval

Set/Retrieve	Date (Time)	Location	Participants	Details
Net Set 1	August 5 (9:10 am)	Site A: Northeast of camp, NAD 83 538332W, 7152323N (anchor point on shore)	Bobby, Ernest, Mason, Jay, Colleen (1 boat)	Depth of net: 1 m(start) to 15.3 m (end). Set off a point of an island, tied to shore and extends to deep water channel, location set in consideration of wind direction, have set nets here in past
Net Retrieval 1	August 5 (3:31 pm)	Site A: Northeast of camp, NAD 83 540725W, 7152638N	Bobby, Regan, Uyarrai, Ernest, Wayne, Zach, Jay, Natasha (two boats)	Caught 6 fish total, including 5 lake trout and 1 lake whitefish

On the way out to set the net, Bobby identified an old traditional campsite that is now covered by a large patch of fireweed. It was on the south shore at coordinate 539602, 7152629. Bobby and Ernest discussed going to a place where there were two islands that create a narrow channel where the current could run in either direction, depending on the wind, and is a popular area for fish to pass through. As soon as we approached the island, Bobby and Ernest looked around and both identified the exact same spot at which to set the net. Bobby noted that pressure in the air can make currents stronger and that sometimes Inuit use the gut contents from a fish to determine where to set nets in the future. Ernest tied the net line to a large boulder on the shore of the island. Bobby noted that Inuit do not set nets this way; they use two buoys and fully suspend the net in the water, and the net will arc with the current of the water.

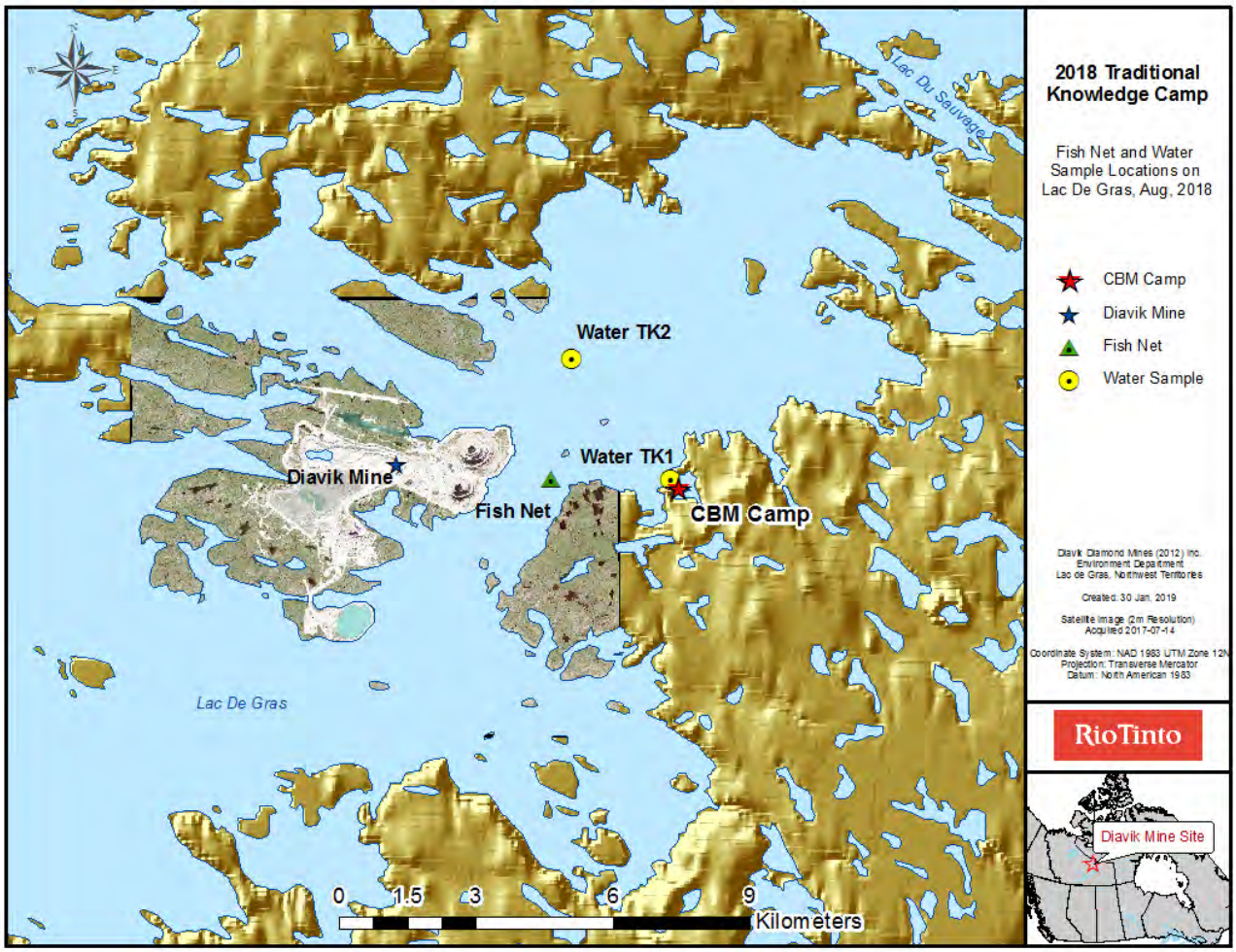

Figure 2.3-2 TK Study Fishnet Set Location and Water Sample Locations

2.3.2.2 Processing Fish

Youth, Elders, and the fisheries biologist (Kathy Mai) processed the fish on a sterile table as they were caught. In order to evaluate fish texture, questions were posed to Elders during the processing that related to TK indicators of body condition, size, morphology, robustness, and other variables. This questioning was led by youth according to the TK of Fish Form which systematically encouraged people to assess the external and internal characteristics of each fish. Scientific records around species, fork length, weight, life history, sex, stomach contents, condition, etc. were documented for each fish. Together, this joint process formed part of the TK, capacity-building and training components of the program. Elders commented on the shape, girth, scales, fat content, eggs or milt, organs (e.g., heart, liver, kidney, pipe, etc.) as well as the presence or absence of parasites, cysts or worms.

People preparing the fish or observing and talking around the processing table linked these observations to ways of living and cultural rules. While interviews carried out during fish preparation led to the documentation of more qualitative-types of information, informal discussions over breakfast or around the fire during the evenings were also held where stories and customs about fish and/or the aquatic environment were shared. The Elders were invited to recount these stories more formally during a recording / interview session held with everybody at one point during the camp (Section 3.3.6).

Kathy demonstrated how to measure fish, take tissue samples for metals testing and otoliths (a bone used to age fish), and otherwise provided opportunities for youth to develop sampling skills and learn to observe and record fish health from a scientific perspective. Some camp participants had extensive experience with scientific sampling of fish and they also stepped up to work with Kathy. Elder Nancy Kadlun took a particular interest in learning how to retrieve otoliths and worked late into the night on several occasions alongside Kathy to secure samples.

> It is a holiday for me. I learned a lot about the fish work and taking out the otoliths.
> - Nancy Kadlun, Daily Notes, August 6, 2018

As in previous years, Elders and youth worked beside the fisheries biologist to catch, assess, clean and prepare multiple fish for comparison purposes and palatability and texture analysis. In addition to the fish tasting, DDMI formally sampled 15 lake trout for metal concentrations in the tissue and otoliths for aging. This included samples from the fish that underwent taste testing by community participants. A total of 36 fish were caught.

In terms of better understanding fish according to TK, the Elders provided lessons in the field, explaining what to look for in a healthy fish while cleaning. A copy of the fish data sheets and TK field forms are provided in Appendix 4. A total of 19 TK forms were completed for fish.

Figure 2.3-3 Fish Sampling Photo Collage

2.3.2.3 Tasting Fish

Four lake trout were cooked and tasted by community participants for the official palatability test. Each fish was prepared in one of four different ways, with careful attention to repeating preparation methods from previous years. A record sheet for assessing the quality of fish consumed (Appendix 8) was completed by each community group for each fish that was cooked. As in previous years, the ratings were as follows:

1. This fish tastes excellent and tastes better than fish we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat.
3. This fish tastes okay but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We would not eat this fish.

Participants evaluated the fish during preparation in relation to TK indicators and rated the taste of the fish they ate in terms of the quality of fish they are used to catching, both in previous years at Lac de Gras and in their home regions. The rating system for taste was developed by communities during the first year of the fish palatability study in 2002 and has been used consistently since that time.

- **Baked** in the camp kitchen oven (Lake Trout #28) by Nancy Kadlun (KIA)
- **Fried** with Tenderflake lard in a pan over the fire (Lake Trout #29) by Julie Wedzin (TG)
- **Boiled** in a pot of water on the camp fire (Lake Trout #27) by Jonas Sangris (YKDFN)
- **Grilled** over the fire (Lake Trout #26) by Terri Enzoe (Tłı̨chǫ)

All four fish were caught, prepared and tasted on the same day, August 5, 2018. The youth, with assistance from Joanne Barnaby, Colleen English, Kathy Mai and Natasha Thorpe, asked questions of Elders from each Indigenous group to rate and document comments for each of the four prepared fish. Elders from the five Indigenous groups completed a total of 20 fish palatability / tasting forms (Appendix 4).

Figure 2.3-4 Fish Tasting Photo Collage

2.3.3 Watching Water: Checking and Tasting Water

The Water Quality and Water Quantity Studies for the 2018 AEMP TK Program considered both TK and scientific sampling in a manner consistent with AEMP water quality sampling procedures and previous AEMP TK studies. Elders participated in collecting both scientific and TK information.

The TK component focused on a range of measures from taste, colour, clarity, temperature, and shoreline/reef characteristics to traditional means of measuring water quality such as smell or the presence of surface film. Indicators of healthy water according to TK were documented using the Water Quality Form, which was adjusted slightly further to suggestions made at the Planning Session (Appendix 5).

The scientific component included similar samples as required under regulatory licensing and appropriate analytes were compared to water quality consumption guidelines and/or Diavik's water licence discharge criteria.

2.3.3.1 Water Quality Sample Locations

Participants discussed water quality sampling site locations while consulting a map and inquiring about how sample locations were selected in the past. However, owing to inclement weather, the decision was made to sample just off the dock at camp as well as opportunistically during the trip back from the Narrows (Figure 2.3-1, Table 2.3-2). The group wanted to sample in the same locations as 2012 and 2015, in part to respect the decisions made by previous participants as well as the community members that advised DDMI where to sample when the water sampling first began (i.e., in the 1990s). The recommendations from the Planning Session to sample near the North Inlet and, if possible, near the ice road as well as one location in deep/clean water were taken into consideration (Table 2.3-2). However, high winds upwards of 30 kph as well as rain and lightning warnings were present for much of the camp and prevented this repeat sampling.

Table 2.3-2 Water Quality Sampling Sites

Site	Date (Time)	Location	Participants	Details
TK1	August 4 (10:07 am)	Bay: Northeast of camp, NAD 83 540963W, 7152329N	Bobby, Kyla, Joanne	Water quality sample taken at 2 m depth; tasting samples taken at 1 and 4 m depths; maximum depth in sample location was 4.4 m
TK2	August 4 (4:50 pm)	Depth: Northeast of camp, NAD 83 541087W, 7152307N	Everybody	Water quality sample taken at 20 m depth; tasting samples taken at 2 and 20 m depths; maximum depth in sample location was 24 m

Samples for TK monitoring were collected from both areas at two depths, close to the surface and close to the bottom. There was one boat used for the first water quality site visit (TK1). There were three boats used for the second water quality site visit (TK2) on the trip back from the Narrows and Elders

alternated between observing and practicing, with youth leading the sampling efforts. Notes taken during sampling are included in Appendix 5.

2.3.3.2 Water Quality Testing Methods

DDMI Environment staff and Colleen English led capacity building and training for the water quality work. Lessons were provided for how to measure water quality, and both Elders and youth practiced various sampling techniques, as detailed below (Table 2.3-3) (Figure 2.3-5). Participants conducted scientific monitoring at both of the selected water quality sample sites. Some water sampling techniques were only demonstrated for practice, due to the limited time available at each site and the unpredictable weather.

Kyla Gray and Colleen English provided an overview of the water quality testing program, equipment and safety measures for working with the equipment. They explained that the scientific water quality testing occurs twice per year, including auguring through the lake ice to test water quality in spring as well as during the summer when there is no ice. On average, it takes environmental technicians 1 to 1.5 weeks to sample all the sites. There is no sampling of sediments in the winter (only summer) and a more 'comprehensive program' is conducted every 3 years.

At each AEMP water quality sampling location (see Figure 3.3-3, Figure 2.3-5 for locations), DDMI environmental technicians start with Hydrolab measurements, which includes dissolved oxygen, turbidity, total suspended solids, conductivity and pH at different depths. Once the Hydrolab has been lowered into the water 1m from the bottom, readings are recorded every 2 m (6 ft). The second piece of water quality sampling equipment is called a Beta Bottle, which is used to collect water samples at three different depths, including 2 m (6 ft) from the top, middle, and 1 m off the bottom of the lake. These samples are sent off to Maxxam Lab in Edmonton for testing for metals and nutrients. There is also a lab at the mine site, where DDMI does it's own testing for a few of the same parameters as the lab in Edmonton, in part for quality control and to have more immediate results.

The third water quality testing equipment is a Secchi Disk, which measures the depth at which light (i.e., the sun rays) penetrates the lake. During the 2015 camp, Dianne Dul noted that the average depth with the Secchi Disk in Lac de Gras is 10 m (30 ft), but may be up to 15 m (45 ft) on sunny days (TCS 2015). This is the depth at which algae and phytoplankton (very small plants that live in the water column) exist. Kyla demonstrated how to use the Secchi Disk.

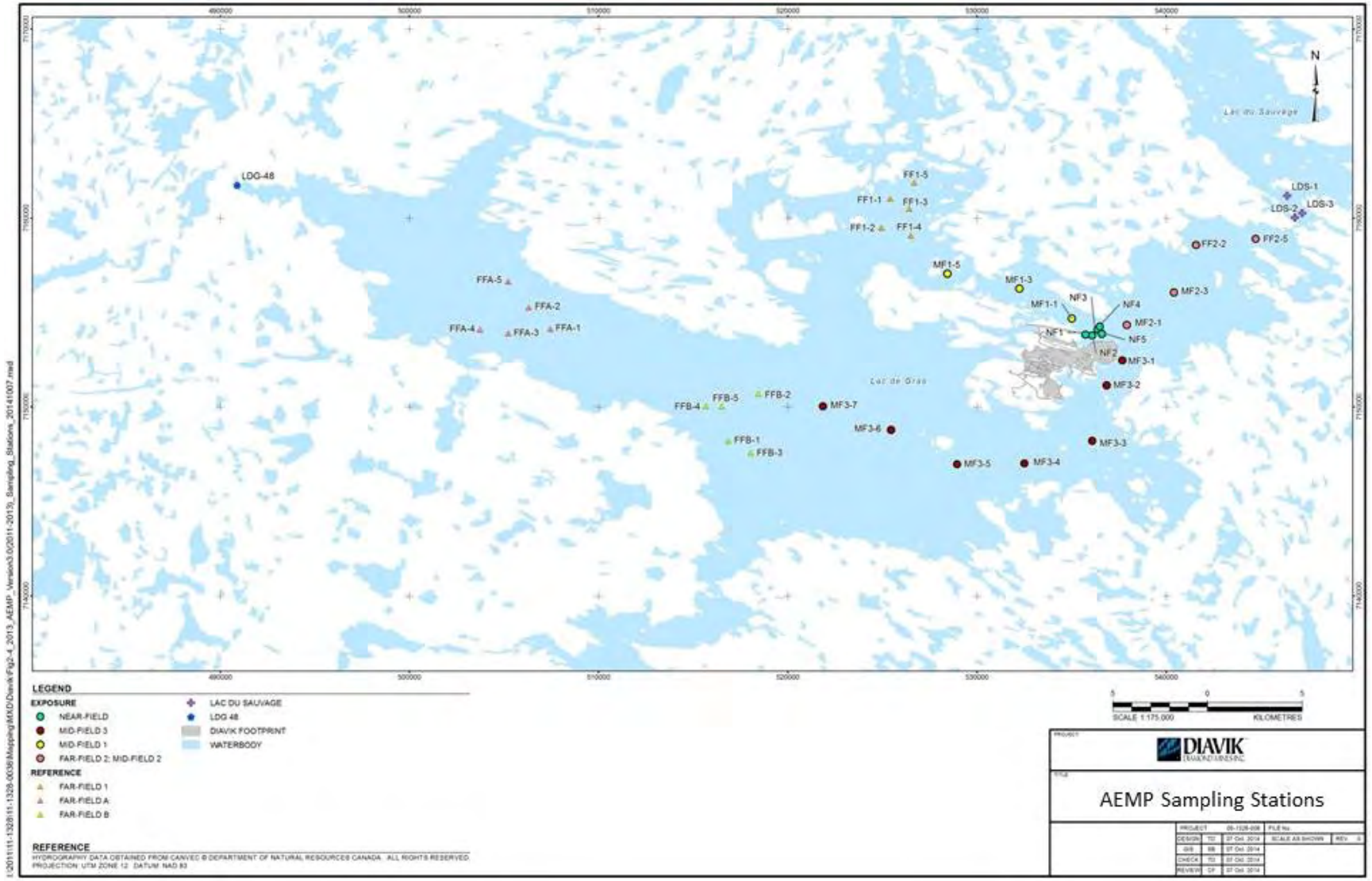

Figure 2.3-5 AEMP Water Quality Sampling Locations (2018)

The next piece of water quality testing equipment is called a Zooplankton Net, which is dropped to 1 m off the bottom of the lake and zooplankton (very small animals that live in the water column) are collected into four different bottles. The sixth type of equipment is a KB Sediment corer, which is a heavy piece of equipment that sinks into the bottom of the lake to collect sediment samples. Samples are collected and sent to a lab in Edmonton to analyze the top sediment layer for metal and chemical content. The last piece of water sampling equipment is called an Eckman Grab. It collects benthic invertebrates from the lake bottom. The lab analyzes the types and numbers of benthic invertebrates, or benthics, which are bugs/organisms that live in or on the bottom sediments of a lake or river and are an important source of food for fish. In summary, the following sample types were demonstrated to camp participants.

Table 2.3-3 Water Quality Sampling Methods/Types

Sample Required	Sample Type
Water Quality	Water samples at various depths with BetaBottle
Nutrients Chlorophyll a Phytoplankton Species (taxonomy)	Composite (mixed), depth-integrated from top 10 m of water column, throughout depth where sunlight reaches; sampling technique demonstrated and practiced; samples not collected
Zooplankton – number (biomass) and species (taxonomy)	Depth-integrated with bottom of net being 1 m off bottom substrate, Duplicate samples, composite of 3 tows; sampling technique demonstrated and practiced; samples not collected
Benthic Invertebrates	1 Composite (6 grabs) OR 6 individual grabs – Ekman; sampling technique demonstrated and practiced; samples not collected
Sediment Samples (lake bottom)	1 Composite (3 cores), using only the top 1 cm of lake bottom sediments; sampling technique demonstrated and practiced; samples not collected

While scientists provided an overview of the water quality sampling methods and equipment, the Elders noted the importance of paying respect to the water and made sure to give tobacco to the water at the dock before leaving for the water quality testing site. At the same locations where water quality samples were taken for scientific analysis, large jugs of water were filled and taken back to shore to be used for tasting.

2.3.3.3 Water Quality Tasting

During the Planning Session and in response to suggestions made by participants in the 2015 AEMP TK Camp, the group decided to taste water in three different ways:

- Cold water (straight from the lake)
- Boiled water (straight from the lake, boiled and then cooled)
- Tea (straight from the lake, boiled into tea)

Everybody tasted each type of water from each site, at two depths per site, for a total of 12 tastings.

Tea was made from water collected from the two water quality testing sites (TK1 and TK2) visited by camp participants. Four separate pots of water samples were labeled and boiled with the same number of Red Rose tea bags. Some pots were boiled on the kitchen stove while others were heated on the fire. The four pots of tea represented water samples from two locations and at two different depths per location. The tea was evaluated using the TK field form and questions based on TK indicators for water quality, as developed by community members in 2012. The questions asked included:

- How does the tea/water taste?
- How is the clarity?
- How is the after taste?
- Is there a residue?

The camp participants gathered around the fire and cups of tea and water were ladled for each camp participant one sample at a time. New cups were provided for each sample. Youth and researchers documented the observations of Elders from each Indigenous group for each sample (Appendix 5). Unlike in 2015 and 2012, the camp participants were aware of which sample came from which site. This meant that this was not a blind taste test and that some bias may have influenced the comments.

2.3.4 Trip to the Narrows

In response to requests made during previous years, a key highlight of the 2018 AEMP was an excursion to the Narrows where Lac du Sauvage flows into Lac de Gras. The Narrows is a well-known archaeological and traditional use site, primarily as it is an important caribou crossing. The winds relented for a short period during the afternoon of August 4, 2018, to allow for everybody to visit the Narrows. The lead boat navigated with the help of Elders guidance and charts while two smaller Lunds followed. The group spent just over an hour exploring the site until changing weather forced a return trip earlier than hoped. While at the Narrows, people picked berries, carried out interviews and otherwise explored caribou trails and signs of their ancestors such as cairns, caches, and tent rings. On the way back from the Narrows, the TK2 water sample was taken (Figure 2.3-1). Notes from the Narrows are included in Appendix 6.

2.3.5 Video Documentary

While DDMI is required to produce multiple reports in order to satisfy regulatory requirements (e.g., annual AEMP and wildlife monitoring reports), written reports may not be the best way to provide information to Indigenous communities grounded in oral tradition. Indeed, during the Verification Session, several participants emphasized how much they appreciated the videos over the reports.

aRTLeSS Collective, local experts in video-documentary making, took footage including techniques used for sampling fish and water, Elder interviews, storytelling, traditional fish processing and preparation, youth reflections and more. Youth were invited to learn about shooting video while in the field, but unlike previous years, they were not formally trained in video-documentary making. Ultimately, both a short and long film detailing the camp were produced by aRTLeSS Collective for sharing through websites and distributing to communities (vimeo.com/artlesscollective/ouryouthourfuture).

2.3.6 Interviews

Throughout the AEMP TK Camp, individuals from each Indigenous group were invited to participate in an individual or group interview to share whatever they wanted on video, over and above the video-documentation that occurred during the fisheries and water work. Both during the scientific sampling and traditional fish processing, youth were tasked with interviewing their Elders based on questions that they developed in addition to those they were following on the questionnaire (Appendix 6). A semi-directed interview approach was used. Interviews were carried out with all participating Elders and youth along with the fisheries biologist. Individual interviews were conducted with the Elders while youth were interviewed together.

Audio and video recordings as well as interview transcripts were backed-up nightly. Video recordings were transcribed professionally. Once verified and finalized, transcripts and raw footage were provided to each Indigenous organization (Appendix 6). Excerpts from the interviews relevant to fish and water have been inserted into the report to provide additional information and insight into key themes and issues related to aquatic effects monitoring.

2.3.7 Evaluation

An evaluative process for the AEMP TK camp consisted of a closing circle comment session as well as a hard copy evaluative form that participants filled out anonymously for each meeting. A final closing circle held during the Planning Session, camp and verification meetings provided a forum for reflection. While people were still sitting around the fire, they shared particularly heartfelt and relevant recommendations and comments. This feedback combines with input from previous camps to direct the nature, quality, and content of future initiatives (Appendix 3).

2.4 Verification Session

A verification workshop was held on December 6-7, 2018 in Yellowknife to present preliminary results and to allow for meaningful community review of both the video-documentary and report. Participants met again to continue to foster relationship building, reflect on their experiences and provide input to draft materials (e.g., author bios, interview notes, photo collages, report content, titles and dedication). Everybody from the camp participated in the Verification Session, except for the youth who were back in school or at work (refer to participants listed in Section 2.3.1). Georgina Chocolate also participated after having attended the Planning Session but not the camp. Interpretation was provided by Peter Huskey. The Verification Session agenda, notes and evaluation forms are included in Appendix 7.

This gathering provided further opportunity for community input about how to improve the AEMP TK program. In particular, the group reviewed the field forms and made suggested edits that will be incorporated for 2021. During the session, a slideshow of photos was presented and an enlarged photo of the camp participants was gifted. After the draft report and video were reviewed together, the camp participants signed the verification forms and the author signature page included in the front matter of this report.

3.0 Observations from Watching Fish and Water

> We are not biologists but we are aware that you will test it scientifically for those things that we are not aware of. How do you feel watching me prepare a fish? Everyone here is preparing their fish well. I feel good about that. We may not be coming from the same community but I've been working with fish for 40 years. I want to cook this middle section of the fish on the grill. I just want to keep it in water until we put it on the grill. It is my first choice, it smells healthy, it smells good. Masi.
> - Julie Wedzin, Daily Notes, August 5, 2018

This section shares the extensive and rich teachings provided by Elders during the AEMP TK Camp organized into different themes including:

- **Section 3.1** provides an overview of the level of effort and outcomes of the various activities at the camp, such as fish inspections, palatability and water quality testing.
- **Section 3.2** delves into the activities related specifically to fish and fish habitat, including summaries of observations and outcomes of the fish inspections, palatability testing, and scientific lab results.
- **Section 3.3** outlines the results of the water quality observations and tea tasting.

3.1 Overview

> Q. So if the fish could talk what would you expect to hear?
> I would expect something happy. I would expect them to be happy with the progress that we're making. Especially when it meets drinking water levels and the depth of the lake and how deep it is and clear it is and that we could just like grab a cup and like grab a scoop of water and be able to drink it and, pretty much the fish in it, eat from it.
> – Zach Sangris, Interview, August 5, 2018

During the 2018 AEMP TK Camp, Elders and youth representatives as well as scientists gathered, prayed, ate, inspected fish and water, shared TK, learned from and taught one another, told stories, built relationships, and "saw with their own eyes" the current state of fish and water in the Lac de Gras area. In summary:

- A total of 36 fish were caught in two locations. Of these, 35 were Lake Trout, 1 was a Lake Whitefish.
- 4 fish (Lake Trout #26, 27, 28, 29) of the 36 fish were selected for processing and tasting using TK and scientific measures. A total of 19 TK Fish Field Forms were filled out with specific observations of the internal and external conditions of the 4 fish. At the same time, a scientific form was completed that included weight, fork length, species, sex, life history, age structure, stomach content and condition.
- 4 fish (Lake Trout #26, 27, 28, 29) were prepared and rated for taste, and tissue samples were taken from each for scientific analysis. The palatability study involved preparing the 4 Lake Trout using four different cooking methods (i.e., frying, baking, boiling, and grilling) and consuming and rating these fish. A total of 19 fish palatability comment forms were completed for these fish by all of the Indigenous groups (KIA did not complete a palatability for form LKTR #26).

- Elders spent multiple hours in boats observing and/or assisting a DDMI Environment Technician to collect water samples. Two water sample sites were visited, with all participants present at the second sample site. Some TK notes were taken in boats and waypoints and other scientific data were recorded.
- Elders tasted two different water samples from each of the two water quality sampling sites. These were collected from near surface (1-2 m (3-6 ft)) and near the bottom (4 and 20 m (12 and 66 ft)) below surface. Tea was made from each sampling site (and depth). TK comments and observations from Elders were documented for each sample. Scientific samples were sent off for water quality analysis.
- A total of 14 TK interviews and/or storytelling sessions were recorded on film and documented with notes for individuals from all five Indigenous groups.
- There were 3 topic-specific discussion groups based on interests of the group (e.g., plants and berries).

Detailed notes and data recorded during each of the activities were compiled to capture observations made by each Indigenous group. From this information, several overarching themes and outcomes emerged, which are presented in subsequent subheadings. Together, these insights provide an understanding of the status of fish and water quality in Lac de Gras adjacent to the Diavik Diamond Mine in 2018. These insights also highlight the opportunities for and challenges in achieving intergenerational, intercultural, and interdisciplinary collaboration. A key theme for 2018 was to celebrate youth and empower them to participate.

These activities and events underscore the importance and success of a community-based, participatory approach to the AEMP TK Program and Camp. Participants celebrated the present versus past approach to mining operations and monitoring whereby Indigenous groups are more involved in managing and monitoring their land, water, fish and air.

3.2 Fish and Fish Habitat

3.2.1 Inspection

Elders gave a cursory review of the 32 fish caught off the dock or in the net and a detailed inspection of an additional four fish, naming the fish parts in their languages (Table 3.2-1, Figure 2.3-3). By examining the fish both externally and internally, the fish were said to look “healthy”, “good”, “very healthy” and “typical.” However, Elders raised concerns about several instances of cysts and worms common to northern lakes that seemed to be more plentiful this year than in previous years.

> I was pretty pleased about the health of the fish. I mean, there, most of them are really healthy, or most of them, yeah. There are some that have like white spots but other than that they're mainly healthy which we're all, we're all happy about. As long as the water's being taken care of, the fish are being taken care of, the land, that's our main concern is, as Dene people.
> – Zach Sangris, Interview, August 3, 2018

In their evaluations, camp participants assigned ratings (mostly out of 3 with higher ratings generally considered "better") to girth, gill colour, firmness, tissue consistency, and edibility of the fish inspected (Table 3.2-2, Appendix 4).

Most qualitative responses and comments provided by camp participants were: "good colour", "good shape", "firm", and "healthy." For the four fish assessed, most indicated that the fish was of "average" girth, with some people describing them as "fat." Gills were mainly assessed as "red" or "dark red" with one fish (LK28) considered to have "red/pink" gills. The firmness was largely "typical" in terms or rebound and the tissue noted as "typical" for all fish. In evaluating the four fish by examining them externally and internally, one of 17 responses was: "I would eat this fish, but it would not be my first choice" where 16 responses indicated "I would eat this fish."

The majority of the descriptors used for the heart, liver, kidney, pipe, eggs/milt was "good" or "healthy", although cysts were noted on three of the four fish. One comment on the fish that didn't have cysts was "safe." Tissues were described mainly as "orange" or "red."

Table 7 summarizes the quantitative results of the ratings during the fish inspections and gives averages for each fish. The average girth ratings were 2, 2, 2.3 and 2.6 out of 3 where 2 is "average" and 3 is "fat." Gills were noted as 1.25, 1.75, 2, and 2.4 (out of 4) on average where 1 is "dark red", 2 is "red, 3 is "pink" and 4 is "white.". For firmness, the average ratings were 1 (out of 3) for all fish meaning "typical rebound" for the firmness (rebound). The internal ranking of tissue was 2, 2, 2, and 2.25 (out of 3) where 2 is "typical." Partially digested fish were found in all four of the fish intestines and stomach.

Although cysts were noted in the heart, tissues, intestines and stomach for 3 of the 4 fish, the overall comments provided were that the fish were still considered "healthy" and "good."

Table 3.2-1 Fish Species in Indigenous Languages

Indigenous Terms for Fish Species							
Indigenous Dialect	**Lake Whitefish**	**Round Whitefish**	**Lake Trout**	**Burbot**	**Jackfish**	**Coney**	**Cisco**
Inuinnaqtun (old spelling / new spelling)	aanaakhiek aannakhiiq	kapihilik	ehoak (ihuuq)	nataanak (nataarnak)	n/a	n/a	kapihilik
Wıìlìıdeh Yatıì	ɬìh	ɬìh	ɬıwezǫǫ	nǫhkwèe	ʝhdaà	wıìlìì	ɬıwetsòa
Tłı̨chǫ Yatìì	ɬìh	ɬìh	ɬıwezǫǫ	nǫhkwèe	ʝhdaà	wıìlìì	ɬıwetsòa
Dené Sǫłıné	łú	łú	łuzané	n/a	ɔulday	n/a	łuek'áta (lake cisco)

Notes: Terms provided by interpreters during the December Verification Session and reviewed by: Inuinnaqtun by Gwen Angulalik and Margo Kadlun; Wıìlìıdeh Yatìì by Maro Sundberg; Tłı̨chǫ Yatìì by Margaret Mackenzie and Dené Sǫłıné by Bertha Catholique.

Terms provided by interpreters. In addition, some terms from: (http://www.ssdec.nt.ca/ablang/ablanguage/chiptionary/Chipewyan%20Dictionary.pdf) http://www.ssdec.nt.ca/ablang/ablanguage/Ikchipdictionary/Chipewyan_Dictionary-Linked/Chipewyan_Dictionary.pdf and some Inuinnaqtun terms from: (http://nbes.ca/wp-content/uploads/2014/03/inuinnaqtun_english_dictionary.pdf).

Table 3.2-2 TK Fish Inspections

Date	Fish #	Type of Fish	Aboriginal Group	Girth Rating	Gills Rating	Firmness Rating	Deformities	Shape	Scales	Other	Comments	Overall Preference
Sunday, August 5, 2018	26	Lake Trout	LKDFN	Average (2)	Red (2)	Typical Rebound (1)	Healthy fish!!!			Little white thing on the liver	We don't eat big fish!	I would eat this fish (1)
Sunday, August 5, 2018	26	Lake Trout	NSMA	Average (2)	Red (2)	-					Heart looks good	-
Sunday, August 5, 2018	26	Lake Trout	Tlicho	Average (2)	Red (2)	Stays Indented (3)		Good size				I would eat this fish (1)
Sunday, August 5, 2018	26	Lake Trout	YKDFN	Average (2)	Red (2)	Dried out						I would eat this fish (1)
	Average			2	2	2						1
Sunday, August 5, 2018	27	Lake Trout	KIA	Average (2)	Dark Red (1)	Typical Rebound (1)					firm, male	I would eat this fish (1)
Sunday, August 5, 2018	27	Lake Trout	LKDFN	Average (2)	Red (2)	Typical Rebound (1)					Good to eat!	I would eat this fish (1)
Sunday, August 5, 2018	27	Lake Trout	NSMA	Average (2)	-	Typical Rebound (1)						-
Sunday, August 5, 2018	27	Lake Trout	Tłı̨chǫ	Average (2)	Dark Red (1)	Stays Indented (3)		Average	Dark and white			I would eat this fish (1)
Sunday, August 5, 2018	27	Lake Trout	YKDFN	Average (2)	Dark Red (1)	Firm						I would eat this fish (1)
	Average			2	1.25	1.25						1
Sunday, August 5, 2018	28	Lake Trout	KIA	Average/Fat (2.5)	Pink (3)	Stays Indented (3)		Scars	Average			I would eat this fish (1)
Sunday, August 5, 2018	28	Lake Trout	LKDFN	Average (2)	Red/Pink (2.5)	Typical Rebound (1)						I would eat this fish (1)
Sunday, August 5, 2018	28	Lake Trout	NSMA	Average (2)	Red/Pink (2.5)	Typical Rebound (1)	Scars					I would eat this fish (1)
Sunday, August 5, 2018	28	Lake Trout	Tłı̨chǫ	Average (2)	Red/Pink (2.5)	Typical Rebound (1)	Good	Good	Good			I would eat this fish (1)
Sunday, August 5, 2018	28	Lake Trout	YKDFN	Fat (3)	Red (2)	Dried			Scars			I would eat this fish (1)
	Average			2.3	2.4	1.5						1
Sunday, August 5, 2018	29	Lake Trout	KIA	Average (2)	Dark Red (1)	-	Nothing	healthy fish	Alright	No parasites		I would eat this fish, but it would not be my first choice (2)
Sunday, August 5, 2018	29	Lake Trout	LKDFN	Fat (3)	White (4)	Good	Nothing	Good	Alright			I would eat this fish (1)
Sunday, August 5, 2018	29	Lake Trout	NSMA	-	Dark Red (1)	Typical Rebound (1)		Good		Colour is good		I would eat this fish (1)
Sunday, August 5, 2018	29	Lake Trout	Tłı̨chǫ	-	-	Typical Rebound (1)	Good	Good	Good			I would eat this fish (1)
Sunday, August 5, 2018	29	Lake Trout	YKDFN	Fat (3)	Dark Red (1)	Stays Indented (1)						I would eat this fish (1)
	Average			2.67	1.75	1						1.00

Note: KIA did not complete a form for #26

Table 3.2-2 TK Fish Inspections (cont'd)

Date	Fish #	Type of Fish	Aboriginal Group	Tissue Rating	Intestine Colour	Stomach/Intestine Contents	Fat (Y/N)	Tissues	Worms	Tumours	Parasites	Heart	Liver	Kidney	Pipe	Eggs/Milt	Odour
Sunday, August 5, 2018	26	Lake Trout	LKDFN	Typical (2)	Fine		N		Nothing	Nothing	Nothing	Good	Cyst	Good	Good	Healthy	Smells like a healthy fish
Sunday, August 5, 2018	26	Lake Trout	NSMA	Typical (2)		3 small whitefish in stomach					Good	Looks good	Looks good. Has a white cyst.			Lots of eggs	
Sunday, August 5, 2018	26	Lake Trout	Tłı̨chǫ	Typical (2)	Orange							Good	Small cysts	Good	Good	Lots and fat	
Sunday, August 5, 2018	26	Lake Trout	YKDFN	-								Healthy	Whitepiece on the liver	healthy	healthy		
	Average			2													
Sunday, August 5, 2018	27	Lake Trout	KIA	Too Firm (3)		1 whitefish						Still moving	looks healthy, typical	Dark red		No eggs	no odour
Sunday, August 5, 2018	27	Lake Trout	LKDFN	Typical (2)		fine	N	healthy fish	Healthy fish	Healthy fish	Healthy fish	Good	Cyst	Good	Good	Healthy	Looks healthy
Sunday, August 5, 2018	27	Lake Trout	NSMA	Typical (2)	Good	1 fish	Y	typical				Good	Good, brown, shiny		Good	Male	
Sunday, August 5, 2018	27	Lake Trout	Tłı̨chǫ	Typical (2)	Orange		Y					Good	Good	Good	Good	Good	
Sunday, August 5, 2018	27	Lake Trout	YKDFN	-								Healthy	healthy	Healthy	Good, 1 fish		
	Average			2.25													
Sunday, August 5, 2018	28	Lake Trout	KIA	Typical (2)	Orange			Typical, just right		On skin, one scar		Looks good, right size for the fish	Healthy, nice size, light brown	Darkish black, healthy		Healthy, orange colour	No smell
Sunday, August 5, 2018	28	Lake Trout	LKDFN	-				Safe	Safe	Safe	Safe	Good	Good	Good	Healthy	Healthy	Looks good, no smell
Sunday, August 5, 2018	28	Lake Trout	NSMA	-	Good	1 digested						Good size and colour	Light brown, looks good			Lots of eggs, red/orange, no white stuff	
Sunday, August 5, 2018	28	Lake Trout	Tłı̨chǫ	Typical (2)	Dark orange	average	Y					Good, healthy	Good, healthy	Good, healthy	Good, healthy	Good, healthy	
Sunday, August 5, 2018	28	Lake Trout	YKDFN	-								Healthy	Light brown, really healthy	Healthy	Healthy	Really healthy	No smell
	Average			2													
Sunday, August 5, 2018	29	Lake Trout	KIA	-	Red	3 fish in belly						White healthy	Healthy, nice size, light brown	Seems healthy			Smells healthy
Sunday, August 5, 2018	29	Lake Trout	LKDFN	Typical (2)	Good					Somewhere	Somewhere	Healthy	Unhealthy		Looks good		
Sunday, August 5, 2018	29	Lake Trout	NSMA	-								Looks good, right size for the fish	Looks good, brownish		White on intestines	Male	
Sunday, August 5, 2018	29	Lake Trout	Tłı̨chǫ	-	Red, orange	unknown			Intestines		Intestines	White cysts on top	Looks healthy, dark colour	Some white lines	Good	Smells good/healthy	
Sunday, August 5, 2018	29	Lake Trout	YKDFN	-	Whitish						Intestines might have parasites	Unknown	Healthy, nice size, light brown	Healthy	Fishes in the stomach	None	Smells healthy/good

Table 3.2-2 TK Fish Inspections (cont'd)

Date	Fish #	Type of Fish	Aboriginal Group	Why was this fish chosen?	What do you look for in a healthy fish?	How do people tell when a fish is healthy or unhealthy?	Is there anything unusual about this fish?	What can you teach us about the outside of this fish?	What can you teach us about the insides of this fish?	Is there anything unusual about this fish?
Sunday, August 5, 2018	26	Lake Trout	LKDFN	Because we only eat small fish		When there is a cyst or other white	Nope. Everything is healthy.	Looks healthy.	It's good.	Nothing
Sunday, August 5, 2018	26	Lake Trout	NSMA						in good shape	
Sunday, August 5, 2018	26	Lake Trout	Tłı̨chǫ	Average size		Tissue is orange	Small cysts on liver	Soft	Nice and orange	small cysts on liver
Sunday, August 5, 2018	26	Lake Trout	YKDFN			From the inside		White belly shows it is healthy	It just ate	
	Average									
Sunday, August 5, 2018	27	Lake Trout	KIA		Wine colour gills					
Sunday, August 5, 2018	27	Lake Trout	LKDFN	Small fish is good to eat, what we are told	Healthy fish good to eat	Just by looking at it	No	Looking very healthy to eat		
Sunday, August 5, 2018	27	Lake Trout	NSMA					Good colour		
Sunday, August 5, 2018	27	Lake Trout	Tłı̨chǫ					Good. Fat		Small guts
Sunday, August 5, 2018	27	Lake Trout	YKDFN			Both inside and outside	Different from Great Slave Lake fish		Edible	
	Average									
Sunday, August 5, 2018	28	Lake Trout	KIA	Only two choices between big and small		White gills	Scars, no bugs	By looking at it for me it looks healthy		Scars on back
Sunday, August 5, 2018	28	Lake Trout	LKDFN	I pick this fish for us to eat, looks healthy		Just be looking at it	No		Bake it and put seasoning salt on it.	Nothing
Sunday, August 5, 2018	28	Lake Trout	NSMA	Only two choices						Looks good
Sunday, August 5, 2018	28	Lake Trout	Tłı̨chǫ	Wanted the small fish, not bigger one					Healthy	
Sunday, August 5, 2018	28	Lake Trout	YKDFN	Because I only have two choices				Inspect the fish everywhere		
	Average									
Sunday, August 5, 2018	29	Lake Trout	KIA							No
Sunday, August 5, 2018	29	Lake Trout	LKDFN						Too much	A lot, not so much
Sunday, August 5, 2018	29	Lake Trout	NSMA							
Sunday, August 5, 2018	29	Lake Trout	Tłı̨chǫ	Last choice		If gills aren't white, it's healthy			If it is dark orange/red, its healthy. Anything has white it could be sick.	Small cysts in the guts
Sunday, August 5, 2018	29	Lake Trout	YKDFN	The very last fish		Examine the entire outside of the fish		Very healthy	The meat on the insides in healthy	

Several participants commented that they prefer to eat smaller fish rather than bigger fish and that this traditional law is shared from one generation to the next. People explained that this is largely because they taste better.

Where possible, the behaviour of the live fish was also taken into account.

> In the way in which the fish acts in the net or takes the hook, there is often a sense of whether or not these fish are healthy. The way that the Elders assess, not only looking at the appearance of the fish from the outside, but also the organs inside, also is a very strong indicator of whether the fish is healthy, a visual indicator.
> – Kathy Mai, Interview, August 6, 2018

Participants explained that fish health and taste are location dependent, meaning that they can be linked to both water quality and depth. Fish were said to taste "swampy" when they spend too much time in shallow water. Furthermore, each person as well as each group can have a different perspective on what defines health and whether or not they deem fish healthy. Sometimes this is closer linked to how fish taste in their own home communities.

3.2.1.1 Indicators of Health

In general, Elders shared that fish health is determined by tactile-visual observations of internal and external conditions of the fish, including tissue consistency, vibrancy of tissue colour, fat content, colour of the gills, liver, heart, kidney, and stomach contents. The inspection of fish by Elders continues well into the cooking process, where observations of how the fish skin and meat responds to the method of cooking, to further confirm health. However, knowing a healthy fish is a complex understanding that is challenging to articulate or break-down into a series of steps typical of a scientific approach. Instead, traditional knowledge is a more holistic approach and one that is difficult to obtain other than through years of direct experience with fish. This was particularly evident in how people reacted to the question: "How do people know when a fish is healthy or unhealthy?" Responses included "just by looking at it" and "both inside and outside." Table 3.2-3 summarizes the kinds of indicators that camp participants used to determine the health status of fish they harvest or inspect, but it is important to understand that it is the combination of indicators that enables people to determine whether a fish is healthy.

Community members looked at the outside of the fish carefully before cutting into it, making notes of any cuts or sores as well as the overall shape and feel. As Terri explained:

> When you look at it, it can look healthy but you'll know when you open it if something is wrong. It looks healthy, kind of orange.
> - Terri Enzoe, Daily Notes, August 5, 2018 (LKTR26)

The colour of the tissue and flesh can provide insight into fish habitat:

> It is an orange colour here because of the deeper cold water it gets like this. In shallower and warmer water it is a bit more pink.
> - Terri Enzoe, Daily Notes, August 5, 2018 (LKTR26)

> Looks like a pretty healthy fish. When you cut the fish up here especially inland, on Great Slave Lake this would be white. Here it is dark on the back and yellow. This looks different from Great Slave Lake fish [which are] more white.
> - Jonas Sangris, Daily Notes, August 5, 2018 (LKTR27)

Table 3.2-3 Health Indicators for Fish

Category	Indicator(s)
Size	Proportionality of head to body (especially girth)
Skin and Scales	Amount of movement of scales during cooking (popping) Amount of movement of skin during cooking (curling) Level of ease to remove skin during cooking Level of oil content on scales Degrees of change to skin colour Presence/absence of slime on the skin Presence/absence of scaring, injuries, abnormalities, disease
Gills	Change of colour in gills (red = fresh & white = long dead)
Intestine	Flora and/or fauna contents of the stomach and degree of digestion of contents Amount of fat on the underbelly Presence of cysts
Gallbladder	Changes in colour of gallbladder Bursting of gallbladder is considered undesirable
Tissue	Presence/absence of parasites Changes of colour in tissue Consistency of tissue
Heart	Relative size Deep red/brown colour
Liver	Changes in colour of liver Relative size
Eggs	Number, colour, size and condition of the eggs

Adapted from TCS 2015

3.2.1.2 Size

In 2012, one lake trout in particular has a disproportionately large sized head compared to it is body which prompted a discussion about size. If the head is too big compared to the body, the fish is considered unhealthy. All of the fish caught in 2018 were said to have good size as well as relative proportionality.

Ernest Boucher commented on how the fish seemed generally larger this year:

> Seems like to me, the fish . . . we used to get smaller fish. Now they get a big trout, really big trout . . .. that trout we got this now, eh, amazing. There are so many fish out there right now. So many fish. They're all big too. You're supposed to get a small one, you know? A small little net like that. We used to have four, five inch net before. But so many. Yeah that's why I just put a smaller net, but we still get the big trout. You can see

> that. Caught two big ones. Yeah. The population has grown, fish. Before I guess you know, people said way before they do a lot of traveling around here, eh? People from Yellowknife. Yeah.
>
> Q: Why do you think there's more fish and bigger fish?
> That's hard to answer, but because nobody's fishing around here. So, there's lot's over here, used to be a big game hunter lodge, I don't know if it is open yet or not, but I heard there's a fishing lodge.
> - Interview, August 5, 2018

Skin and Scales

When people catch a fish, one of the first things to assess is how the skin and scales feel and look. When a fish sits too long in a net, the tissue can become soft to the touch and doesn't rebound as well as a healthy fish.

> It feels good, it rebounds.
> - Nancy Kadlun, Daily Notes, August 5, 2018 (LKTR28)

> In this camp we want them alive. Catch a few fish while they are still alive and check them. We processed dead fish. The texture changes because they have been dead overnight.
> - Bobby Algona, Daily Notes, August 2, 2018

Camp participants tested how each fish felt to the touch and how the tissue rebounded as well as looked over the entire fish to see that the scales looked healthy and weren't deformed in any way. Most respondents indicated that each fish examined had good "rebound."

The skin and scale pattern are also studied for injuries, scars, disease or abnormalities. Camp participants noted that injuries can be caused by other fish. Nancy Kadlun noticed a lesion on the fish she was processing (LKTR 26).

> To see if this is edible, I would like to check on the inside of where the little wound was that I saw on the outside. I'm going to check to see if anything is growing under the wound. The wound we saw before is not a parasite or any worm, it is just a little scar where it was wounded from something. It is just a wound (up near gill).
> - Nancy Kadlun, Daily Notes, August 5, 2018

After she examined the tissue underneath, she was satisfied that the scar hadn't compromised the health of the fish.

Gills

People have long observed that studying the gills will tell whether the fish is in good health or condition. The longer a fish has been dead in a net, the lighter the colour of the gills:

> Gills look good, dark wine colour. It is good.
> - Jonas Sangris, Daily Notes, August 5, 2018 (LKTR27)

> When you see the gills, it looks dark because it was alive. When the gill is white, the fish may be sick or unhealthy.
> - Julie Wedzin, Daily Notes, August 5, 2018 (LKTR29)

Further, gills that are red or pink suggest that a fish will be good for eating because the tissue will still be firm. The colour of the gills is important in knowing whether the fish is healthy and how long it has been dead.

> When we catch fish, we take a look at the fish and make dry-fish if it is healthy or cook it. If it is unhealthy, you can see by the gills. If it is white, it is no good. If it is red, it is healthy.
> - Bobby Algona, Daily Notes, August 2, 2018

With the exception of one respondent for one fish who noted white gills, all responses indicated that the fish evaluated were red, dark red gills or pink. It is possible this anomaly was an error, as it was for the fish processed by Julie (LKTR29) who mentioned white gills while she was processing, as per the quote above.

Stomach and Intestines

Contents of the intestines and stomach as well as the amount of fat on the underbelly can provide insight into what and how much the fish has been eating or whether it's health is compromised, for example, from cysts or worms.

Many of the fish processed had partially digested fish in their stomachs. Some fish had worms in their stomach, supporting the discussion around how fish can eat other fish that have worms and this is way that worms are transferred.

Fat on the underbelly is also a sign of a healthy fish or that is has lots to eat. When asked the question during the TK analysis, "What can you teach us about the outside of this fish?" one group responded on the form that a "white belly shows it is healthy."

Lakes with lots of nutrients can lead to fatter fish. The fish that was boiled was said to taste really fatty which aligns with the results of the TK inspection carried out before the fish was prepared for tasting.

Tissue

The colour, feel and quality of the meat (or tissue) of the fish is a very strong indicator of overall health. Camp participants looked to the smell, colour and striation of the tissue, commenting on how the richer the colour, the better the overall health and overall body condition. The darker the colour, the more time the fish has spent in deeper water.

> Sometimes if fish are really sick, they would have something white or watery in between in places where they shouldn't. There was no smell it was good fish.
> -Nancy Kadlun, Daily Notes, August 5, 2018 (LKTR26)

When asked the question during the TK analysis, "How do people tell when a fish is healthy or unhealthy?" one group responded on the form: "tissue is orange." In the comments related to tissues, one respondent noted "safe" which suggests the strong link between tissue analysis and determining the overall health of a fish.

Heart

When preparing the fish, people examined the size, shape and colour of the heart. While it is common to eat the heart as a delicacy, this was not done during the camp. All fish examined were said to have healthy hearts. One heart was still beating during the processing, which is indicative of a good eating fish. Another respondent commented that the heart was the "right size" for the fish, again indicating a healthy fish.

Liver

When examining the insides of the fish, people explained that the liver provides insight into whether the fish is healthy. During fish inspections, Jonas explained:

> Liver should be brown and nice and shiny.
> - Jonas Sangris, Daily Notes, August 5, 2018 (LKTR27)

> The liver looks healthy and it is a nice size. The colour looks great, it is a light brown. Its healthy.
> - Nancy Kadlun, Daily Notes, August 5, 2018 (LKTR26)

> If the liver is whiteish than it is no good, it is unhealthy. So this is healthy, it is darker.
> - Julie Wedzin, Daily Notes, August 5, 2018 (LKTR29)

People also looked for the presence of cysts or worms in the liver as an indicator of overall health. Two of the four fish processed for palatability studies had cysts in the liver yet people noted that they would still eat the fish.

Eggs and Milt

Fish eggs are highly valued by many Indigenous groups. They are eaten raw, cooked or mixed with bannock. Visual inspection of the number, colour and condition of the eggs while processing the fish helps people evaluate life stage and overall body condition and can provide insight into the overall state of the species in a particular area:

> The eggs look really healthy, they are red and orangey, no white stuff. If they're healthy, you can tell because there is no white stuff on them.
> - Nancy Kadlun, Daily Notes, August 5, 2018

There were eggs in both female fish evaluated and people commented that the colour, quantity and texture looked healthy. One of the two male fish has milt which participants observed that it looked "good" and "healthy." Given that milt is not eaten, it is not of as much interest as eggs and so it was not generally discussed other than to acknowledge when it was present.

Overall – Concerns about Changes in Fish Health

The overall health of fish can teach you about the health of the land, water and air. Camp participants talked about how fish navigate through a changing environment.

> They got sense. You know, if you're, if you're a kind of fish on the side, whitefish, you know on, on both sides? You'll see a little white fin. And that's their sense. Sense of, they call this, they know that something's wrong. They've got sense of that, yeah. So they don't go there, they go somewhere else. Right from the neck back like to, almost to the tail. Right in the back. Little brown thing, and inside there's a white, white line, like. And they know . . .. A big sense to them and that's their hearing, like, you know?
> -Jonas Sangris, Interview, August 3,2018

Camp participants pointed to several combined factors that led to their conclusion of a healthy or unhealthy fish. The most common combination is tissue, gills, liver, and stomach contents, including presence/absence of parasites or cysts. Red gills, firm skin, smooth scales, fat lines in tissue and on the underbelly were reported indicators of good condition. Looking for injuries, deformities, cysts, parasites, is a key part of evaluating the overall health of the fish and community members are used to seeing all of these when processing their fish.

Some participants felt that there was a slight decrease in overall fish health compared to previous years. There is always an underlying fear and perception that mining and is affecting fish:

> When my, my mother was alive, when the mining company came up, she said, "One day there will be changes in the fish," and there is. I know that it is going to come, but I just didn't know when. And now we see it, it is all kind of fish that has sores on their head, some of them, I think they have cancer because we could see it, we could see lots of worms in them, cysts in them, even in their . . . around their heart you can see these little white stuff around it growing. Because we put nets in the water, we go fishing, even at home . . . wherever we can go fishing you know so we can have short line or have some fresh fish for the night or something. Some, some fish have . . . are sick. We see it. So that's a big change too.
> - Terri Enzoe, Interview, August 3, 2018

One participant commented on broader environmental degradation as threatening fish health:

> People are having to bring their char to Renewable Resources more than in the past. In the last couple of years they have been observing the fish and the fish seemed sick. That's what we have been doing in the last couple of years. We aren't blaming anyone

> right now. It is that microplastic in the ocean that's all over the world.
> - Bobby Algona, Daily Notes, August 2, 2018

Most concerns around fish health were because there seemed to be more cysts or parasites this year:

> The ground is so dry and for the fish I kind of noticed there are so many cysts in all the, almost all the 20 fish that I cut up. But three years ago I only noticed there was two or three fish that had cysts, but there's more. Like the worms on their skin. I don't know what's causing that but we'll find out more. Maybe they're just the ones here by the shore, I don't know. But there's lots of healthy fish though.
> - Nancy Kadlun, Interview, August 4, 2018

> There is something here, white stuff, some kind of bugs or cysts on the intestines . . .. The fish may look healthy but because of the…you can see some growth on the guts. We'll see by the time we cook it and do the tasting we can see if it is good or not . . .. It looks healthy, apart from the guts.
> - Julie Wedzin, Daily Notes, August 4, 2018

> I was just seeing all these worms on their body. So, I would like to know what causes those. But I've known they've been there for a long time, but why are there more and what causes it?
> - Mason Beaverho, Interview, August 5, 2018

> I've been coming to these mining camps. For me, these are the very first ones that I come here, fish are clean. Not one cyst or, or worm in them. In the few days we've come across more cysts and more worms in them in the fish that we are catching now. I'm starting to get suspicious now too a little bit.
> - Bobby Algona, Interview, August 3, 2018

> The trout that we pulled in various other sessions like 2012, 2015 were more healthy fish. The ones that we pulled in now there were a lot of cysts and, you know, worms and stuff like that. Some were just unhealthy fish and they had to be dumped. There were, I think, two at the last session in 2015 . . . no, pardon me, three. There was one that I caught and let go and it looked like he was starving or something like that. He was sickly because he had a great big head and a long narrow body. And he was about three feet long, this trout. But he looked more like a snake . . .. I caught him and took him off of the hook and let him go. The other two were just cysts and worms, eh? But this time here there quite a bit more with cysts and worms. And some of the livers didn't look too healthy. So I think that there's something happening with these fish here in this lake.
> - Wayne Langenhan, Interview, August 6, 2018

Elders who participated in 2012 and 2015 (at a minimum) and were able to track their observations over time indicated their concern about an apparent increase in cysts. While reasons for the apparent increase were not clear, several possibilities were proposed including climate change

effects or impacts from mining operations. Several participants as well as the fisheries biologist explained that cysts and parasites are common in fish and cycle in terms of their numbers:

> You can see small cysts inside the fish but it is common around the NWT, I mean, it is not like every fish we took out from the lake was, had like, sickness or infection in there so it is really common but when the elders and the Kathy and them, they cut it up, I was really, I was really happy to see that it was healthy because where I'm from in Whatì, we have a large body of water so it is like, it is what I see back home, is exactly what I'm trying to say. And it is really nice that we as youth come out here to experience and record the samples, so, to see with our own eyes and, yeah it is just been great being out here and seeing that happen.
> - Mason Beaverho, Interview, August 5, 2018

> The number of parasites in a fish, is almost like flu in people. Under natural circumstances, this can vary, there can be trends. It is only a concern when a huge number of fish have these parasites and it doesn't go away over a period of time. It is a concern for the health of that fish stock. But often these things will rise and fall naturally, like an epidemic in people.
> – Kathy Mai, Interview, August 6, 2018

During an interview, Nancy explained that she noticed more cysts and worms and wanted to know why this might be happening. She mentioned that it affects her evaluation of a healthy fish:

> I would like to find out why there are more worms because the first fish I filleted, they had worms on their body, but I don't know what causes that so I'm just curious. (laughs).
>
> Q: Are, are you concerned about it?
> Well, if I think about it I just, I'm not concerned but I know it is that way. But there are so many, I don't know what's causing that.
>
> Q: Would you eat those fish?
> Well if I'm starving, I would eat them. Just take the cyst out, because they're not skinny. They're not really, really skinny. Just take the cyst out, but I would eat them cooked. If I really have to (laughs).
>
> Q: Are there other ways, other things that help you to tell if a fish is healthy?
> Well, us, we've been doing fish for so long we could notice whether it is healthy or not.
> - Interview, August 5, 2018

During the Verification Session, an analysis of cysts and parasites documented in previous years was presented. It was interesting to note that the numbers recorded for 2018 did not appear to be higher (Table 3.3-1).

Camp participants were concerned about spreading parasites to other fish and animals and requested that affected fish be taken to the incinerator. It was mentioned that community members commonly burn fish with worms on campfires. As traditional law dictates, fish parts from healthy fish were returned to the lake away from the camp.

> We talked about putting fish back in water with parasites in them. Those should go to the incinerator. So we don't think it is a good idea if they're not healthy. But not if there is worms and cysts and stuff in the meat.
> - Wayne Langenhan, Daily Notes, August 5, 2018

> When you have fish open and you see worms or cysts on it. You have to open it to check. You separate them. If you put it back in the water, the fish in the lake moves with the water. And other animals will eat it. Whatever they do when they fly, they'll poop it out and spread it. That's what Madelaine Drybones told me. When I see the healthy fish, I think about this and I don't think we can put it back in because it spreads. Traditionally we'd burn this type of fish guts.
> - Terri Enzoe, Daily Notes, August 5, 2018

In addition to cysts, worms and parasites, people look for deformities in a fish before deciding whether it is healthy.

> If it was a deformity on the outside, we wouldn't eat it. Because it was internal, we can cook it. It tastes good. It tasted excellent. I ate two pieces. Fish over the fire tasted good too. The smoke tasted good . . .. If it is deformed or has internal injuries, we don't eat it, it is not our first choice. I've been working with fish for many years. I look at the outside and I know the health of the fish.
> - Julie Wedzin, August 5, 2018 (LKTR29)

One Elder spoke about his observations that there are more fish that they are bigger in the Lac de Gras area than he remembers from earlier days:

> Seems like to me, the fish . . . we used to get smaller fish. Now they get a big trout, really big trout . . .. The way I look at it is, it is only three-and-a-half-inch net, and that trout we got, eh, amazing. There are so many fish out there right now.
> Q. Why do you think there are more fish and bigger fish?
> That is hard to answer, that but because nobody's fishing around here. So there's lot's over here, used to be a big game hunter lodge. I don't know if it is open yet or not, but I heard there's a fishing lodge . . .. Maybe it is open or not, I don't know but. Second time I was here, that was middle of August, I think. We used to go around go see them go right through there. With a boat hunting caribou, big game.
> - Ernest Boucher, Interview, August 5, 2018

Elders and youth provided much insight into why fish health can be compromised through impacts from climate change and industrial activities:

> Yeah, it goes in the water and, you know, it is the fish, you know. The habitat . . .. They don't like that kind of stuff. So they'll move somewhere, or they'll just die. Well, some other things that causes this too is climate change. You know? Getting too warm, the water. So all kinds of things, eh? That's what [Bobby Algona] was talking about yesterday. Not only here but up north too. They notice that climate change. The world is churning about something. Something's happening.
> – Jonas Sangris, Interview, August 3, 2018

> Q: So those cysts and worms and sores that you're talking about, were they here in the past?
> No. It never used to be around before when I was growing up. When I was young. So now it is here. And I don't know how we're going protect those things because the climate change. We don't know if there's anything going on the other side of the world. The wind changed. Who knows what it is (the wind) carrying, right? You know it could go in the water; it could go in the land.
> – Terri Enzoe, interview, August 3, 2018

> Maybe they're blasting more or some of the vibration underwater. I don't know. It seems like the water testing is going on at a pretty good rate, you know, like regular intervals. But I don't know about the blasting. What's going on, you know, down in those pits? How much is the rock vibration is being pushed out? . . . it might be just worthwhile to look into the frequency of the blasts and at what depth they're blasting at, you know? The power . . . how big an explosion, eh? I noticed, as well a few other people, there that the-fish were not as healthy as the last time we were out here. So something's obviously changing . . .. I don't know if climate change could do it. But I think there's got to be something to do with the vibration of the blasting and maybe the intensity of the blast, you know, maybe the depth. I have no idea. But there's something definitely changed here.
> - Wayne Langenhan, Interview, August 5, 2018

Participants recognize that there are differences in fish between Lac de Gras and their other regions that can lead to slight differences, for example, in taste, tissue consistency, colour. Some participants commented that it was difficult to evaluate the lake trout in Lac de Gras from three years ago compared to the present, but that it was easier to compare them to lake trout that they catch in their territories. Fish health changes, depending on life cycle phases as well as environmental conditions that vary temporally and spatially.

3.2.1.3 Fish Location and Population

Elders know that fish are sensitive to various types of habitat, clarity of the water, time of day, sunlight, water quality, and temperature. They use this expertise to predict good fishing locations or places to set fishnets. During the fish tasting, people made comments such as “no shallow taste”, “taste like swamp,

but still good" and "should have went deeper waters, taste a bit shallow" indicating the link between fish habitat and the quality of the tissue.

3.2.1.4 Fish Preparation, Consumption and Use

During fish inspections, around the evening fire at the camp, and during interviews, the Elders provided input on fish preparation and consumption, including tools, methods of drying and cooking, stories and medicinal uses.

There are many ways in which people used to and continue to preserve fish so that it can be enjoyed throughout the fall and winter. During the camp, Elders demonstrated various ways of preparing dry-fish and hung the fillets over a low burning, smoky fire. Terri worked with Rod to build a rack, making sure to show youth how along the way. Youth were also exposed to various ways in which each person prepares fish to be dried.

3.2.2 Palatability

Elders tasted a total of four fish prepared by baking, boiling, frying, and grilling (Figure 2.3-3, Table 3.2-4). In general, there were mostly positive descriptions based on the taste test of each fish (Appendix 8). The Fish Palatability Study included LKTR26, LKTR27, LKTR28 and LKTR29.

As detailed above, the fish were prepared in four different ways:

- **Baked** in the camp kitchen oven (LKTR28) by Nancy Kadlun (KIA)
- **Fried** with Tenderflake lard in a pan over the fire (LKTR29) by Julie Wedzin (Tłı̨chǫ)
- **Boiled** in a pot of water on the camp fire (LKTR27) by Jonas Sangris (YKDFN)
- **Grilled** over the fire (LKTR26) by Terri Enzoe (LKDFN)

Wayne Langenhan of the NSMA was responsible for tending the cooking fire.

On average, most camp participants scored the prepared fish with a rating of either 1 or 2 (excellent/ good). There were no ratings between 3 and 5. A zero indicates that no rating was provided. Thematic analysis of the comments indicates overall satisfaction with the health, taste, texture, and colour of the fish. There was repeated use of the words "good", "very good", "excellent", and "tasty." Other adjectives used repeatedly to describe the fish included "nice", "great", "fatty", "good flavour and texture", "normal", "beautiful", and "fresh." One participant commented that the fish was "deadly good!" Table 3.2-4 summarizes the results of the comments collected on the forms.

> The fish taste good in all the ways that we cooked. When we were fixing the fish, processing the fish, they looked healthy. Also when we first take a look at the fish, we check the gills so that they are red. If they are red, we know it is a healthy fish. That is the first thing that we see.
> - Julie Wedzin, Daily Notes, August 5, 2018

The taste of fish changes depending on what it has been eating or where it has been feeding:

> Could taste the ground a little in this fish. What it has probably been eating. Feeding from the bottom.
> - Bobby Algona, Daily Notes, August 5, 2018

Several Elders commented that the grilled fish was tasty but had a bit of a “swampy” or “fish” taste and it is unclear if this was the actual fish or the cooking method:

> Tastes more ‘fishier’ because we are in the bay. It tastes swampy but still a good fish.
> - Terri Enzoe, Daily Notes, August 5, 2018

> You can taste the fish whereas sometimes when you cook it, it doesn’t have a taste. This still has a fish taste.
> - Bobby Algona, Daily Notes, August 5, 2018

> This fish is kind of strong tasting. All the trout from each different lake, it tastes different. Red meat usually tastes good, better that the white meat. This is edible and good. Kind of stronger taste than what I usually eat at home.
> - Nancy Kadlun, Daily Notes, August 5, 2018

One participant suggested that the boiled, baked and grilled fish tasted “fishy” compared to the fried fish.

The baked lake trout was particularly rich, perhaps because it was so fatty:

> Really rich, too rich, not cooked right. You could taste how it is: shiny, greasy, too fat.
> - Doris Enzoe, Daily Notes, August 5

> Rich but good!
> - Ernest Boucher, Daily Notes, August 5, 2018

In general, it can be difficult for people to notice a change in taste of the fish from the previous camp three years ago. Instead, camp participants compare the taste to what they are used to in their own communities. Many people prefer or are more familiar with the taste of whitefish, and whitefish has been added to the taste test in years past. However, the analysis also has to be carried out on lake trout as per standard protocols for consistency over years.

> Since we don't eat a lot of trout . . . in N'Dilo, Dettah, Yellowknife area, Behchokǫ̀, we don't really know a lot about the taste and texture and everything, like what trout should be. We could tell if they're diseased or not by looking at certain signs. But . . . like signs that we get from other fish about the cysts and different types of worms and stuff like that- that are within the meat and the intestines. But we can't really narrow down the tasting thing on trout. A better option to the trout would to be fish whitefish because 90% know whitefish. They eat it on a steady basis. So I just wanted to bring that

> up because, it is just like me trying taste tea, eh? What the hell do I know about tea? I don't drink it. I drink coffee just about all- all my life, eh? So I could tell you something about coffee. But I can't tell you something about tea. And I can't tell you about trout because I don't eat enough of it. But I can tell you something about whitefish. So this is my point that I'm trying to come across with, you switch fish.
> – Wayne Langenhan, Interview, August 5

Setting nets is important for catching whitefish:

> NT – We are looking to you Ernest to give us some guidance on whether or not to set a net. Winds same all day, some rain later. We have to do the TK analysis of 4 fish. It might be nice to do those this morning before the rain comes. We could try off the dock or set a net.
> Ernest – That island off here, close by over there. You could have 7 or 8 fish in 3 hrs. It is not far from here; you could set it out this way. It doesn't take long; 10-15 mins and we're done.
> Nancy – We could have more than that in less time off the dock.
> Jonas – You have to think of others. Some people want whitefish from here. They want to compare it to what they know.
> - Daily Notes, August 6, 2018

Future camps can include tasting of whitefish as part of the TK analysis in response to recommendations expressed by participants. Whitefish has been part of past tasting tests and it is expected it will be part of future testing again, especially if the weather allows for more net setting.

3.2.3 Summary of Fish Tissue Laboratory Analysis

As mentioned previously, DDMI samples a portion of the fish captured during the AEMP TK study for scientific analysis. Fish tissue samples are normally obtained for 10 fish, but samples were submitted for 15 fish in 2018 due to an issue with some of the otoliths. Samples submitted included tissue samples from the fish that were tasted by camp participants.

Lake trout are the species typically tested for metal content and tasted by community participants because they are at the top of the food chain in Lac de Gras. As such, their potential for accumulating some metals, such as mercury, is the greatest and makes them the best species to test. The biological data for each of the fish sampled for science are outlined in Table 3.2-5 and Appendix 4.

Table 3.2-4 TK Fish Tasting

Date	Fish #	Type of Fish	Aboriginal Group	Cooking Method	Commenters	Recorder	Palatability Score	Comment #1	Comment #2
August-05-18	26	Trout	KIA	Grilled	Bobby Algona, Nancy Kadlun	Regan	2, 3	Nancy: Uncooked, didn't taste any metal, tasted good, smelled good, texture didn't break up when picking up with fork	Bobby: Very taste, good, sometimes fish don't have a taste, meat is firm, not mushy, very good, tender, no different from last fish camp. Not metal taste, smell very good. Very good texture.
August-05-18	26	Trout	LKDFN	Grilled	Dorris Terri Enzoe, Ernest Sangris	Eric	1	Doris: Different from Great Slave Lake fish	Ernest: Cold water fish is different. Tastes like bay water fish.
Sunday, August 5, 2018	26	Trout	NSMA	Grilled	Wayne Langenhan	Joanne	2	I don't usually eat trout, it seems ok but I don't really have anything to compare it to. It was good.	
August-05-18	26	Trout	Tłı̨chǫ	Grilled	Julie Wedzin	Mason	2	Everything taste good, looks good. With salt, it would be better. Firm. Good the way it is as cooked. Should've went deeper waters, taste a bit shallow.	
August-05-18	27	Trout	KIA	Boiled	Bobby Algona, Nancy Kadlun	Regan	1	Nancy: Fish is good and tasty, smells good, pretty good, texture is okay	Bobby: Good fat fish, very tasty, smell is good, texutre is good, no bitter taste, no after taste. Excellent, taste like ground a little.
August-05-18	27	Trout	LKDFN	Boiled	Dorris Terri Enzoe, Ernest Sangris	Eric	1	Doris: It tastes good, still taste like swamp but smells good	Ernest: Smells good, tastes good, very good.
August-05-18	27	Trout	NSMA	Boiled	Wayne Langenhan	Joanne	2	This is better than the others. Blander. I didn't care for the stronger smell of the others.	
August-05-18	27	Trout	Tłı̨chǫ	Boiled	Julie Wedzin	Mason	2	Taste good, all the 4 methods of cooking the fish, it's hard to tell which taste better	
August-05-18	27	Trout	YKDFN	Boiled	Jonas Sangris	Zach	2	Tastes good, soft, smooth taste, smells good, good the way it is. No shallow taste	
August-05-18	28	Trout	KIA	Baked	Bobby Algona, Nancy Kadlun	Regan	1, 3	Nancy: Kind of strong taste, all trout have different taste, red and white meat, edible fish, stronger smell, trouty smell	Bobby: Undercooked but edible, smell is okay, taste is okay, texture is good
Sunday, August 5, 2018	28	Trout	Tłı̨chǫ	Baked	Julie Wedzin	Mason	2	Looks good, tastes good. Everything is good, but if it's baked longer, it would taste much better.	
Sunday, August 5, 2018	28	Trout	LKDFN	Baked	Dorris Terri Enzoe, Ernest Sangris	Eric	3	Doris: It 's too rich, richer than home. It's shiny and too greasy. Fat.	Ernest: Good but kind of rich. Fat.
Sunday, August 5, 2018	28	Trout	NSMA	Baked	Wayne Langenhan	Joanne	3	I prefer the one done on the fire. I don't know what I'm looking for because I don't eat trout . It was undercooked.	
August-05-18	28	Trout	YKDFN	Baked	Jonas Sangris	Zach	2	Tastes good, smells good, shallow taste, better with salt	
August-05-18	29	Trout	KIA	Fried	Bobby Algona, Nancy Kadlun	Regan	2, 3	Nancy: strong taste but it is edible, texture is okay, kind of strong for me	Bobby: very tasty, texture is very good, didn't mush in my oily, smelled very good, no after taste, no bitter taste
August-05-18	29	Trout	LKDFN	Fried	Dorris Terri Enzoe, Ernest Sangris	Eric	3	Doris: It tastes swampy and dry	Ernest: Just about the same as baked.
Sunday, August 5, 2018	29	Trout	NSMA	Fried	Wayne Langenhan	Joanne	2	It all tastes the same to me because it is all trout	
August-05-18	29	Trout	Tłı̨chǫ	Fried	Julie Wedzin	Mason	2	Everything taste/looks good. I cook it, so I would know.	
Sunday, August 5, 2018	29	Trout	YKDFN	Fried	Jonas Sangris	Zach	2	Tastes good, smells okay, firm taste, cooked right, medium well, no shallow taste	

NOTES:
Fish Palatability by Indigenous Group
# of fish tasted = 4 fish (4 trout)
# of completed forms = 15 forms

Table 3.2-5 Scientific Fish Sample Results

Fish #	Species	Length (mm)	Weight (lbs)	Sex	Stage	Age (years)	Mercury	Stomach Contents	Condition	Comments
1	LKTR	810	15.5	Female	Mature	-	-	small whitefish	parasite in tissue, worm in tissue, large liver	Nancy; unhealthy
2	LKTR	850	16	Female	Mature	-	-	small fish x2	-	-
3	LKTR	725			-	-	-	-	-	-
4	LKTR	810			-	-	-	-	-	-
5	LKTR	760	10.25	Male	Mature	-	0.424	empty	healthy no parasites	All communities
6	LKTR	655	12.5	Female	Immature	-	-	juvenile whitefish	parasite and worm	Nancy
7	LKTR	630	7.5	Male	Mature	25	0.112	juvenile whitefish	parasite	Nancy; unhealthy would not eat
8	LKTR	880	15	Male	Mature	-	0.367	juvenile whitefish	healthy no parasites	Nancy; very healthy
9	LKTR	770	10.25	Female	Mature	24	0.259	juvenile whitefish	healthy no parasites	Kathy processed
10	LKTR	700	9.5	Male	Mature	-		juvenile whitefish	healthy no parasites	Kathy processed Nancy guided
11	LKTR	680	10	Male	Mature	-	0.174	juvenile whitefish	healthy no parasites	Kathy processed Nancy guided
12	LKTR	565	4.25	Male	Mature	-		juvenile whitefish	worms	Kathy processed Nancy guided
13	LKTR	705	8.7	Male	Mature	-	0.193	juvenile whitefish	healthy	Julie
14	LKTR	630	5.5	Male	Immature	17	0.142	juvenile whitefish	good/healthy	Julie
15	LKTR	710	8	Male	Mature	23	0.158	juvenile whitefish	good/healthy	Julie
16	LKTR	730	12	Male	Mature	29	0.281	whitefish	healthy	Julie
17	LKTR	630	6	Male	Mature	26	0.194	whitefish	healthy	Nancy
18	LKTR	681	9	Male	Mature	-	-	whitefish	healthy	Julie
19	LKTR	630	6.5	Male	Mature	-	-	whitefish	cysts	Nancy
20	LKTR	770	14.5	Male	Mature	-	0.177	whitefish	healthy	Nancy
21	LKTR	-	-	-	-	-	-	-	-	Caught at narrows - no data
22	LKTR	-	-	-	-	-	-	-	-	Caught at narrows - no data
23	LKTR	700	10	Mature	Female	-	-	whitefish	healthy	caught at dock
24	LKTR	-	-	-	-	-	-	-	-	-
25	LKTR	-	-	-	-	-	-	-	-	-
26	LKTR	660	11	Mature	Female		0.371	fish	cysts	Doris; white thing on liver, looks healthy, average weight, don't eat big fish too much mercury
27	LKTR	620	9.75	Mature	Male	23	0.284	fish	healthy	Jonas
28	LKTR	698	9	Mature	Female	28	0.172	fish	healthy	Nancy
29	LKTR	830	15	Mature	Male	20	0.387	fish	cysts on intestines	Julie
30	LKTR	-	-	-	-	-	-	-	-	Net
31	LKTR	-	-	-	-	-	-	-	-	Net
32	LKTR	-	-	-	-	-	-	-	-	Net
33	LKTR	-	-	-	-	-	-	-	-	Net
34	LKTR	-	-	-	-	-	-	-	-	Net
35	LKTR	-	-	-	-	-	-	-	-	Net
36	LKWH	-	-	-	-	-	-	-	-	Net

Mercury

Mercury is found naturally in the environment, but global concern has increased due to rising mercury levels from human activity and industrial processes, and it is tendency to be transported and deposited over long distances. Increased levels have been noted in the past in small fish in Lac de Gras (DDMI 2007), as well as in other lakes within the Northwest Territories (http://www.hss.gov.nt.ca/health/environment-and-your-health/mercury-levels-fish). Mercury levels are used as one of the main health indicators for the fish palatability study because it will bioaccumulate (increase in amount over time) within fish and humans. Figure 3.2-1 shows the results that were observed in fish sampled during the 2018 AEMP TK program. As noted previously, there was an issue with some of the otoliths in 2018; therefore, Figure 3.2-1 displays a comparison of fish age, size and mercury level for a total of 9 fish. A copy of the complete lab results for each fish sampled is included as Appendix 4.

The results show that none of the lake trout sampled had mercury concentrations higher than the Health Canada guideline for fish consumption, despite a range of age in fish from 17 to 29 years. There were 6 additional fish tissue samples that were also submitted to the laboratory for testing despite not having a corresponding otolith sample. Of these, all mercury levels also remained below the Health Canada guideline (Table 3.2-5).

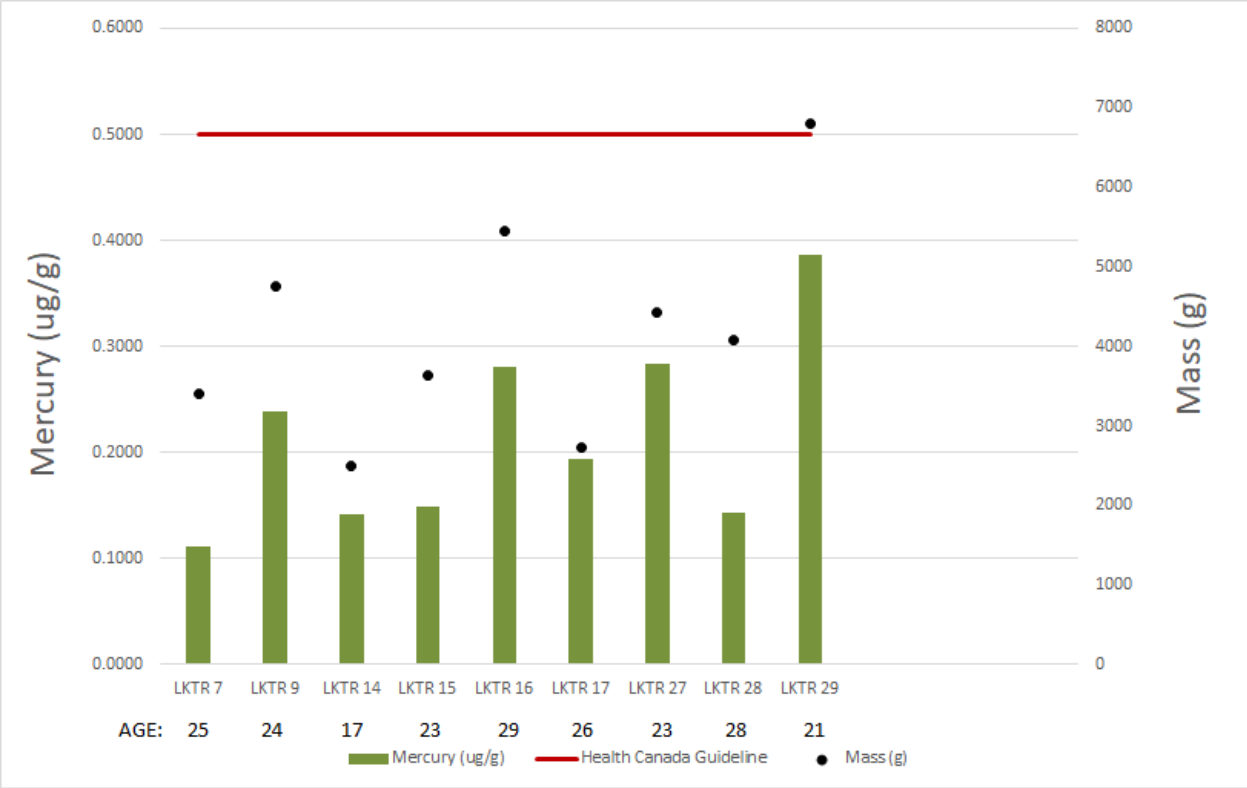

Figure 3.2-1 Lake Trout Mercury (Hg) Concentrations, Age and Weight (2018)

Parasites and Cysts

As noted, participants in the 2018 AEMP TK Study suggested that there appeared to be an increase in the number of parasites or cysts observed in fish. While this has not been a consistently recorded indicator in the AEMP TK Study in all years, there was an opportunity to review previous reports and data sheets to evaluate parasite observations in the years where they were recorded. Table 3.2-6 provides a summary of the findings. Some participants noted that parasites are common in fish in northern waters.

DFO describes the occurrence and types of organisms that may be found in fish in their brochure "Common Parasites, Diseases and Injuries of Freshwater Fishes in the Northwest Territories and Nunavut" (http://www.dfo-mpo.gc.ca/Library/232932.pdf). As a result of the number of parasites observed in 2018 actually being lower in comparison to years past, participants recommended that parasite levels in fish be added to the fish field form as an indicator of health for future years.

Table 3.2-6 History of Cysts in Fish (AEMP)

Year	# Fish with Cysts	# Fish Inspected	Percentage
2002	10	15	67
2003	8	12	67
2005	28	41	68
2009	19	19	100
2012	10	12	83
2015	7	8	88
2018	7	22	32
Average	13	18	69

3.3 Watching Water

Throughout the camp, participants were often evaluating the water while walking along the shore, fishing off the dock or looking out across Lac de Gras. Watching the water has always been part of traditional knowledge in understanding weather conditions, predicting change or sourcing drinking water.

> The water is important to us, because fresh water is really important to all of us. We live off ... if we don't have water, where are we going to . . . we're not going to survive here.
> - Terri Enzoe, Interview, August 3, 2018

Camp participants considered water quality as part of the entire ecosystem wherein water is the common thread and considered the main source of life.

> That's where the birds would be feeding, the loons, all that underwater. They dive underwater in that are with little fish in their mouths. Looning! Seagulls too.
> - Jonas Sangris, Water Quality Notes, August 4, 2018

> Have they ever tested the plant life on the bottom in this lake? Have they done any plant studies of what's in the bottom of this lake? Maybe those plants are really contaminated down there or getting contaminated, you know? The fish got to eat something. They just don't always eat other fish. There are other little things like bugs and the bugs eat the plants and it is a cycle.
> - Wayne Langenhan, Interview, August 5, 2018

> I been drinking water all my life. It is healthy. We live on water. The main part. It's important to have clean water. An important thing.
> - Ernest Boucher, Water Tasting Notes, August 4, 2018

Taking water samples at two locations enabled participants to evaluate water quality through both science and traditional knowledge (Figure 2.3-4, Table 3.3-1). Some indicators specific to water to determine health include odour, clarity, movement, and temperature. In the past, as in today, people depend on healthy drinking water which requires skill both to identify where to collect this water and to know whether it is healthy according to how it tastes.

> Q: Are you satisfied with the taste of the water?
> Yeah, the water still tastes great. It is pure water and this is a huge lake. It has really good water, so I hope it stays the same forever, because it is a huge lake and it also goes to all of our only water source. Not only, but there's lots of little rivers that go down from this same lake, but then we will try to preserve it as long as we could because we have a big town that's getting bigger each year in Kugluktuk.
> – Nancy Kadlun, Interview, August 5, 2018

This camp differed from previous camps in that there were more ways in which the water was prepared for tasting. In the past, participants sampled just tea whereas this year they tasted tea and well as the boiled and cooled water plus water straight out of the lake. Camp participants commented on how boiling the water can change the taste of the water and how tea can disguise the taste of the water. Overall, they felt satisfied that this modified approach was more thorough in determining overall water quality.

> On our walks in life we drink the cold water straight. Just knowing that each lake has different taste in water. Because of the rock content.
> - Bobby Algona, Daily Notes, August 2, 2018

The samples taken at depth versus surface have a different taste in the same way that samples taken from the middle of the lake don't have the same taste as samples taken from shallow bays.

> The water to me tasted fine. You have to compensate for the depth, you know? If it tastes dirty or different or whatever is on top it could be from just dust floating and sinking down at 6 feet or whatever. But down at like 20 meters, the water stays pretty clear. So it could look clear but that there really could be really small inside it, tiny. If you just compensate for the depths of the water and the coldness of the water, you can

> figure it out. Whether this water is any good or bad. But yet if it was really that bad, the fish would be floating around and probably half that camp over there [at the mine]. So, you got to go by the ... a lot by the temperature too.
> - Wayne Langenhan, Interview, August 5, 2018

> We noticed there was, we could taste the fishy, fish down below and kind of like by the top near the shore is was like we could taste the grass.
> - Nancy Kadlun, Interview, August 4, 2018

The sample taken closer to camp (TK1) were said to taste "swampy", "fishy" and "grass tasting" because there were collected "too close to the land" (Table 3.3-1). The samples taken at depths were said to taste better:

> First old water, I could taste the smell of air. The down below, I can taste pure water.
> - Nancy Kadlun, Water Tasting Notes, August 4, 2018

In comparing the samples taken from close to the shore (TK1) versus closer to the middle of the lake (TK2), participants noted that they preferred the samples away from the shore.

> Julie: Good water. The taste of the water is good and clear. Clear as glass. Similar to what I drink at home, at Behchokǫ̀.
> Bobby: No bitter taste. Good water. Very good.
> Nancy: This is even taste greater than this morning. Very good water. Its colder and it tastes more like yummy from the deeper water. Very good. Clearer water than this morning.
> Terri: Water is clear. Good. Very fresh. This morning was rough. This evening is very good. Deeper water. I think it was because it was from deeper water.
> Jonas: Very nice water. Very fresh. This morning was grassy, this was nice cold and smooth. Just like fresh water.

The way and vessel in which the water was heated also affected the taste in that some people said the samples tasted "like aluminum pot" or "smoky." Water boiled in steel was said to taste better than water boiled in aluminum. Temperature also made a difference:

> The boiled one is smoother than the cold one. Tastes easier to drink.
> - Terri Enzoe, Water Tasting Notes, August 4, 2018

> Boiled tea from inside the cabin, you could taste the metal. It is so pure you can taste the metal from the pot. The water from 4 m, you can taste pure water. The difference is what you use to boil it. The water is so pure, you can taste the pot. We don't see any ring or scum in the kettle.
> - Nancy Kadlun, Water Tasting Notes, August 4, 2018

> Tastes really good. Tastes about the same from the 1 m. Since it is cold water, straight from the water, it has not been put in a kettle you don't taste the metal from the kettle.
> - Bobby Algona, Water Tasting Notes, August 4, 2018

Some people enjoyed the campfire taste in the water as they commented on tea (Sample TK1D):

> Bobby - Very smooth. Very good taste. Pure. Healthy. This one, I didn't taste the pot in this one.
> Jonas: No smoke taste. This one was cooked inside that is why. You can really tell the difference.
> Terri: Too plain for me because when it takes smoky tastes way better for us. For me, the water is healthy, no marks when you see the water in your cup. Clear, clean.
> - Water Tasting Notes, August 4, 2018

The timing and amount of rain also affected the taste:

> [Sample TK1D has an] average taste. Tastes the same as the one from 1 m. For me, this tastes a little better because I have a bad cold. Right now, blowing so hard. Cold out here. To me, the water is really cold out here. When I go home, it will be lots of rain and the water will be different again.
> – Ernest Boucher, Water Tasting Notes, August 4, 2018

> It's good. Average. You don't taste anything in it. Taste like rain water a bit. Lots of rain this summer. Clean. Smooth-like. You could tell the difference form the last one at 1 m.
> - Jonas Sangris, Water Tasting Notes, August 4, 2018

The samples were compared to water that people usually drink in their communities.

> The cold one you taste is a little grassy. Inland lake water. When you take Great Slave water, it tastes different. When you go on the big lake, it is good water. Inland lakes taste too grassy. My uncle tells about big lakes, drinks good tea. Otherwise, smell that grassy.
> - Jonas Sangris, Water Tasting Notes, August 4, 2018

In addition to considering taste, people also looked at the water samples for residue or debris in the water during the tasting sessions. Many camp participants noted that when tasting tea, a ring left behind on the cup, a bitterness or lingering taste are signs of deteriorated water quality.

> No ring around it. The tea taste good. We could tell because it is red (like red rose tea). Clear, clean.
> - Terri Enzoe, Water Tasting Notes, August 4, 2018

In general, camp participants were satisfied with the water quality as determined through tasting (Figure 2.3-3). When asked if the water tasted any different from what people remembered in either 2012 or 2015, participants didn't think so:

> I don't notice anything. I don't notice a difference from 2012.
> - Bobby Algona, Water Tasting Notes, August 4, 2018

> Q. I was wondering how you felt since you've been coming back. I'm wondering what you think about the water in [Lac de Gras] these days?
> The water it tastes like you know swampy eh? You know that's from you know, being blown. I mean how many days wind-blown. Because all that stuff in the bottom moves eh? It comes out and then it goes down again you get the water from down there. Yeah. That's what it is . . .. That's the one there, it is swampy. Bay eh? All that wind pushing in, it is like a river that's in here you know? It goes, then it moves out again.

> Q. Do you have concerns or worries about the water in Lac de Gras right now?
> No. Not right now.
> – Ernest Boucher, Interview, August 5, 2018

In an effort to honour the spirit of the water, participants were also asked: "If the water had words, what would it say?"

> Terri: For me, I think the water is happy because it is still fresh. The water is still fresh. It has not been destroyed by anything, even though the mine is here. I feel like the water is fresh. If I was coming every year, it might be a different answer maybe.
> Ernest: I think it is pretty happy. Even tea on the fire, then they taste like smoke. Average. The water from the cabin inside, tastes different again. No smoke. Still the same, just taste different.
> Julie: The water is fresh and healthy. It would say.

Figure 3.3-1 Water Tasting Photo Collage

3.3.1 Indicators of Good Water

Community members talk about several indicators of healthy water from a TK perspective such as:

- Clear—debris or slime-free
- Cool temperature
- No or neutral odour
- Movement
- Quantity / presence of insects
- Tastes good
- As detailed in Table 3.2-5, participants thought that the water was healthy. Temperature was predominantly noted as “cold” with some respondents stated “average” or provided no response. For clarity, all completed responses noted “clear.” All completed assessments from TK1 were noted as “green” in colour with movement noted as “some” for the sample taken at the surface and “still” for the samples taken at depth. These assessments were noted while the samples were being collected.
- The water tasting results showed that people ranked the cold water highest followed by the tea and boiled water. On average, camp participants rated the water quality to be 2.7 (out of a 3-point scale) for the tea, 2.1 for the boiled then cooled water, and 2.9 for the water taken directly from the lake. While some respondents noted the water samples tasted “average” or didn’t provide a response, over 70% of the responses for all samples were “good,” (Table 3.3-1).
- Considered together, these indicators form the framework for the TK analysis of water quality.

- Q. What about your other senses, though? More than just taste, it is looking at it, smelling it, getting a sense of whether the water is healthy in Lac de Gras?
  Wayne: Well, I think the water, it tastes alright to me. I mean, it is taken out deep. But 2-meter water ... actually, other than it being a little bit warmer, at whichever time you take it, (because if it is really hot out that water can be). Quite a few degrees, warmer and taste different than the water at 60 meters because it is really cold down there. If you taste something that's really cold, it can taste great. But if you taste something warm, no matter what it is ... For instance, a can of beer. You drink warm beer it tastes terrible. But if you drink an ice cold one, it tastes a lot better, right? So it is probably the same with water. Maybe microbes or something like that closer to the surface than way deep down.
  – Wayne Langenhan, Interview, August 5, 2018

- The biggest impact is from nutrients from groundwater that gets released from mining. So I notice that there are more small bugs that live in the water column over the years. The mine water is what gets treated before it is released. And nutrient levels in the lake will go down and return close to previous levels naturally over time. That is a big difference between metals and nutrients.
  - Colleen English, Verification Session, December 7, 2018

Table 3.3-1 TK Water Quality Ratings and Water

General Information					Ratings and Observations of Water Quality								
Date	Sample #	Aboriginal Group	Recorder(s)	Location	Temperature	Depth	Clarity	Movement	Colour	Tea Test	Cold Water Test	Boiled Water Test	Other Observations/Notes
August-04-18	1S	KIA	Regan	Surface	cold (3)	Shallow (1)	Clear (3)	Some (2)	Green (2)	Good (3)	Good (3)	Good (3)	Tea tastes good, very smooth without scum. Smokey taste, no difference from the past sessions here in Lac De Gras. The boiled water tasted smoky, smooth, without any bitterness- good water.
August-04-18	1S	LKDFN	Eric	Surface	cold (3)	Shallow (1)	Clear (3)	Some (2)	Green (2)	Good (3)	Good (3)	Good (3)	Tea is nice, clean and good. The cold water is clear and tastes good but is a little swampy and grassy. The boiled water is okay, but it tastes like smoke.
August-04-18	1S	NSMA	Joanne	Surface	cold (3)	Shallow (1)	Clear (3)	Some (2)	Green (2)	no response (0)	Average (2)	no response (0)	Would not drink the tea. The cold water is clear, comfortable, but could tell it came from near the land as there was a vegetal taste. The boiled water was clear and had a taste of metal.
August-04-18	1S	Tłı̨chǫ	Natasha	Surface	cold (3)	Shallow (1)	Clear (3)	Some (2)	Green (2)	Good (3)	Good (3)	Good (3)	The tea was clear and tasted good, similar to back home. Red rose is good, boiled tea is the same. The cold water looks clear just like the cup and tastes good. The boiled water tasted similar to others.
August-04-18	1S	YKDFN	Zach	Surface	cold (3)	Shallow (1)	Clear (3)	Some (2)	Green (2)	Good (3)	Average (2)	Average (2)	The tea doesn't taste like anything other than tea. The cold water tasted swampy and grassy. The boiled water tastes like log and firewood- it was okay. Just make sure there is no smoke or it will taste smoky.
August-04-18	1D	KIA	Regan	Depth	no response (0)	Deep (3)	no response (0)	no response (0)	no response (0)	Good (3)	Good (3)	Average (2)	Tea tastes very good and pure. The cold water tastes pure compared to the 1m, very good. Smooth water, no bitterness. The boiled water tastes pure with smoke and pot taste.
August-04-18	1D	LKDFN	Eric	Depth	cold (3)	Shallow (1)	Clear (3)	Still (1)	Green (2)	Average (2)	Average (2)	Average (2)	The tea tastes better. It's plain but the water is healthy. The cold water tastes better than the first sample. The boiled water still tastes smoky.
August-04-18	1D	NSMA	Joanne	Depth	cold (3)	Deep (3)	Clear (3)	Still (1)	Green (2)	no response (0)	Good (3)	no response (0)	The cold water was clear and a bit better than the tea water. The boiled water was also better than the first.
August-04-18	1D	YKDFN	Zach	Depth	cold (3)	Shallow (1)	no response (0)	Some (2)	Green (2)	Good (3)	Average (2)	Good (3)	The cold water tasted better than the tea test. It was also clear and tasted similar to rain water. Th boiled water tasted averagely good.
August-04-18	1D	Tłı̨chǫ	Natasha	Depth	cold (3)	Deep (3)	Clear (3)	Some (2)	Green (2)	Good (3)	Good (3)	Good (3)	Tea is tea, it tastes the same. There were no rings in the cup, the first one did, but this one didn't. The cold water was similar to the tea, and as clear as the cup. The boiled water tasted good, same as the last one.
August-04-18	2S	KIA	Regan	Surface	no response (0)	no response (0)	no response (0)	no response (0)	no response (0)	Average (2)	Good (3)	Good (3)	Tea has nice gold colours, very good tea. Taste of metal from the pot- two bugs spotted. The cold water tastes very good, no bitterness. Water was clear with fresh taste. The boiled water was good, made a big difference! No bitterness or scum at the bottom. Had a smoky taste for some participants.
August-04-18	2S	LKDFN	Eric	Surface	Average (2)	Deep (3)	Clear (3)	Running (3)	Green (2)	Good (3) & Average (2)	Good (3) & Average (2)	Average (2)	Tea tastes very good. The cold water tastes the same as 1A. The boiled water had an average taste (average joe blow).
August-04-18	2S	NSMA	Joanne	Surface	cold (3)	Deep (3)	Clear (3)	Some (2)	Other: Blackish/Blue (1)	no response (0)	Good (3)	no response (0)	The cold water was still. The boiled water was not as good as the deeper sample, tasted a little still.

General Information					Ratings and Observations of Water Quality								
Date	Sample #	Aboriginal Group	Recorder(s)	Location	Temperature	Depth	Clarity	Movement	Colour	Tea Test	Cold Water Test	Boiled Water Test	Other Observations/Notes
August-04-18	2S	Tłı̨chǫ	Natasha	Surface	no response (0)	no response (0)	no response (0)	no response (0)	no response (0)	Good (3)	Good (3)	Good (3)	The tea tasted the same as the ones before- no difference. The cold water tasted good and looked clear. Tastes the same as water back home. The boiled water was similar to cold water, but there was a little bit of taste of smoke.
August-04-18	2S	YKDFN	Zach	Surface	Average (2)	Deep (3)	Clear (3)	no response (0)	Green (2)	Good (3)	Good (3)	Average (2)	The boiled water tasted like smoke.
August-04-18	2D	KIA	Regan	Depth	no response (0)	no response (0)	no response (0)	no response (0)	no response (0)	no response (0)	no response (0)	Good (3)	Boiled water had nice gold colours. Tastes very good, no scum.
August-04-18	2D	LKDFN	Eric	Depth	Average (2)	Average (2)	Clear (3)	Some (2)	Blue (3)	Good (3)	Good (3)	Good (3)	The tea tastes so good. The cold water tastes the same as the tea, very good. The boiled water tastes like smoke- there is flavour in there.
August-04-18	2D	NSMA	Joanne	Depth	no response (0)	no response (0)	no response (0)	no response (0)	no response (0)	no response (0)	Good (3)	Good (3)	The cold water and boiled water were the same- clear.
August-04-18	2D	Tłı̨chǫ	Natasha	Depth	no response (0)	no response (0)	no response (0)	no response (0)	no response (0)	Good (3)	Good (3)	Good (3)	The tea tastes good- whoever collected the water must be lucky. The cold water tasted similar to the first cup of tea water. The boiled water also tasted similar to the cold water.
August-04-18	2D	YKDFN	Zach	Depth	no response (0)	no response (0)	no response (0)	no response (0)	no response (0)	Good (3)	Good (3)	Average (2)	Tea tasted like orange pekoe.
	Averages:				**cold (3)**	**Average (2)**	**Clear (3)**	**Some (2)**	**Green (2)**	**Good**	**Good**	**Average (2)**	

Note: In general, the ratings are scaled so the higher the number, the more positive or healthy the water

# of water samples = 4 samples (2 at depth and 2 at surface)

# of completed forms = 20 forms

3.3.2 Water Quantity

Particularly in the last few decades, northern community members have reported changes in water quantity largely associated with environmental change. Such fluctuations are often outside of the range of people's knowledge or experience. On several occasions, Jonas commented that the water seemed lower than he remembered:

> I was here once already in 2012 and I noticed one thing so far - the water went down a bit.
> - Jonas Sangris, Daily Notes, August 3, 2018

> The water level on Lac de Gras seemed lower, this year it is higher on Great Slave Lake.
> – Jonas Sangris, Verification Session, December 2018

Ernest also commented on how water levels seem to be lower:

> Used to come here 40 years ago and we could drive the boat right up through the Narrows. I'd lead 3-4 boats. Water level used to be a lot higher. I don't know why it is too low. Even in Kugluktuk, the water level is lower.
> - Ernest Boucher, Storytelling at the Narrows, August 4, 2018

3.3.3 Water Quality Scientific Testing Results

Community participants were involved in conducting and observing scientific monitoring for water quality in Lac de Gras. Participants selected two sites and water quality samples were taken from one depth (Table 3.3-2). Participants were shown how to take many different types of samples. During the training session, some sampling procedures at the TK stations were only conducted for training purposes and not submitted for analysis. The sites selected were classified as TK1 and TK2, and samples were taken at one depth for each station, 2 m at TK1 and 20 m at TK2. A complete set of laboratory results is included in Appendix 5.

Table 3.3-2 shows the results of the water quality sampling done at TK1 and TK2 in relation to Diavik's water license requirements and CCME drinking water quality guidelines.

Table 3.3-2 Scientific Water Quality Sampling Data

Parameter	Units	TK 1	TK 2	CCME Drinking Water Guideline	Diavik Water License Requirement
Total Aluminum (Al)	mg/L	0.00719	0.00721	n/a	1.5
Total Ammonia (N)	mg/L	0.012	0.016	0.2	6
Total Arsenic (As)	mg/L	0.000337	0.000305	0.01	0.05
Total Cadmium (Cd)	mg/L	<0.000005	<0.000005	1	0.02
Total Chromium (Cr)	mg/L	0.000054	0.0001	0.005	0.0015
Total Copper (Cu)	mg/L	0.000582	0.000584	0.05	0.02
Total Lead (Pb)	mg/L	<0.000005	<0.000005	0.01	0.01
Total Nickel (Ni)	mg/L	0.000639	0.000654	5	0.01
Total Zinc (Zn)	mg/L	0.00019	0.00064	n/a	0.05
Total Nitrite (N)	mg/L	<0.000001	0.0000044	3.2	1
Total Suspended Solids	mg/L	<4.0	<4.0	n/a	15
Total Dissolved Solids	mg/L	18	16	≤500	n/a
Turbidity	NTU	0.38	0.27	0.1 - 1.0	10
pH	pH	6.95	6.67	6.5 - 8.5	6.0-8.4

Figure 3.3-2 Water Sampling Photo Collage

The results in Table 3.3-2 show that the quality of the water in Lac de Gras remains good because samples taken during the TK camp had levels less than those required by the Diavik water license, and lower than the Canadian Drinking Water Standards (Table 3.3-2). Water quality results from scientific results and TK support the same general conclusion that the water is still good in Lac de Gras.

3.4 Excursion to the Narrows

The group took an excursion to the Narrows on August 4, 2018. While exploring the land around the Narrows, Terri and Nancy talked about the importance of berries while filling bags of berries; Jonas, Julie and Ernest, shared stories while perched on rocky outcrops surrounded by their ancestors' footsteps; and the youth wandered the land, quietly casting and exploring caches, caribou trails and more. Notes from the trip to the Narrows are included in Appendix 6.

> Beautiful country. Lots of seagulls here when we arrived. They are fishing. The youth have some fish already I think . . .. When they come out here in the old days, because of the current, the ice is not too thick, so they set nets. Go out there and cannot break ice, 6-7 feet so they set nets here. Fish for dogs when they had a dog team. Lots of Ekwò, caribou.
> - Jonas Sangris, Storytelling at the Narrows, August 4, 2018

The Narrows is well-known as a key crossing location and so much of the discussion centred around caribou, as Julie explained:

> I think people have been in this area because there are lots of caribou here at the Narrows. The population is not down. There are lots of caribou still, they are probably hiding. Sometimes if you go boating along the shore awe may see caribou. When we walk on the caribou, if we are lucky, we might see caribou.
>
> Q. Is there anything you need to do to keep your caribou luck?
>
> The only way we are lucky is when we go somewhere, a new part of the world and we offer gifts to the land. That is the way we are lucky, giving gifts to the land. There are legends from our ancestors that if we go boating and see growth like this, take a little piece and offer it to the water, we may see caribou. That is how our ancestors did it and how we do it to this day.
> - Storytelling at the Narrows, August 4, 1028

Terri and Nancy shared memories of picking berries with family and how this was wonderful time together (Figure 3.4-1). Cloudberries, cranberries and blueberries were a very welcome and vital source of nutrients for people in the days when "there was no store." As in the past, summer and fall are important times to stock up on berries for the winter. Berries have always been cherished food either alone or added to pancakes, bannock, tea and fat or made into jam. People also continue to use berries and other parts of tundra vegetation (e.g., dried mushroom powder, spruce gum, lichen) in a poultice to

heal cold sores, scrapes or wounds. People still dry berries such as cranberries to enjoy throughout the winter.

> Picking with elderly women that go out all the time. They tell me which plants I is can take for medicine. It is not just any kind you can take. Before taking anything from the plant you have to give tobacco to take something from the plant.
> – Terri Enzoe, Storytelling at the Narrows, August 4, 2018

Men and women are considered plant experts, although women generally spend more time picking and processing berries.

> Q. Are women always the experts for plants?
> Terri – The men too.
> Nancy – Both are in my area. Everyone tells stories and teaches.
> - Storytelling at the Narrows, August 4, 2018,

Following the trip to the Narrows, Julie Wedzin expressed her appreciation:

> I am happy I came on this trip; it makes my heart feel strong. The land is beautiful, it is good to be here. It makes you feel young; I am going to tell stories when I get home and tell about how I ran around the tundra like a young girl!
> - Daily Notes, August 5, 2018

During the last camp, Madelaine Drybones described caribou trails at the Narrows, so Terri promised to return to her community and share her experiences and observations visiting the Narrows.

Returning to the Narrows was a powerful experience that inspired much storytelling, reflections on the past and the challenges of today. Key topics shared are highlighted throughout the report and particularly in Section 5.0.

Figure 3.4-1 Plants Photo Collage

4.0 Lessons

Throughout the camp, the Elders were constantly teaching youth through both dedicated sessions and general discussions throughout the camp. Examples of some teachings included:

- Knife sharpening
- Safety
- Traditional laws and customs
- Bannock making
- Building a Drying Rack

Notes were not taken during the bannock making or drying rack construction lessons, but they were video documented and returned to communities.

4.1 Knife Sharpening Lessons

A key recommendation from 2015 was to carry out a knife sharpening session in 2018. When the group arrived on-site, it became even more important to conduct the session as the fillet knives were dull. Wayne led the session along with Terri, Ernest, Bobby and Nancy to show youth how to care for their knives. While the group tried to use some sharpeners provided, they didn't work well, and the group became frustrated. Nancy and Bobby then demonstrated how to use a rock or two knives against one other to sharpen the blade. Granite is the best rock to use to sharpen an ulu. Wayne joked that he wished he had brought his electric knife.

4.2 Safety Teachings

Kyla Gray, Sean Sinclair and Shelby Skinner provided a Health & Safety (H&S) presentation during the first day of the camp (August 2). Colleen explained the importance of a daily H&S routine, including morning check-in and end-of-day debriefs. The target for the AEMP TK Camp is zero injuries. Kyla emphasized that people should follow traditional protocols when the camp participants go out on the land, combined with DDMI protocols. If these are followed, everybody should be safe. Everyone should look out for one another. Check in every two hours by radio. Kyla reviewed boat safety (e.g., minimum of two people and max of five per boat, bring radio, life jackets, no boating above 15 knots of wind, safe boating zone for the lake), fish cutting (e.g., use of gloves), and forbidden activities (e.g., swimming, hunting). Kyla explained that the cook is the trained medic for the camp. There is no hunting while at the camp. Life jackets should be worn while on the dock. If participants go beyond the bear fence, they should bring bear spray and/or air horns and travel in pairs, at a minimum. Kyla reviewed fish catch limits, including 50 lake trout and 20 whitefish, according to the permit from the DFO. Colleen also explained timeframes for boating activity (i.e., no later than 8pm).

Throughout the camp, the Elders were constantly sharing traditional laws around safety and survival. In the past, this traditional knowledge expertise could mean survival.

> [My dad] taught me a lot of things, how to survive in the bush. It was cold in those days. If you going to sleep like that, you going to freeze. He told me to get up and make a fire. Make some tea. I was thinking how to get water. Go outside, he said, Take the top snow and use the bottom snow, that is the best, give you lots of water. That time, in the fall, freezing rain. That is the best. Out here there is nothing, no store. If you are cold, you need to get wood that is the only way you are going to survive. If you are thirsty you have to make water. If you hungry, you have to hunt. If you don't kill anything, you'll starve to death. That is how they taught me.
> - Jonas Sangris, Storytelling at the Narrows, August 4, 2018

4.3 Traditional Law, Customs and Practices

The camp provided an opportunity as a large group to practice laws and customs that relate to respecting and caring for one another. Spending time outdoors on the land as a group also provided opportunity to demonstrate traditional rules around caring for fish, water, and the land. Some of the practices held at the camp included:

- Feeding the fire (greeting ancestors and praying to the Creator for good weather and safety)
- Paying the water (offering leaves, branches and other elements to the lake for safe travels)
- Being grateful and expressing gratitude
- Helping one another
- Stewardship for the plants and animals
- Respecting Elders and each other
- Respecting and communicating with the plants and animals

Whenever they could, the Elders took time to teach youth about important cultural practices and rules through storytelling and teachings.

> Traditional law, it means that the First Nations, they got the old law. What to do and what not to do. Those are the things that [non-Indigenous people] that's what they call it. It means . . . people say that's our law, traditional state. So, we have our traditional law. What to do and what not to do. Those are some of the things that we still follow today. I noticed in a couple of years they started using that kind of stuff, traditional law. You know, that's very important. That's elders work, you know? And the, all the stuff like that.
> - Jonas Sangris, Interview, August 3, 2018

> I see some practices coming back, paying the land. Feeding the water. Paying the fire. That has to do with the relationship and the way we understand the spirit.
> - Jonas Sangris, Interview, August 3, 2018

Traditional laws are important for people in terms of caring for one another and living a good life, but they are also a way to tie people to their Elders and ancestors:

> You should never lie to people, you know? Be healthy, you know? Stuff like that. There's about 10 or 12 of them that you have to do, you have to know. So, if anybody goes out on the land, you know, what do you take? First thing is your matches, guns and bullets. And the rest, you'll be okay because you live off of animal out in the land. That's the thing that they taught, [Foreign language 00:01:40], they call it, that's animal, wildlife. So, you always have to remember that.
> - Terri Enzoe, Interview, August 3, 2018

> Traditional law has been in place for years, many years and a lot of people follow it. I know they started following it before it wasn't like that. Now it is good that you follow those kinds of words. If you say traditional law, then right away you think of the elders that put it together. You know, those are very important to us.
> - Jonas Sangris, Interview, August 3, 2018

The youth know the importance of these traditional laws and are already working to learn and remember them, as Mason and Zach discussed:

> Zach: We have ten Dene laws from Yamoria, he's a great medicine man from back in the 1700s maybe even longer than that. He gave us the ten laws: share what you have, be thankful, be polite to one another, respect your elders and if you overhunt feed, feed those around you, feed your friends, your family. Everyone together is basically one family.

> Mason: Yeah it just like what I learned and ... they said that, don't hunt. I mean you can hunt for today and tomorrow but don't hunt for the day after tomorrow. Like just keep that in there, like, don't try to take out all the fish and drink all the water, just save some, like I said.
> - Interview, August 5, 2018

Grounded in necessity, another typical law in Indigenous culture is to get the work done when the weather or conditions provide the opportunity. For example, regardless of the time of day, when an animal was harvested or a fish net pulled, people had to come together to prepare the meat. This traditional law was reflected in the way the Julie advised the camp participants about getting tasks done before resting in the luxury of storytelling:

> It would be good to have nice sharp knives to work with the fish and make dry fish. When would the interview be? There are lots of stories we can share, I'd rather see the tasks done first.
> - Julie Wedzin, Daily Notes, August 3, 2018

For some of us we tell legends and stories in evening camp. Especially the youth. Over the summer, a couple of youth asked us what kind of story are you going to tell us today. So I tell them stories and legends and the law of the land and our ancestors. I tell them a lot of those stories. In late evening when everything is done for the day and we're sitting around camp. Youth ask me for stories and I give them without hesitation. All legends and stories. Telling stories is one of our elder's traits. The rules and the laws of the land.

- Bobby Algona, Verification Session, December 7, 2018

Figure 4.3-1 Interviews Photo Collage

5.0 Storytelling, Traditional Knowledge, Reflections and Observations

Beyond the observations from Elders about the health of fish and water quality in the Lac de Gras area, are the extensive, rich teachings about a variety of themes shared daily (Figure 4.3-1). While the focus of these interviews was on fish and water, the breadth and depth of the insights shared speaks to the holistic and comprehensive nature of TK. That is, the knowledge of fish and water is situated in a much larger context of information, activities, beliefs, and customs. This includes the relationship of fish and water to other species of flora and fauna, the connection across geography and generations, traditional land uses as well as the spiritual realm. Thus, this Section is presented as follows:

- **Section 5.1** provides an overview of how participants acknowledge the healing power of the land.
- **Section 5.2** delves into the importance of relationships, built over time, as a strong foundation to working together.
- **Section 5.3** elaborates on the importance of relationships by exploring the concept that we are all related and the importance of relationships between all people regardless of their origin (i.e. everybody as one).
- **Section 5.4** explores the connections between Elders and youth and their importance in both passing along traditional ways of knowing and building a strong future.
- **Section 5.5** explains the strength in traditional knowledge holders and scientists working together and learning from one another.
- **Section 5.6** honours the powerful women who inspired all participants throughout the camp with their strength, fortitude, generosity and wisdom.
- **Section 5.7** discusses perceptions around mineral exploration and development impacts to the environment.
- **Section 5.8** reviews observations of environmental change due to changing climate and how this impacts aquatic health.
- **Section 5.9** speaks to the importance of Indigenous peoples reclaiming their roles as guardians and leading monitoring initiatives today and long into the future.

Each of these themes are explored in this Section.

5.1 Healing Power of the Land

In the North, cultural identity has long been tied to the relationship between people and the land. Being “on the land” provides the backdrop to the many customs, practices and traditions expressed.

> I'm not new. I'm reincarnated. I've been here before and for some reason I'm back. . . I'm always travelling out on the land. I think land is a beautiful, peaceful place to go to when you're stressed out, there's so much things that are happening in your life as you're growing up. So I just go out on the land and that is the only way I can heal myself instead of going somewhere else…. Land is really important to me. I don't think you need anything when you're out there, you can, you can speak to trees, the water, the ... or the plants. They would listen to you, but they wouldn't talk back, but do you ever

> hear that whistling in the wind? This is just like somebody's talking to you.
> - Terri Enzoe, Interview, August 4, 2018

These strong practices bring people together and provided the backdrop for all activities that took place during the camp. Given that the cool, rainy and windy weather, making sure these practices were followed became even more important for group health and safety.

> And then we pay tobacco every 10 minutes if it is windy. We always tell the youth to have lots of respect for the land. You know when you're never there, you pay tobacco, even to the water too. And especially where it is a spiritual place, you have to have a lot of respect where you're supposed to be quiet and you don't talk. You have to pay the water.
> – Terri Enzoe, Interview, August 3, 2018

Another traditional law is that spending time in nature allows people to feel healthy, relaxed and connected to what matters:

> I am happy I joined the trip. It makes me feel strong and well to have a strong heart to be here. The land looks beautiful. It is good to be here. We are happy to be here amongst these people around this group. Us elders they feel young now, out here.
>
> Her interpreter explained: “She is going to telling stories when she goes home. She’ll say she was running on the tundra like a young girl. One day.” [laughter]
> - Julie Wedzin, Storytelling at the Narrows, August 4, 2018
>
> One day when we're out, we were out in the barrenlands, he told me, ‘Mom, how do you feel being out here?’ I said, ‘You know what? I feel lightheaded (care-free). I feel good about myself. It is so peaceful. I can go on the lake.’
> - Terri Enzoe, Interview, August 4, 2018
>
> We're teaching our young people how to do stuff like that now, which is really nice. ... before we lose it, we might as well teach the young people. Even the ones that are here with us, you know watching and fishing, it seems like they are happy to be out here. You know ... because there's too much electronics. They are into their iPods, iPads and stuff like that. When I was growing up, there was nothing like that.
> - Terri Enzoe, Interview, August 4, 2018
>
> In the bush, eh? Uh, guys that's a good life there. I did that for a year and I was in the Gordon Lake. I went there in the fall, I came back in March. Oh man, that was the best time of my life. Yeah.

Being on the land is the strongest way to keep traditional knowledge alive as it provides the opportunity to see how the water, land, air, fish, wildlife and more are all interconnected:

> One of the things that elders always talk about is, you'll watch the birds. You'll watch the geese because they'll go north. Then they lay their young, they come back. And there's always a line. Two lines, one beside and one beside. The elders looked at it and they say, "Well, to the north is long line. To the south is short line. So it is going to be lots of caribou coming down on this side, on the north side". They watch out for stuff like that, eh? So they know where the caribou going to be. And also, when they were camping like this at night, they watch the northern lights. They watch the northern lights and you see the northern lights; the northern lights like to go towards the south. So they'll go that way. And the elders, they will go over there. They're going to go hunting that way in the morning, they said. So it was stuff like that, they usually do. Because when the caribou would make noise to the feet, they would rub together, eh? Took, took, took, go like that. So to the south, so they always go that way. So they know where the caribou are. Most stuff like that they know, eh?
> – Jonas Sangris, Interview, August 3, 2018

Beyond the important work of monitoring aquatic health, the AEMP provides people the opportunity for renewal and connection with nature, self and one another.

5.2 The Importance of Relationships

Camp participants reminded everybody that without spirituality we would not have the depth of understanding that exists within TK. This was demonstrated in several ways on a regular basis. It takes the form of ‘paying the land and water’, conducting prayers and ‘feeding the fire’ ceremonies in which everyone is invited to participate. Elders speak about the importance of demonstrating respect for the land, water and all beings whether they be plants, animals, water or rock or humans. Their understanding of creation lends itself to a deep and loving relationship with the natural world. TK cannot be considered - let alone understood - in isolation of this important context. All living things are sacred and understood as being gifted to us with tremendous life-giving and/or healing properties.

TK is also seen along a time continuum stretching into the past with reference to ancestors, spanning into the present with the Elders and looking forward to the future with the youth. Building on the past, TK of the present exists within a relational context in that it is transferred from person to person based on a pre-existing relationship (e.g., Elder-youth, Elder-Elder, or Elder-Euro-Canadian); TK does not exist in a void or vacuum. So, the importance of respecting others, treating others well, and taking care of one another becomes important to ensure proper transfer of knowledge.

Many participating Elders have been working together on Diavik TK initiatives such as the AEMP and TK Panel for upwards of ten years. They have built strong foundational relationships that echo those of their ancestors who commonly met in the same area for thousands of years. This commitment and continuity over time allows for more intimate and meaningful sharing as well as playful teasing that only friends can share.

Teasing as well as laughter were often heard across the tundra, around the fire and coming from the tents. Having fun and enjoying what you do is also very important, as taught by the Elders. Indeed, these are important values within northern Indigenous cultures.

> But one of the things the elders said that I (laughs) always remember is that, where I was hunting in MacKay Lake in the summer, in the fall, three old guys went hunting. Sitting there shooting caribou and there goes whiskey jack. So, no matter where you go, even at 40 below they still show up. You know? He showed up and one old man said, 'I wish I was like whiskey jack.' (Laughs) one of others say, 'Why?' 'Well they fly around, look at everything. You know, they're happy.' And he said, 'Oh, well it is one thing,' he said, 'but they don't have bills to pay.'
> - Jonas Sangris, Interview, August 3, 2018

New friendships between the youth were also forged:

> We will probably not see each other for another couple of years or so and that weekend that happened because friendship comes a long way especially when it comes from a nation to a different nation. We just have to acknowledge that the land and the water is, isn't going to be like it was like 50 years ago, so we have to do our best to acknowledge it and just work to preserve it and protect it.
> - Zach Sangris, Interview, August 5, 2018

> My weekend here was pretty nice . . . especially seeing you guys again, and some other new faces around the camp. And yeah, it is just been a great weekend.
> - Mason Beaverho, Interview, August 5, 2018

Friendship, laughter and respect for one another together are the strong foundation that fosters a sense of family, as noted by the sentiments shared by many Elders and youth on the last day of camp. The concept that "we are one" meant that knowledge systems were equally valued, all expertise was important (whether held by a youth, biologist, Elder or consultant), and that differences between people came together to balance the group as a living whole.

> This weekend for me has been amazing. Everybody around here is like a whole family together, everyone's so nice to each other. The food is great, going out boating, catching fish on the dock, going out to check the fish nets was also fun, doing it hands on. Everything was amazing.
> - Zach Sangris, Interview, August 5, 2018

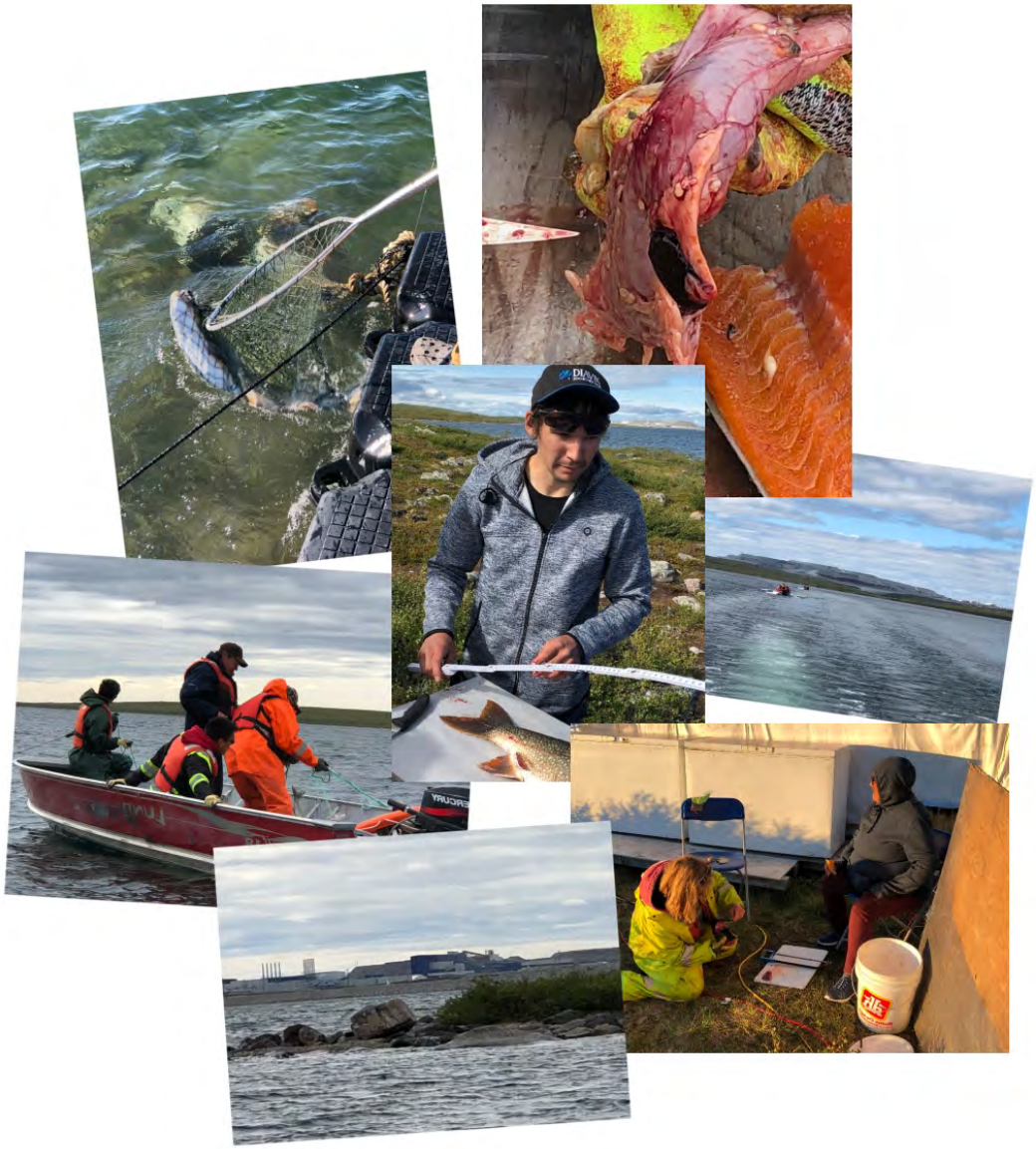

Figure 5.2-1 Working Together Photo Collage

5.3 Working Together as Nations

Regardless of where people were from, they worked together throughout the camp and expressed the importance of continuing to collaborate in the future (Figure 5.2-1). Each Nation understood the value of doing this important work together now and into the future. Interest in ongoing collaboration has been expressed consistently over the years and people are determined to find a way to work together long after all the mines have closed.

> We have to watch out for one another and be united as one. There are many issues we face but it is important to talk and learn and teach the next generation to have a better life. Our elders have spoken in a similar way as to what we say today and we speak for the next generation.
> - Jonas Sangris, Verification Session, December 7, 2018

> I thank the group for their knowledge and stories that you all shared. I gained knowledge from you also. I'm from the barrenlands and others live in the treeline.
> - Bobby Algona, Verification Session, December 7, 2018

> For people to get stronger, we all need to work together to keep our land clean.
> – Nancy Kadlun, Interview, August 5, 2018

> In the future I would like it if we work together, that's the only way...If we don't work together, the land in the future will be all gone... it will be all gone for young generations. For sure, I know that. That's what's happened in the South, eh? It is going to happen right here. And we've got a big country. Really big country. Rich country too. We're not hungry. We just go fish; we can get a fish any time we want. Yeah. People are starving on the other side of the world. Beautiful people. Yeah.
> - Ernest Boucher, Interview, August 5, 2018

Even language barriers did not prevent people from communicating with each other.

> The people in my tent we all speak different language, but I made signs for Julie to tell her when dinner was ready. The happiest time for me was driving the boat, and the ladies in the boat with me were great. Wayne, I got him wet when Kathy sat in the front (laughter). Coming here and teaching the youth when we come is a very good thing to learn from one generation to the next. I played dumb when I came here, I know how to do fish sampling and water sampling because I want the youth to learn. So next time when I come back, I can do it. I work for Ni hat ni (a community-based monitoring program) and we make sure the mother earth is clean when we leave camp. When you smoke, you don't leave it on the ground as it will stay here forever. My kid taught me that. Don't throw your garbage on mother earth, you bring it home no matter where you leave. We were taught this by our Elders. Marsi cho.
> - Terri Enzoe, Daily Notes, August 6, 2018, 2018

> It helps me gain knowledge from my elders and neighbouring Aboriginals that we learn from one another. At the same time, through the Agreement, the people who are involved are the care-takers of the land so that it can be monitored. I want to thank you for that.
> - Peter Huskey (Interpreter), Verification Session, December 7, 2018

The youth recognize the importance of different Nations working together and they understand that it is the common commitment to a healthy environment that will continue to draw them together.

> There are our elders that spoke about the monitoring that would be taking place and it is happening today. We do this for our young people and there is no income and less and less trapping. Without employment, we can't survive. We have to watch out for one another and be united as one. There are many issues we face but it is important to talk and learn and teach the next generation to have a better life. Our elders have spoken in a similar way as to what we say today and we speak for the next generation.
> - Jonas Sangris, Verification Session, December 7, 2018

> It is very good that all of the different groups of people are coming together. We all agree with one thing and that's water, land, fish, animals, we all care about the same things and it doesn't really matter if we're all different people. I'm sure nature will take care of us if we take care of our Mother, so that's our main goal – keep it as healthy as we can!
> - Zach Sangris, Interview, August 5, 2018

> It doesn't really matter where we're from, all that matters is that we're living the same lifestyle. I've seen the 2015 (camp) video and that they were talking about how, the way they gutted the fish was different (from different communities). Even though they did it differently, it doesn't really matter how they did it as long as it is being done. It is just really nice seeing other nations come together, agreeing and just seeing it with our own eyes because like I said this is our land, this is our water and we have to do our best to protect it and preserve it for the future.
> - Mason Beaverho, Interview, August 5, 2018

The youth were eager to express their gratitude for the opportunities to work together to protect the environment (Figure 5.3-1). They also recognize that as Canadians we are fortunate to have so much land and clean water:

> And we're lucky living in Canada, all across the country there's a whole bunch of fresh waters here and there. Some countries don't really have that and it is just quite sad that they don't experience what we experience. It is a shame that some youth don't recognize that and I'm glad that youth like Zach and Regan and Erik and me from different nations acknowledge that, so it is good. — Mason Beaverho, Interview, August 5, 2018

Figure 5.3-1 Youth Photo Collage

5.4 Elder-Youth Connections

While camp participants expressed a desire for a stronger Elder-youth connection, they identified linguistic and logistical challenges (e.g., year-round school) to establishing and maintaining this connection. Elders expressed gratitude for the opportunity provided by the program for fostering teaching and transfer of knowledge about the environment, resources, history, ceremonies, drumming, and stories. In turn, youth were grateful to learn directly from their Elders and through their experiences. As in previous camps, each youth was instructed to assist the Elders in carrying their luggage, fetching meals, getting on/off boats, and making sure they had tea/coffee: the youth made sure Elders were comfortable and safe (Figure 5.4-1).

The youth at this camp were outstanding, each in their own way. It took some a little longer than others to show their individual strengths but by the end of the camp they all received acknowledgements of their strengths. Organizers are keen to explore ways in which the youth component of the camp experience can be enhanced even further.

> Great to hear from the youth especially the openness and desire to learn and to help the elders. My heart is warmed every time I see you elders and I'm grateful you are well enough to come back and be a part of this.
> - Joanne Barnaby, Daily Notes, August 3, 2018

Throughout the camp, the youth showed a profound interest and kindness in helping the Elders. For example, Mason Beaverho often volunteered to stay behind from an activity to watch over his Elder, Julie, even when it meant missing an exciting excursion such as the boat trip to the Narrows. In the end, Julie felt strong enough to go and so Mason went too. This was just one example of his selfless care for others.

> I'm feeling ok, but I'll stay behind with Julie and Peter can go.
> - Mason Beaverho, Daily Notes, August 4, 2018

The youth were always keen to lend a hand. Every night, Regan and Eric would gather the fish guts in a bin and go out in the boat to dump them away from the camp so as not to attract wildlife. Zach set the tone for the camp when during the opening circle, he offered his help:

> I like to move around, not sit still so ask me to help. I'm really excited to be here.
> - Zach Sangris, Daily Notes, August 2, 2018

> I'm thankful for the youth and them going fishing at the dock and catching fish and I hope they do that in the future to continue doing what they learned.
> - Julie Wedzin, Daily Notes, August 6, 2018

> That is Regan. He knows what is going to happen ahead. That is special. He is always helpful and sees things. The old lady asked for salt to feed the fire. She saw the rain was coming and she asked for salt. It helped. She lived on the land and she knows these things.
> - Jonas Sangris, Daily Notes, August 6, 2018

The camp provided opportunity for Elders to interact with youth and vice-versa; however, many participants lamented that such opportunities are not as frequent as they should or could be and that youth today live in a world that makes learning from the Elders challenging.

> Zach: [The Elders] taught me some things that I never knew and, and it is basically a learning process being here. You get to learn new things all the time every single day. Nothing really changes, always a learning process.
> - Zach Sangris, Interview August 5, 2018

> Mason: Yeah and I would say the same. When I was in Whatì I had a really tough time trying to speak my language, mainly because the people that I socialize with don't really speak, you know, Tłı̨chǫ so when I was out here it was really nice to talk to Jonas and Peter and catch some new words here and there. With other elders like Bobby and Wayne and them, that was really nice being with them, and (laughter) that was really nice hearing some good stories here and there.
> - Mason Beaverho, Interview, August 5, 2018

> Through the Environmental Agreement, the mine set up this camp to watch the fish and water. I think when they first started the mine, everything was written on paper. The predictions they were predicting on science and now they brought in the TK. The TK and science are working together, and they are producing books and video to bring these together and it also brings the signatories to the agreement together, the KIA all of us, together and work together. Our time here together is very valuable for future generations. If they read the report, they will learn what we've seen, and they will continue to learn.
> - Peter Huskey, Daily Notes, August 6, 2018

These Elder-youth interactions inspired many camp participants and brought optimism for the future:

> My husband is not with me and I don't have my parents. I feel like an orphan and face difficult times. But I've heard a lot of good things here and for future generations we are seeking answers. Those things that the youth learn from us and scientists for employment. My grandchild I raised, I don't know how things will take place, it may be worse than it is today. When I hear you speak, it makes me stronger as I listen to you. We don't know what will be taking place in the future. That's what I think. Masi.
> - Julie Wedzin, Verification Session, December 7, 2018

It was really nice to see with my own eyes that the fish and water here are healthy instead of reading reports. . .. We share the same lifestyles we use the fish and the weather and things aren't different for us. It is nice to see the fish and water are healthy.
- Mason Beaverho, Daily Notes, August 6, 2018

We spent some time talking to the youth about what they think about the future and what they think about what is happening here in Lac du Gras. I was overwhelmed by the knowledge and strength of these youth. Sometimes it is hard to learn to be strong in two worlds, but sometimes being strong in the other world takes them from the land. It is good that Diavik gives them this opportunity to come out on the land. Not only to see that the water and fish are healthy but that the people and cultures are healthy.
-Natasha Thorpe, Daily Notes, August 6, 2018

I so appreciate the youth. I am confident in the future because of them. Each one of you have unique strengths and gifts. I see the leadership in you already and that makes me feel really good. I had a really special visit from a wolf, a mama bear and a cub. I had an experience that I am still growing from and learning from and to be visited by the wolf, cub and mama bear is really special. I dreamt about it last night and I feel strong.
- Joanne Barnaby, Daily Notes, August 6, 2018

And from the traditional knowledge that my elders and my grandmother's stories and my father's stories. My millions of questions for my father. I have gained all this traditional knowledge from those, from my elders. The majority of it, from my father and my grandmother. It is one of those many stories that my grandmother has been giving us as children growing up very small, small children. And we're always asking many questions about a lot of things
- Bobby Algona, Interview, August 3, 2018

I kind of meet the young, because I'm always the one that's speaking out. I always tell the young people; I think it is time for you to speak up. It can't just be me, because I'm not going to be here forever.
- Terri Enzoe, Interview, August 3, 2018

I'm so happy about the youth coming because they learn lots from hearing. As I was a young girl my mom would talk to me how future's going to be like. I seem to forget it all and then after I had my kids her words came back to me strongly, and I'm, I'm so proud of that. And I would really, I really like when the youth come because if they hear and learn of what is happening, that will never go away and they should be, they're going to be passing it down in the future.
-Nancy Kadlun, Interview, August 5, 2018

> I am from N'dilo, just outside Yellowknife, and I was born and raised there. My great grandpa took me out on the land once and he took 3 things: string, matches and a knife. I was about 7-8 yrs old and he left me on the land for a few days and told me to survive. I survived and am still here today. I love being here and helping, ask me for anything. I like to move around, not sit still so ask me to help. I'm really excited to be here.
> - Zach Sangris, Daily Notes, August 2, 2018

It is not easy for youth today given many challenges within the community, for example, the legacy of residential schools, the influx of drugs and alcohol, competing responsibilities between traditional life and wage economy.

> My grandparents raised me to tell stories of the past. They predicted how people will be raised in the future and how these alcohol and drugs and that young people will depend on the elders to teach them. They don't know the stories of our ancestors and the sharing of these stories is very important. They should maintain these stories and maybe in the next 3 yrs we don't know what is going to happen. We want the youth to live a healthy lifestyle and we want to share these stories and prepare the fish and make dry fish. They will see and learn this. We will talk about the fish. How they collect and test water. Those are things for the youth to learn. Within the school system, we should ask the teachers to select the individuals to go on the tundra and do the monitoring. So if they are asked and interested, they can come.
> – Julie Wedzin, Verification Session, December 7, 2108

> If they got nothing to do and no work, they'll get in trouble. That's what is happening now. I feel sad for the younger people today. Put them out here, they will survive. Put them downtown, they break windows, go to jail so they can get 3 meals a day. In the fall, you see the routine, the kids go to jail for the weekend. They are not bad. I remember one of my cousins, working at the mine. What do you do? I drive trucks. You have a licence? No, he said, but they are desperate to work. Now, last year, one guy has no school, cannot read. No academics. He can't read so they let him go. Now it is starting to happen. He was at the mine. Happened to a friend of mine. They let him go. For safety, I could see that, but it is hard. Damned if you do, damned if you don't.
> - Jonas Sangris, Storytelling at the Narrows, August 4, 2018

Figure 5.4-1 Elders and Youth Photo Collage

5.5 Working Together with Scientists

Interest from all participants in working with scientists is strong in this program. They recognize the differences in world view but see these very differences as a source of strength. While their own knowledge system has the advantage of longevity and 'seeing the big picture,' they know that science is able to see things at the microscopic level and that often it is how very slight changes can be detected early enough to stop larger problems from developing.

> I have always been concerned by the discrepancy. . . the cleft, the lack of connection between the scientific biological data collection and what indigenous fishers know, because they know a lot. They usually know far more than a professional, coming from outside, because they've watched a fish population. They are dependent on that fish population, and they have watched it for years, decades, centuries. Therefore, the knowledge that that indigenous population has, is deeper or perhaps, far more significant over longer periods of time, then professional knowledge, which is often overrated. I mean, even aging, using scales or otoliths, is a very inexact science.
> - Kathy Mai, Interview, August 6, 2018

> We have to do both sides because it is really important and strong. Without scientists who's going to help our elders? Because they understand from going to camps like this that they learn too. For the future they feel stronger and keep wanting to do and learn more as they come to camps like this.
> - Nancy Kadlun, Interview, August 5, 2018

> Nancy knows everything about fish, but she doesn't understand the scientific method. It was great because ultimately, Nancy succeeded in pulling those otoliths, at the same time as I did. So, on a personal level, it is melding of the two methods of knowing, Nancy and I, working together to get this done, right? And that's what needs to happen. I tend to say there will be far more improvements on the scientific side, then on the traditional knowledge side, because the knowledge is essentially there.
> - Kathy Mai, Interview, August 6, 2018

Elders and youth alike demonstrate interest in what scientists are doing whether they are taking water samples or fish samples and are keen to learn and participate.

> Mason: When Kathy was cutting up the trout to see what the age was, I learned something and in 2015 they had a TK study in my own town in Whatì, and I was part of it so I kind of knew what she was talking about there, I learned a lot of science. It was just great seeing some other nations from across the NWT and Nunavut coming together and sharing their knowledge with us as youth so, everything's just been great for the past weekend.
> - Interview, August 5, 2018

> Zach: Playing with those beta bottles was extremely fun. Dipping it in the water, at 20 meters, pulling it back up, testing it, yeah it was a lot of fun. I've done similar things, I did soil sampling back in N'dilo, we had a three-month course. So doing something similar was really enjoyable for me. They (the elders) taught me some things that I never knew and, and it is basically a learning process being here. You get to learn new things all the time, every single day.
> - Interview, August 5, 2018

> I would like to say thank you for doing stuff like this because it is really important. As people (from the communities) without equipment, we can't do it. So, I'm so thankful for people that are monitoring the water and air every year. It is going to be hard for us and heart breaking if everything just ends with these camps. So, I'm thankful for people working every day for monitoring the water and the air.
> - Nancy Kadlun, Interview, August 5, 2018

The coming together of two ways of knowing with mutual interest and respect for each other, is always an inspiring aspect of the program for all involved. This positive and respectful exchange sends a message to youth that all knowledge is valued and to have access to both is especially rare and rewarding. They begin to understand the uniqueness of this way.

The opportunity for Indigenous and non-Indigenous people to spend time on the land together over the week leads to levels of cultural understandings that aren't possible in an urban setting. The understandings gained by non-Indigenous participants fostered respect and appreciation for Indigenous ways of knowing because they, too, were able to "see with their own eyes."

> Without a camp like this, we wouldn't know how our water is going to be. Looking at it with our own eyes makes us strong and want to do more.
> - Nancy Kadlun, Verification Session, December 7, 2018

Elders and youth alike demonstrated interest in what the camp scientist is doing whether they are taking water samples or fish samples and are keen to learn and participate.

5.6 Powerful Women

We were blessed with having some amazing women with us this year (Figure 5.6-1). Julie is 80 years old, has raised 13 children and still fishes. She lives independently without power and starts her own generator when she needs it and splits her own wood for heat! She is a powerful role model and an entertaining story teller.

> I am very happy to be among the group here. We make jokes and laugh together. We see the youth fishing and I'm very happy they are catching fish. They should dance when they catch fish! . . . A couple of years ago I walked to Lac St Anne from Frank's Channel for the spiritual gathering, I wore out my moccasins!
> - Julie Wedzin, Planning Session, May 6, 2018

I am happy I came on this trip; it makes my heart feel strong. The land is beautiful, it is good to be here. It makes you feel young; I am going to tell stories when I get home and tell about how I ran around the tundra like a young girl!
- Julie Wedzin, Storytelling at the Narrows, August 4, 2018

Since I was a young child, I had no parents. I was raised by my grandparents. They taught me very well. They taught me how to work just like a man on the land. They said maybe in the future I'd share our stories and that's what happening today. And also today as we're gathered here. In the past when they were telling me stories, they told me I'd be sharing these stories with others and that's happening today. When we worked on the land, they taught me how to work like a man out on the land in this kind of a setting. It is like I'm self-taught. I got married at an early age. I'm self-taught learning how to sew, make dry meat, dry fish, cleaning hides, caribou and moose. And today the young people I help them the young women, how to prepare fish and parkas. It is only through participating and doing the work that we learn and get the experience. Some of the elders that turn old and into their 90s they tend to not remember stories from their past. But I remember those things, some of the things that happened with my dad. When I got married, we raised a lot of children. My husband used to go hunting and that's where we got most of our experience on the land. When we have children, we have to teach them how to work on the land and share our experience and this is what I did with my children. In the past we used to use dog teams and today we use snowmobile. When the snowmobile breaks down, you have to fix it and it runs out of fuel. Dog teams don't. Snowmobiles cost lots of money. There are lots of women elders in Behchokǫ̀ but they are afraid to speak, especially in meetings. The youth too – they are afraid to speak. We have to teach our children, that is the only way. The youth here are probably here because they are interested in the stories. The stories and experience they gather here will be good for them.
– Julie Wedzin, Daily Notes, August 2, 2018

Figure 5.6-1 Strong Women Photo Collage

Julie further explained how times have changed:

> When I first travelled to Wekweetì and there were no houses or buildings and Wekweetì didn't exist at that time. When I first came, they started building houses. Just before they made a settlement, I was married at that time. The men were the head of the house and made the decision. My husband made the decision to go back to Behchokǫ̀. When the couple get married, they live a long time and raise kids together. Men would hunt caribou, ducks, fishing, all the wildlife. If you live with a good man that harvests, it is a good life that they live, a healthy life. Now today, when people get married, they often split up, divorce, it is not healthy. At the same time, if we find an old man able to do the work for us, what's the use of having an old man around not able to do anything? [Laughter] I am thankful to come on this trip because I can see the tundra, the barrenlands and it looks beautiful. I am happy I made the trip to the Narrows. I'm glad I was brave and strong enough to come. Now I've sat I may not get up again.
> - Julie Wedzin, Storytelling at the Narrows, August 4, 2018

Terri was anxious to drive the boat to the Narrows. She showed us how she could navigate and handle the boat as well as any man! Although Terri has suffered many tragedies in recent years, she maintains a very positive outlook and continues to hunt, trap and fish. She travels extensively on the land with her son but often goes by herself if no one is available. She recognizes the power of the land to heal and finds her spiritual strength there.

Terri has been central to the success of the community monitoring program and interacts with visitors well while sharing with them the importance of taking care of the land on their travels. Visitors comment on how caring and helpful these guardians of the land are.

> One time I was cleaning fish in the tipi with canvas cover. There was a noise outside and I walked out and there was a bear standing there. That one time the bear came along and was standing there and I didn't know what do to I was all by myself. There was a door on the tipi and there was a log so I took the log and started banging on the door. I talked to the bear and said go away and mind your business. So it went on its paws and gently walked away. Today I have two dogs with me.
> – Julie Wedzin, Daily Notes, August 2, 2018

There was lots of teasing and laughter around the important role of women.

> If any men with muscles want to help out with the fish heads and the otoliths, that would be very helpful because it is hard work.
> – Nancy Kadlun, Daily Notes, August 4, 2018

Nancy has been attending the camp since 2012 and has been a role model and teacher. As always, she patiently demonstrated how to prepare fish, carefully showing the youth and giving them the chance to "learn by doing." She was out wandering the tundra for berries every night, always providing for her family. She showed extreme fortitude in learning how to remove otoliths from the fish heads. She worked with Kathy tirelessly, trying to carefully remove this delicate and elusive bone.

As she has in previous camps, Nancy took the initiative to prepare bannock regularly for participants. She took time to show interested participants the "Inuit" way of making bannock. The cooks tried to learn Nancy's way and before long, Julie came into the kitchen to share her methods.

5.7 Mining

Camp participants described a range of environmental and socio-economic effects of the Diavik Diamond Mine. In particular, they repeatedly noted the decline and/or displacement of caribou herds that once were numerous and proximate to their communities. These changes are alarming to Elders because caribou are an important source of past and current survival, sustenance and cultural identity for all Indigenous groups.

> Q. How do you feel about these mines operating out here?
> For me it shouldn't be here in the first place. I mean it is like because we live off caribou, right? So it makes a big change for me. Like all the caribou are migrating and they are on Nunavut side now, because I think they were close to Rankin, which they were just around here before.
> - Terri Enzoe, Interview, August 4, 2018

> You see that mine here? We're pretty close to it. What goes up, has got to come down (emissions). You know what I mean? All this stuff there eh? One year we were at the mine ... across there. We flew a chopper from there towards Coppermine. The caribou, you know, they're going in April. Eh? I could see that snow; it was just yellow. Yellow all the way, you know? Where does that come from? That's from the mine.
> – Ernest Boucher, Interview, August 5, 2018

> The mining companies say it is clean and everything, that it is different from a gold mine or anything but every mine itself has different chemical contents that they use and they mix and how emulsions are being used. They're going underground and using a lot of emulsions now. It is going to change a lot of the water quality contents.
> - Bobby Algona, Interview, August 3, 2018

> Sometimes I wish there would be less airplanes, less mining, just so we can have fresh water and the animals or fish we can eat, it is already healthy, because when I was growing up, it wasn't that much planes, now it is planes all over. Animals are really sensitive... You know, the smoke (emissions) gets into water. And they'll go, they'll go move somewhere else. That's what the fish will do. Same thing and it is sensitive because you see a caribou walking and if you see a sound they won't go there. They'll go a different way. Way around, or something. That's why it is, if they hear the moose, the caribou will go east. Further east.
> - Jonas Sangris, Interview, August 3, 2018

While Elders expressed that the overall health of fish and water of Lac de Gras is still good (as observed using both TK and scientific indicators), many were still concerned about the water, based on previous experiences with mining.

> We are caretakers on the land.
> - Jonas Sangris, Verification Session, December 7, 2018

> Q. What about in this area, would you like to see ongoing monitoring in the future with other communities?
> Yeah. I would like to see that in the future, because I've seen some fish that are not healthy. It would be nice for somebody in our community or Yellowknife to come here and monitor, you know, the fish and the animals that are around here, even the water. It would be nice. Somewhere down the line maybe. I don't know how long the mine is open for, but it would be nice if we started earlier and not just to protect our water and our fish but even caribou.
> - Terri Enzoe, Interview, August 4, 2018

Community members talk about the cumulative effects of multiple mineral exploration and developments as they weigh costs and benefits across the region.

> I like the camp because we're trying to preserve, our community or country. We need the water. If we just say, you know, if we just keep saying, 'Yeah, oh yeah, yeah," how will our community look like? This will be all cleaned because there are so many people or people want to work and there's so many mines coming in all the time. This is not going to be the last mine, so let's try and have our water and air as good as long as we could because you never know what it is going to be like in the future.
> - Nancy Kadlun, Interview, August 5, 2018

Some community members talked about how they use the important materials from the extractive industry.

> Every little component that you have cameras and computers, iPods, everything, to me it has many mines in these components in a camera. I've come to know these. There are many metals and many plastics and many components in the camera. You have all in the way they are made, I couldn't even imagine how many metals that you need make a camera or stove. I could only imagine many types of ways that they're using. And that's, that's good. A lot of these tools that we have I really appreciate them all. I appreciate how white folks made their tools . . .. I have nothing against mining or anything. It is just that the, the mining itself has emissions and emulsions and I just wish that they would have the knowledge to have less emissions. The way they discard the very things that they don't use. And I'm happy today that they are making a very big effort into finding ways to have less impact on life on Earth.
> - Bobby Algona, Interview, August 3, 2018

> I've never been against the mining because I have many uses for what the mining companies do. I have many things. I have clothing. I have pocket knives. I have tea, tea pots. I have frying pans that are very useful to me. But I just want all of industry to find better solutions along the way for all of humanity in this world to be healthy. Just find that better solution. Just work, think hard and use a lot of traditional knowledge.
> - Bobby Algona, interview, August 3, 2018

Jonas Sangris shared key insights into the economic realities facing communities today and how mining provides opportunities in a changing world:

> They have to look after what things have in agreements, the impacts, benefits agreements. They have to look after water so they don't spoil the water. Also, on land, in the lake and also the animals, you know? We made agreements that will do that, they'll work on it every couple of years, check it out, to see if it is fine, you know? Which is good. I think they need to do that because if you don't, you'll look at all the old mine sites down, there's a lot of old mine sites from the 40s and 30s there's still stuff around, eh? People just have to clean up. They start doing that now, eh? But right here I think they're doing a pretty good job of work. They're doing pretty good. You can see it.
> - Jonas Sangris, Interview, August 3, 2018

> I guess for the economy it is the best thing that ever happened. I always remember, I was a Chief and the Giant Mine closes, got to remember we're downsizing and the elders, I asked them, 'What can we do?' I don't know,' they said, 'I don't know what's next.' They say, 'The Creator looked after us. So it is only up to Him now.' And a few years later they find diamonds!
> - Jonas Sangris, Interview, August 3, 2018

He continued to tell a story detailing how moving away from living on the land and into communities today has taken a toll:

> Yeah, there's lots of changes because of the mines. Mostly start to work now. Nowadays you have to pay for everything. Before it wasn't like that. All you look after is you get water and firewood. And the rest will take care of themselves as wildlife, animals, all kinds of animal. Some elders say the non-native make us pay for everything now.... we were talking about houses. One of the elders got up and said, 'Why do you guys always want the government to act?' he said. 'Before,' he says, 'if I want to build a house, I grab my ax and go into a bush and cut some logs and build my own house.' He said, "You know, that's why those elders did that.' He said, 'They were healthy. You know? Now look at me," he says, "I'm almost 300 pounds. All this, my wrist does all the work now." He says. Everybody looking at him, what do you mean?' He said, 'If I want power, if I want water, turn tap, if I want light, just put 'em on. Only this,' he said, 'that's it.' You know, everybody looked, 'It is true,' they said. You know? So that's, that's one of the Dene ways that we're losing. You know, stuff like that. So power, everything we have to pay for it. So, you need work (for money) most days now.
> - Jonas Sangris, Interview, August 3, 2018

Balancing living on the land with the wage economy has been difficult:

> When I look out at the Narrows and see the mines, I feel happy and sad in a way. I wonder how an elder would feel in the past. They don't have a chance to go back here. Sit around, nice and quiet. This morning, I sit around and I here all machine running. All those big hills now, come from underground. In one way, happy and sad feelings too. When you think of the elders in the past. In the past, the elders look around for caribou, white fox, that was there way of life. Now it is hard. I never thought there would be a mine here. It is good for the economy, for people, but First Nations are still hesitating. It is hard for them, especially the second generation, because the first generation all they did was trap and hunt. Now we are caught in two worlds. We like to come out here, but you need cash to travel up here.
> - Jonas Sangris, Storytelling at the Narrows, August 4, 2018

Youth today are particularly challenged:

> Nowadays, I could go both ways. Go to work (for money) or go to the bush. I can survive anywhere. But my kids wouldn't. My kids learned the white ways now. It is too bad those things happened. Not only the mining, the government, killing the First Nations people off. You have to have a gun license, permits, you look at the gun law, they cannot even buy shells without a permit. Those are some of the things. Trapping issues. Humane trapping, they shut all that down. We never heard of those things before. One of the elders said, they took all those things away from you, put you close together in town, so you have to work, pay taxes, for power, that's is how they want your money all

the time. If you really think of it, it is true. Sort of a balance of both ways. Mainly now, today, the economy will be stronger. I made sure that all my four kids graduated. I told them, go out in the world, find your way to survive for your kids. I'm not going to tell stories all the time. Good, but in a way, it is sad. Sad they are spoiling the land. The other way, it is good, IBAs, but how long is that going to last.
- Jonas Sangris, Storytelling at the Narrows, August 4, 2018

5.8 Environmental Change

As in other years, the impacts of environmental change were discussed frequently throughout the Planning Session and camp. People are noticing changes in weather, climate, animal behaviour, forest fires and more.

Q: Are there other things that people would watch for just to tell if the land is healthy?
All the elders, they think they know, because of the climate change. That things are changing. There are ponds, we used to have ponds, now there's no ... no more water. There is less fish sometimes. We see that. Um, since the mines opened, caribou moved, they moved away. Too dry, not enough rain. They see that. More forest fires. They also watch how high is the water or how low is the water. They'll see changes in that, they'll tell us.
- Terri Enzoe, Interview, August 4, 2018

Q: If fish could talk, what do you think they would say to us?
Terri (Doris): "Don't put too much garbage in the water," because there is lots of plastic we got in the air. It goes to the bottom of the lake, because whatever is in the bottom of the lake, it is what the fish eat.

5.9 Guardianship and Monitoring

Mineral exploration and development combined with climate change necessitate ongoing environmental monitoring across the North. Increasingly, community members are formally reclaiming their traditional roles and responsibilities as guardians and advancing community-based monitoring initiatives across their territories. Not only does monitoring provide a source of employment, but also it supports people in getting out on the land. Zach Sangris provided guidance on how monitoring opportunities should be shared and advertised:

[We should monitor] every year, I suppose, every two years maybe, three, three at the most. I mean three years every now and then is pretty good. What we need is longer terms, longer days to be out together, and the day that we leave is the day we could all report back to our communities about our experience, Chief and councils. We can tell them what we learned and they could recommend it to other youths and generations to come about what we're doing out here and they would be interested in doing something like this, and I'm sure of it, cause, I wasn't sure of coming because I wasn't really aware and it was kind of a last minute thing for me but as soon as I heard

> monitoring, I was like 'oh yes, I'm coming,' because I've done monitoring before and I really enjoyed it and being out here, I've enjoyed my time.
> - Zach Sangris, Interview, August 5, 2018

> We still really need to keep coming, I'm pretty sure there will be more mines and if they would help us do the same thing as Diavik does, I would be so glad to hear that's happening and they should learn from what Diavik did. We're so thankful for Diavik doing this. Maybe they'll learn from that and we'll just keep asking for more because we want to protect more land and water, especially this big water because so many elders and people have done it for so long and it is important that we keep it clean.
> - Zach Sangris, Interview, August 5, 2018

One Elder advised that community members should be more involved with monitoring mine operations and provided detail on how to improve fish monitoring on-site:

> I'm talking about monitoring the blasts and the levels and the rock movement, the water movement with some sort of instrument that would measure the vibrations through the waters. … The closer monitoring of the fish, even if you only got to take one or two fish once in a while. You could, you know, take them in winter time and then set short nets, something like 50 feet. You won't catch a lot of fish in a 50-foot net. But you will catch the occasional one and you could check it. It could be in different places. They can take one big long net, chop it up into five or six pieces, you know? And just restring the guy lines and set her up with the anchors or whatever. This way here you'd have different places where you could catch the fish and, see what's going on with them, you know? I think there's definitely got to be something . . . some program come up with that is keeping a closer eye on this lake.
> - Wayne Langenhan, Interview, August 5, 2018

A key element of monitoring is reporting findings back to other community members.

> We need to report back, so our people know why we are here.
> - Ernest Boucher, Verification Session, December 8, 2018

> We don't get the words of our elders back into our communities.
> - Georgina Chocolate, Verification Session, December 8, 2018

For the AEMP TK Program, future efforts need to ensure that TK researchers from each community are included early in the planning process so that they can consider training youth within their communities for monitoring from a TK perspective.

> I think that people who do TK (research) work should also come. I think groups have this (capability). They could document the information. They could teach people in the future. I think we should all be involved together (researchers, elders and youth). I think young people don't know where to start or what to do; they need help and need to

learn how to help their elders and take notes. And learn the history of their ancestors. The trails are important. We can teach some people when they go on the tundra – there are our ancestors trails and the caribou trails. In the future the youth will become elders . . .. So if the TK person is there, they can teach the young person to do it again in the future. And they'll come back again if they have a positive experience. We can't bring a new youth out there when the work (documented TK) is unknown.
- Georgina Chocolate, Verification Session, December 7, 2018

6.0 Evaluation and Recommendations

At the completion of each gathering, a closing circle and evaluation was carried out. Results from the evaluations of the Planning Session and Verification Session are included in Appendix 2, while results from the TK camp are detailed below (Table 6.1-1).

Results from the evaluation process feed into recommendations tracking so that each future event can be improved (Table 6.2-1).

6.1 AEMP TK Camp and Study Evaluation

Camp participants provided recommendations regarding camp logistics, process (i.e., changes to future activities related to the AEMP TK Program), and methods for conducting the palatability study, fish inspections, and water quality.

Forms were handed out to participants at the end of the camp and outlined 12 questions for which a rating was requested. All participants completed the form and a summary of the results is presented in Table 6.1-1. Participants found the camp to be “very good” or “good” in most categories.

Table 6.1-1 AEMP TK Camp Evaluation

Question	Very Good	Good	Neither Good nor Poor	Poor	Very Poor	Total Responses	Comments
How would you rate the camp for working together?	11	4	-	-	-	**15**	
How would you rate the camp for Elder-youth teaching opportunities?	9	5	-	1	-	**15**	Plan and organize sessions
How would you rate the camp for communications among participants?	10	5	-	-	-	**15**	Good interpreters; morning & evening Planning Sessions were good
How would you rate the camp for respect among participants?	13	2	-	-	-	**15**	
How would you rate the camp for Elder care and attention?	11	4	-	-	-	**15**	Cleaned up garbage, shelter for fish cleaning, chairs with backs at the fire were great
How would you rate the camp for Youth care and attention?	10	3	1	-	-	**14**	
How would you rate the camp for documentation of Traditional Knowledge?	8	5	2	-	-	**15**	Opportunity to document more stories
How would you rate the camp for filming process?	9	3	2	-	-	**14**	Pablo and Jay were fantastic
How would you rate the camp for safety, food and support?	11	4	-	-	-	**15**	Too much safety, wish to eat more fish and country food
Overall, how would you rate the camp?	11	3	1	-	-	**15**	

Question	Just right	Too long/ many	Too short/ few	Don't know	Total Responses	Comments
How would you rate the length of the camp?	10	1	4	-	15	Probably long enough for Elders
The number of participants was:	10	0	3	2	15	Need more youth (x4)

Five open-ended questions were also asked on the evaluation form, and comments provided are summarized below.

What are the benefits/learnings you experienced from the Program?

Many camp participants noted the importance of working together to protect and preserve the land and water, including different Indigenous groups as well as Elders and youth. There was a sense of the strength in observing diverse ways of inspecting, processing, and cooking fish in the spirit of being one family. The other benefit noted was healing. Another camp participant noted their role as advisor to Diavik on how to protect fish and water.

What are the benefits to the community/organization from the Program?

Camp participants noted the importance of Elder-youth connections that the camp facilitated. They also thought a key benefit was for communities to learn about the status of the mine area in relation to fish and water. Finally, camp participants appreciated the documentation of TK throughout the camp for future generations.

How would you describe the program & process to others?

Camp participants used words such as amazing, open, learning, and opportunity. The activities of the camp were described as monitoring, helping one another, boating, and learning about other cultures, and engaging interesting people.

How would you explain the value of this program to a senior leader at Diavik?

The participants would describe the camp to senior leaders at Diavik as collaborative in style in order to confirm the ongoing work that Diavik is doing to protect the water and fish. The participants also noted the importance of seeing for themselves the status of the fish and water. Camp participants appreciated the level of engagement of, direction from, and participation of Indigenous Elders.

Did you feel there was anything missing from the camp?

Camp participants noted the following gaps for consideration in future camps:

- More youth participation
- Infrastructure additions: Urinals and phones to call home

- Food options: Ice cream and traditional recipes
- Additional programming: Games or other on-the-land activities
- Honest, open and transparent communications

6.2 Participant Recommendations

The following table (Table 6.2-1) Table 15 summarizes the recommendations made in relation to the AEMP TK Program since 2012. A response to each recommendation is provided by DDMI, where applicable.

Table 6.2-1 Participant Recommendations and Responses for the AEMP TK Study (2012-2018)

Recommendation	Source	Response
Participation		
Many elders have participated in the camp multiple times. Recommendations for other TK experts were put forth (see Appendix 8).	2018 Verification Session	No response required.
Additional youth from each group of people. Two youth from each: one girl and one boy.	2018 AEMP TK Camp; 2018 Verification Session	The number of beds is limited based on the size of the camp and Diavik does not plan to expand the camp. It is important that available beds are filled, whether that be with elders or youth. In each year, there are one or more participants who are unable to attend at the last minute. We would first encourage communities to identify alternate participants and have them undergo security clearance in advance, before any discussions about increasing numbers would occur.
Longer camp. Four days is too short. Having 5 days at camp would be best to not feel so rushed and to have room for bad weather.	2018 AEMP TK Camp; 2018 Verification Session	Flight schedules to and from site determine the schedule for the camp. This is the first year where bad weather limited camp activities for an extended period of time. Diavik's preference is to continue with four days.
Community members who do TK research should come to document the information and help train youth.	2018 Verification Session	As noted above, space is limited at the camp. A possible alternative is to have a TK researcher provide a day of training for the youth in their home community in advance of the camp.
Have the camp more frequently so I can come back sooner!	2018 AEMP TK Camp	The DFO authorization requires the program to be conducted every 5 years, however DDMI has committed to the 3-year schedule for the AEMP TK Program, which is conducted at the same frequency as the 'comprehensive program' for the scientific sampling under the AEMP.
We need to use the camp as an opportunity to strengthen the spiritual understanding of the youth to counter drug and alcohol problems.	2018 Planning Session; multiple participants	No response required.

Recommendation	Source	Response
Important to reach out to youth throughout the communities to advertise the opportunity for the AEMP camp, not only go through community organizations. Revisit ways to engage youth again before 2021.	2018 Verification Session	Diavik works with the community organization, who in turns decides how to advertise in the most effective way for their community.
Have more young people involved in the camp. It would be better to have more than 3 youth, at least 1 per community group. And maybe communities should choose different young people each time so that more people have a chance to experience this.	2015 Verification Session; multiple participants	Funding is provided and multiple requests made to community organizations for youth involvement. Possible options to improve this for 2018 include: involving Elders in recruitment, notifying youth of opportunity prior to spring break, showing the video to help them know what they'd be doing, identify alternate youth and have them complete security screening in advance.
Request people who can drum to attend the next camp.	2015 AEMP TK Camp; Bertha Catholique, LKDFN	DDMI can include this in the invitations that are sent to community organizations, but the decision on who attends rests with each organization.
Should have one male and one female from each community. Every time we go to the camp, we need to bring the youth. Best to choose someone who interacts with their Elders in their communities. When we think about young people, it is good to have girls and boys. It is good to have some Elder camp participants that return year after year.	2015 May Planning Session; multiple participants	Requests for participants sent to each community organization requested 1 male, 1 female and 1 youth (male or female); as well as 1 interpreter, if required. Invitations informed them who attended in 2012, and also encouraged some participation by TK Panel members (due to their familiarity with the site and this program). It was then the community organizations decision whom to send.
Camp Rules		
It is important to feed the fire, pay our respects to the water. This is personal and not everyone may want to do this, but we should honour this for those that do.	2015 AEMP TK Camp; Modeste Sangris, YKDFN	These requests were included in the camp plans.
Have youth stay in same tents as Elders. We don't want the kids to bring any games, headphones, radio or anything.	2015 May Planning Session; August Enzoe, LKDFN	Arrangements were made to accommodate this request at the camp and youth were notified of the Elder's direction not to bring games, etc. during videography training before the camp.
Methods		
Plan TK Methods training session before going into the field so that youth are better trained to interview and work with the Elders. Involve more community TK researchers so that they can work with youth in their communities beforehand.	2018 Verification Session	As noted previously, space is limited at the camp for TK researchers to attend. However, it may be possible to have a TK researcher provide a day of training for the youth in their home community in advance of the camp.
Encourage feedback from Diavik about how the AEMP is working. We haven't heard back from Diavik on what we're doing, how we're doing. But it seems to me that we can have more feedback on how they're using the information, maybe we can learn more that way.	2018 Verification Session	This could be added to the agenda for the camp or the Verification Session, depending upon availability of appropriate Diavik staff.

Recommendation	Source	Response
Take water samples closer to the mine on the way to camp so weather does not preclude going back to sample.	2018 Verification Session	This is a good suggestion and can be added to the camp agenda for 2021.
The camp should be 5 days long with 2 days for travel.	2018 Verification Session	Flight schedules to and from site determine the duration of the camp. This is the first year where bad weather limited camp activities for an extended period of time. Diavik's preference is to continue with four days and allow for 1 day of travel before/after the camp for out-of-town participants.
Insert field to record weather on field forms.	2018 Verification Session	This is a good suggestion and can be added to the camp field forms for 2021.
What we should do is put the important parts of interviews with elders in videos so that young people can watch them.	2018 Verification Session	The videos produced to share in a public forum are intended to be a summary of the camp purpose, activities and findings. All of the raw footage from the camp, including TK interviews, is provided to each community organization for use as they see fit.
Re-visit format of field forms.	2018 Verification Session	This is a good suggestion and can be added to the Planning Session agenda for 2021.
Even though the reports are long, it is important to have the information there for people to look up.	2018 Verification Session	Acknowledged.
Lots of people don't read reports, so the video and sharing the raw footage becomes more important.	2018 Verification Session	Acknowledged.
Use more visuals, including photographs, of the camp	2018 Planning Session; multiple participants	Photo collages were compiled for the 2018 report.
Catch and test fish from the Narrows.	2018 Verification Session	This was articulated before the camp and the possibility to catch fish at the Narrows was discussed. Two fish were caught at the Narrows but they were released.
Camp participants need to introduce the videos to local teachers, principals and to make it available to youth.	2018 Verification Session	This recommendation is not directed to Diavik.
Consider testing berries, plants and animals (e.g., caribou) and more as part of the environmental testing.	2018 Verification Session	Participants are able to collect berries and plants to taste throughout the camp, and their observations can be recorded through interviews or group discussions. Diavik is not supportive of caribou tasting due to the current hunting restrictions and decline in the herd.
Better time management and planning in some areas.	2018 Verification Session	Discussion of this for the camp can be added to the agenda for the 2021 Planning Session.
Continue using drone footage in videos.	2018 Verification Session	Acknowledged.
Make the video a bit longer	2018 Verification Session	In response, edits were made to the video to make it slightly longer and have more Indigenous language sections.
More speaking in Indigenous languages and recording this as part of the video.	2018 Verification Session	Participants are always welcome and encouraged to speak in their own language, and interpretation assistance is made available as required. If such footage is included in the publicly shared video, translation would be required for subtitles.

Recommendation	Source	Response
Focus more on the TK ways rather than the scientific sampling.	2018 Verification Session	Diavik relies on the community participants and program facilitators to guide the content and direction of the program, most notably in relation to TK. This is discussed during the Planning Session meeting that is held in advance of the camp.
More frequent monitoring of fish (e.g., sampling, tasting) including during winters and once each year instead of just once every three years.	Wayne Langenhan, Interview, 2018; 2018 Verification Session	The DFO authorization requires the program to be conducted every 5 years. DDMI is committed to the 3-year schedule for the AEMP TK Program, which is conducted at the same frequency as the 'comprehensive program' for the scientific sampling under the AEMP.
Most people know whitefish better than trout because that is what they eat on a steady basis. It makes it hard to do a taste test on trout.	Wayne Langenhan, Interview, 2018; 2018 Verification Session	Taste tests for trout in Lac de Gras should continue as it was selected for testing since 2002, due to it being the top of the food chain in the lake. Participants are always welcome to add additional tasting fish, as has been done in previous years, in order to include fish more familiar, or of interest to them.
Air the video on APTN or North Beat and improve communication of results back to the community and participants.	2015 Verification Session; August Enzoe, LKDFN; Bobby Algona, KIA	Once the final video is complete, DDMI will determine their preferred avenues for sharing the film. This request will be shared with them. Each community organization and camp participant receive a copy of the report and video to use/distribute as they see fit within their own organizations. Camp participants are encouraged to work with their organization to provide ideas on how best to share this information in their home community/communities.
Conduct a second spring monitoring session in March to sample water during runoff season. Have people explain how to sample and what goes in to the water.	2015 Verification Session; Modeste Sangris & Philip Liske, YKDFN	Diavik would not be prepared to open and operate the TK Camp in winter or early spring and runoff does not usually happen until May. DDMI is planning a TK Panel session at the mine in May/May 2016 & this is the preferred group to be involved with this type of work.
Use plain, cold water from LDG for TK water quality tests & tasting, rather than tea. It would be best to also boil some water in a pot over the fire to see if any sediments or film result from boiling. If anyone wants to try tea, they can always make some.	2015 Verification Session; multiple participants	This method will be used for 2018, as all participants agreed that this is a preferred approach.
Include some 'land' studies in future studies for this program, e.g., plants or shoreline vegetation and any dust on the plants	2015 Verification Session; Bobby Algona, KIA	Many Elders and youth currently pick berries during the camp and evaluate vegetation in this way. Diavik also includes TK evaluations of dust on vegetation in their lichen study. Further discussion with community members on the method and goals for this component would be required prior to adding on to the existing program.
Consider doing a similar program for caribou – harvest an animal, look at it, cook it and taste it – in mid-September.	2015 AEMP TK Camp; Modeste Sangris, YKDFN	Diavik would not support a camp that requires harvesting caribou. Given the status of the herd and current hunting bans, this would not be supported.

Recommendation	Source	Response
Plan for a boat trip all the way around East Island during the next camp. Participants want to see the entire island with their own eyes to determine if there are any impacts from mining.	2015 AEMP TK Camp; Philip Liske and Modeste Sangris, YKDFN; Anonymous	DDMI will evaluate this recommendation and determine if there is a way to do this in a manner that is considered safe for DDMI. Diavik understands the communities' interest in doing this and will work to incorporate this into the schedule for 2018, but weather will play a part in this decision.
Take water samples from the same two locations as was done in 2012 (near the diffuser and water intake).	2015 AEMP TK Camp; Modeste Sangris, YKDFN; Bobby Algona, KIA	All participants agreed to this approach. However, weather did not cooperate in 2015 so water samples were taken from areas where fishnets were set. Confirm preferred approach for 2018 camp during the Planning Session.
Should take a water sample of treated water (from the camp) and one from Lac de Gras (untreated) and you'll see that the tea tastes the same, but it will be a different colour.	2015 May Planning Session; August Enzoe, LKDFN	A comparative sample of treated water was not taken to make tea; only non-treated Lac de Gras water was used for tea. This was an oversight.
I don't drink tea. Can we make coffee too? I don't drink tea or coffee. How would I know whether it is good or not? I'd rather sample it by drinking it plain.	2015 May Planning Session; multiple participants	Some people who don't drink tea responded to the relevant questions that could be answered with testing only plain water.
Provide a drying rack to make dry fish. Elders can also demonstrate fish cutting techniques for dry fish.	Previous Study Report (2012)	A drying rack was made for the 2015 camp and a separate fire pit was set up for it.
Develop a curriculum for the video to be used in schools for students to learn about.	Previous Study Report (2012)	This is outside of DDMI's scope. Participants can recommend this to, or work with the schools in their communities to achieve this.
Translate the film or add subtitles for each language (e.g., Chipewyan, Dogrib, Inuinnaqtun).	Previous Study Report (2012)	This is not possible with the budget available for this program.
Lessons		
Teach one another how to make fish nets the old way (e.g., root nets)	2018 Verification Session	This recommendation is not directed to Diavik.
Schedule and plan teaching sessions for youth in a more organized and structured manner to ensure that all topics identified for that year are included.	2015 Verification Session; Anonymous	There is benefit to providing a loose schedule of events and then letting camp participants determine how to structure the days at the morning and evening Planning Sessions, but there is also a risk that some plans change or are missed. The facilitators plan to work with community participants to determine a preferred approach for the 2018 program at the next Planning Session.
Conduct the AEMP TK Program every 2 years instead of every 3 years, as there is too much time in between studies.	2015 Verification Session; Anonymous	Diavik prefers to keep the AEMP TK Program in alignment with the schedule submitted and approved by the WLWB for all AEMP sampling programs. Given that results from the 2012 and 2015 TK studies were similar, there are no plans to increase the frequency of this program.
We eat the fish heads, they're really tasty. There are lots of stories on the head bones. We should come prepared with fish & water stories.	2015 May Planning Session; Mona Tiktalek, KIA	An opportunity to share fish head stories was organized during the camp.

Recommendation	Source	Response
We have to show how to start a u-shaped fire.	2015 May Planning Session; Mona Tiktalek, KIA	Unfortunately, the individual who recommended this lesson was unable to attend the camp.
Teach youth about cutting up fish, and how to cook and dry it. And how to tell if it is healthy. Help the cook make bannock and help cook fish.	2015 May Planning Session; multiple participants	All communities did this repeatedly, and many participants commented that it was interesting to learn each other's techniques. Bannock was made and participants cooked fish.
Teach how to look at the landscape on a walk. Try to organize a walk for those Elders that can walk a while.	2015 May Planning Session; Adrian D'Hont, NSMA	This was not organized at the camp but can be included in future studies.
Send a group to the mine site itself, rather than just focusing on fish and water. We want to know what they do at the mine to prevent bad things happening to fish and water.	2015 May Planning Session; Modeste Sangris, YKDFN	DDMI employees visited the camp to explain the different monitoring programs that are done for the land, water and animals. We did briefly visit the mine site, but unfortunately it was not possible to go for a site tour.
Teach survival skills and on-the-land safety knowledge (e.g., knife and knife sharpening skills, how to tie different knots)	2015 May Planning Session; Philip Liske, YKDFN	Some participants brought sharpening tools and youth were shown how to sharpen knives and ulus. Some youth were taught how to drive outboard motors. Knot tying was missed, but this can be included in future studies.
Teach how people used to travel on the barrens in the past. We travel differently on the land now.	2015 May Planning Session; Madelaine Drybones, LKDFN	Many stories were shared about past trips and methods of travel on the barrens.
Teach how people preserve fish. When you're out there on the tundra, you have to preserve the fish.	2015 May Planning Session; Philip Liske, YKDFN	Many stories were shared about fish preservation techniques: stick fish, drying, packing, storing fish underground and in canvas, pound meat, dog food, bait/lures.
Share stories about the land, plants, berries, fish and wildlife. Storytelling and traditional games around the fire at night.	2015 May Planning Session; James Rabesca, Tłı̨chǫ	Many stories were shared on these topics. A plant discussion was held in one of the tents, and many stories were shared around the fire throughout the day, as well as during berry picking. No traditional games were played in 2015, but these can be incorporated into the 2018 program.
Safety		
Fold out chairs would be nice for the Elders at the fish table; there was a lot of time standing down there.	2015 AEMP TK Camp; Chelsea Adjun, KIA	Some fold out chairs and benches were moved between the camp and the fish processing table, as needed to make Elders more comfortable.
Don't eat food from plastic bags in summer because it gets too hot. It gets smelly. When they cut the fish up and collect the stuff for testing, do they put it in a plastic bag? Does it spoil before they do the test?	2015 May Planning Session; Mona Tiktalek, KIA	Any fish that were put into plastic bags for storage prior to eating or testing were immediately placed into a cooler, fridge or freezer to preserve them. The concern with food in plastic bags is if it gets too warm/too much sun.
Fold out chairs for interviews may be nice. Easier than sitting on the ground for many Elders.	2015 May Planning Session; Anonymous	Some fold out chairs were provided for interviews.
Use two receivers/whisper kits for translation to improve reception, communication and sharing.	2015 May Planning Session; multiple participants	This was arranged and worked better than the 2012 system.

Recommendation	Source	Response
Supplies / Camp Logistics		
A larger kitchen tent.	2018 Verification Session	Should the kitchen tent or platform require repair or upgrades, DDMI would investigate the possibility of a new and/or larger kitchen tent at that time.
More benches for around the fire. These could be shorter to be more maneuverable.	2018 Verification Session	DDMI prefers to maintain a mix of benches and chairs, as different participants prefer different seating options.
Arts and craft supplies for more activities on the land. For example, sewing together and teaching one another from different areas.	2018 Verification Session	Participants are welcome to bring any arts and crafts that they wish to do or share with them. Alternatively, if they raise a request at the Planning Session in advance of the camp, it may be possible to procure and supply necessary items for teaching and sharing crafts.
Firewood should be a combination of wood including spruce ad birch. Fish tasting would be better with dry wood.	2018 Planning Session; 2018 Verification Session	Acknowledged. Diavik will explore options for obtaining this wood in advance of the next camp.
More copies of the DFO pamphlet on parasites should be available.	2018 Verification Session	Acknowledged. DDMI tried to obtain additional copies in advance of the camp, but DFO did not have any available. We will try for this in 2021. Diavik also tries to have a DFO staff attend part or all of the camp to assist with sharing science information on fish; unfortunately no one was available to attend in 2018.
Improve the pathway to the tents.	2018 AEMP TK Camp	Diavik has tried to minimize disturbance at the camp, but we recognize that some access paths are not as safe as they could be. We will raise this with the camp contractor in advance of the 2021 camp.
Better fishing rods with stronger line.	2018 AEMP TK Camp	Diavik can supply stronger line and will determine the suitability and number of rods in advance of the 2021 camp.
Nets should be 5-6” mesh size for average and decent size fish	2018 AEMP TK Camp	New nets were provided in 2018.
Need a new kitchen	2018 AEMP TK Camp	Should the kitchen tent or platform require repair or upgrades, DDMI would investigate the possibility of a new and/or larger kitchen tent at that time.
Serve more traditional food at camp and Planning Session; Some options would be moose, caribou, rabbit, fish, muktuuq, drymeat.	2018 Verification Session	Diavik is limited to following the health and safety rules of the mine and suppliers. It is very difficult to obtain traditional foods through these channels. Participants are welcome to bring their own dry fish or meat, and fish caught in Lac de Gras can be consumed at any time.
It would be nice if we can phone home once.	2018 AEMP TK Camp	Diavik will investigate options for this as technology advances leading up to the 2021 camp.
New drums. Need at least 3 drums at camp.	2018 AEMP TK Camp; 2018 Verification	Diavik will check the existing supply of drums at the mine prior to the 2021 camp to determine if they are suitable for use.
Provide a better processing table. The current one is too high and too awkward. Cut legs so that it is shorter.	2018 AEMP TK Camp; 2018 Verification Session	Diavik can request the camp contractor to complete this task during camp set up in 2021.

Recommendation	Source	Response
When processing the fish, the following items would be helpful: clipboards, cheesecloth and a blank fish diagram for filling in fish parts in different languages.	Previous Study Report (2012)	These were all provided for the 2015 camp.
Wood stoves in tents.	Previous Study Report (2012)	Oil stoves are in the tents and are more practical for use at the camp, due to limited wood supply.
Separate showers and outhouses for men and women.	Previous Study Report (2012)	Separate outhouses were provided for men and women. Showers are in the same building but have private dressing areas.
Allow participants to bring country food.	Previous Study Report (2012)	In May, DDMI explained that country food could not be brought from outside, due to health code requirements, and that NWT caribou is not available to purchase commercially. Fish caught from the lake was used for chowder and also cooked on the fire for individual consumption.
A building to meet in during windy or rainy days, or for interviews.	Previous Study Report (2012) Logistics, supplies	The kitchen tent and some spare accommodation tents were used for this purpose during the 2015 camp.
Participants bring campfire wood from their community (to avoid using commercial industrial wood).	Previous Study Report (2012)	DDMI supplies fire wood for the camp and orders it in from Yellowknife. Airplane cargo space and weight considerations for participant luggage would prevent this.

Many of the recommendations made by community participants to date have been achievable and supported by DDMI. Through time, this table will continue to grow and track recommendations, responses and any resulting changes in a transparent way.

7.0 Closing

The 2018 AEMP TK Program was well received as measured through the evaluation and feedback provided by participants as well as the multiple expressions of gratitude shared during closing circles. Camp participants were satisfied with the state of the lake, water and fish, and remain comfortable drinking the water and eating the fish sampled: both fish and water were deemed to be “good” and “healthy” although the perceived increase in the presence of parasites in fish remains a concern. Moving forward, better documentation of worms, cysts, and parasites in all fish will help people track trends and compare them to fluctuations in other fish across the North.

> Last time I was here was in 2012. Things have changed a bit, but not for bad. It is very important to bring together communities. When we started the mine, the elders said to make sure the land was looked after. The water was clean, the animals are healthy. I don’t think it is changed. I think the mine is doing their job. And that’s good to see. I think I gained 20 lbs. since I came. Good cook. The fire keeper was good. Thank you very much every one of you. God bless and see you next time.
> - Jonas Sangris, Daily Notes, August 6, 2018

As in previous years, the AEMP TK Program provided opportunities for community members to come together from different territories to share stories, teachings, observations and traditional practices. When traditional knowledge is the at the centre of any monitoring approach, it is vital to consider the larger context within which observations are made. Thus, while the AEMP TK Program focus is on fish and water, a holistic approach understands that talking about fish and water cannot happen in isolation: traditional knowledge dictates that these observations are inextricably bound to broader socio-cultural and environmental considerations.

The intercultural and intergenerational opportunity of this initiative brings participants back to the time of their ancestors when coming together on the land in the Lac de Gras area was common practice.

> A lot of our ancestors are not here today but when you're speaking, a lot of elders have a lot of stories. We are not in control of our time on earth, but we have to teach the future generations so that they can be strong. We keep our language and use it to keep us strong. When we talk with each other here, we are one. I'm very thankful.
> - Julie Wedzin, Verification Session, December 6, 2018

The important roles taken by the women and youth this year stood out from previous years and made for a particularly empowering camp experience.

> My grandparents raised me to tell stories of the past. They predicted how people will be raised in the future and how these alcohol and drugs and that young people will depend on the elders to teach them. They don't know the stories of our ancestors and the sharing of these stories is very important. They should maintain these stories and maybe in the next 3 years we don't know what is going to happen. We want the youth to live a healthy lifestyle and we want to share these stories and prepare the fish and make dry fish. They will see and learn this. We will talk about the fish. How they collect and test water. Those are things for the youth to learn. Within the school system, we should ask the teachers to select the individuals to go on the tundra and do the monitoring. So if they are asked and interested, they can come . . .. it would be good if we keep them in our prayers and turn their lifestyle back to our ancestors' stories.
> - Julie Wedzin, Verification Session, December 7, 2018

The youth brought inspiration and hope to the Elders through their enthusiasm, gratitude and vision. They were polite and inquisitive, but most importantly, they spoke with profound respect and leadership. Despite their age, it was clear they are absorbing the traditional teachings of their Elders as well as embracing scientific ways.

> I would recommend this to other communities and even more, especially, and if the time frame could be longer out here. It would be much more fun, living the bush life showing them the way of life, old traditional knowledge and the scientific knowledge that we can learn out here. A lot of young people need to know these kinds of things.
> - Zach Sangris, Interview, August 5, 2018

> I'm trying to acknowledge what's happening here because this is our land, this is our water, and, as a youth we have to acknowledged it because, because this land and this water is not mainly for us or for our ancestors it is for our future and when I see little kids in my community I just wish that they can experience what our elders and what I experience when I was out here. . . . We don't want things to change because we want the future generations to experience what we experience.
> - Mason Beaverho, Interview, August 5, 2018

> I encourage more youth to get involved with these kinds of with these kinds of things happening here in the North especially with climate change and the water shortage that's been happening. I've said this many times before in other videos, it would just be nice to have youth, like my age and the new generations get involved. The environment is our land, we are living on there and the water especially because our body is made up of mostly water and therefore if the water isn't healthy then we're not going to be healthy.
> – Mason Beaverho, Interview, August 5, 2018

> We have to think about our young generation. Because in the future, this mine won't be here forever. Yep, that's what they've been saying. The elders they're all going slowly eh?
> – Ernest Boucher, Interview, August 5, 2018

Living in two worlds is not easy, as participants repeatedly explained. Today, community members face barriers to spending time on the land, connecting with themselves, healing in nature, and monitoring the land, water, fish and air within their territories. At the same time, the impacts from environmental change and exploration and development necessitate that more people reclaim their roles as guardians through spending time on the land. Through the AEMP, Diavik provides these opportunities beyond the scope of simply watching the water and fish at Lac de Gras.

> When you go back home, we'll soak it in again and make our thoughts come back to this time. When we come here it is a wonderful life. We try to show this to other cultures to work with. I thank Diavik for that.
> - Bobby Algona, Daily Notes, August 6, 2018

> This land and this water doesn't belong to us, it belongs to the future, and, we don't know, we can't tell whether the future is going to be great but like I said all we have to do is do our best and try to protect it.
> - Mason Beaverho, Interview, August 5, 2018

> I appreciate the courage that Diavik shows. They expose themselves and take a risk by showing us what they are doing so we can judge for ourselves. That is not easy. I am grateful that Diavik has that courage.
> - Joanne Barnaby, Daily Notes, August 6, 2018

> Before, I didn't understand the connection between the Barrenlands and the people. I do now.
> - Craig Kovatch, Daily Notes, August 6, 2018

As seasoned guardians of their lands, participants of the AEMP TK Program concluded that the present status of the fish and water in Lac de Gras adjacent to the Diavik Mine is good and better than they expected, particularly given the proximity to industrial activity.

> This is my second time coming here and hardly anything has changed from three years ago and I'm happy about that. In the future we would like our grandchildren and other young people to know that we do this in truth so they can learn from us.
> – Nancy Kadlun, Interview, August 5, 2018

> Hospitality was good. I enjoyed my time here since day one. Now it makes me want to come back and see what comes up next. Good camp and good people. The camp sure opened my eyes. Seeing everything myself was a good time.
> - Regan Adjun, Daily Notes, August 6, 2018

> If the land is healed then you'll know it: good fish, good water, good animal. It is the only way you're going to know. If I come back here in 10 years is, if it slows down, if I see caribou walking that way and over the hill. I'll be happy. And then if you catch a fish, good to eat, stuff like that.
> – Jonas Sangris, Interview, August 3, 2018

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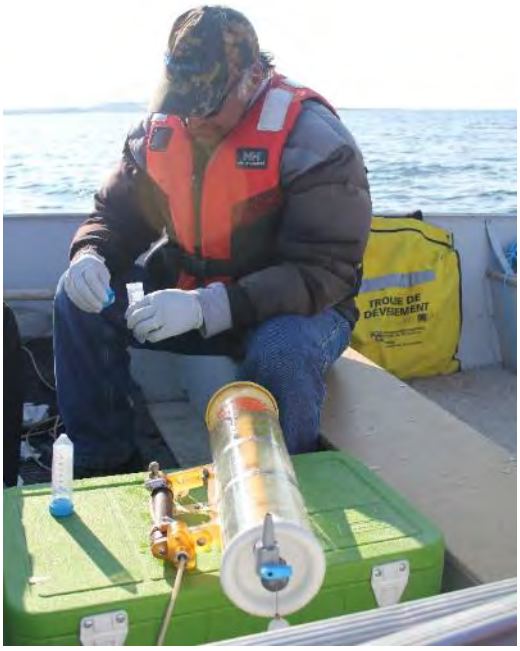

Appendix 1 Signed Informed Consent Forms

Diavik Diamond Mines Inc. Aquatic Effects Monitoring Program 2018

Informed Consent Form

I (name) Regan _____ on August 5th _____, 2018 give permission for Thorpe Consulting Services Inc., Barnaby Consulting, Artless Collective, C&E Consulting, Diavik Diamond Mines (2012) Inc. and other program participants (i.e. community youth) to take notes, photographs and/or audio and video recordings related to "my participation" in the DDMI Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) Study. I understand that "my participation" includes a planning meeting held on May 15-16, 2018 in Yellowknife, an on-the-land fish health and water quality study at a tent camp near the Diavik Diamond Mine from 2 to 6 August 2018 and a data verification (report and video) meeting in Yellowknife in the fall of 2018.

I understand that the Diavik TK Panel, the Environmental Monitoring Advisory Board (EMAB), established in 2001 with the signatories to the Environmental Agreement, and the Wek'èezhìi Land and Water Board have a mandate to review programs and results from TK monitoring activities. The DDMI AEMP has and will continue to engage local community members to collect samples, make observations and contribute to the design, format and methods of the ongoing aquatic monitoring during the operations of the Diavik Diamond Mine using both traditional ecological and western scientific knowledge.

Through my signature below, I understand that:

1. I consent to have my words, activities and responses regarding and related to my knowledge recorded on maps, in notes and photographs, on Global Positioning System (GPS) units, and using audio- and video-recording equipment (collectively referred to as Traditional Knowledge Data or TK Data);
2. I am free to choose not to respond to any questions that may be asked without penalty;
3. I am free to end the interview or refuse to participate in an activity at any time that I wish and / or choose to be anonymous in my participation without penalty;
4. My representative Aboriginal Organization, DDMI and / or Thorpe Consulting Services may use the information collected to contribute to aquatic and fisheries management and monitoring, in the identification of indicators, and inclusion with scientific results, discussions, and knowledge;
5. Camp participants, my representative Aboriginal organization, DDMI, Thorpe Consulting Services and the signatories of the DDMI Environmental Agreement may share my information which I have verified and given permission to share, for example, in either reports and/or video-documentaries;
6. I agree that my contributions to the TK Data may also be used for future educational, cultural, heritage, and environmental purposes that are outside the scope of the DDMI TEK Camp and that my representative Aboriginal organization, DDMI and/or Thorpe Consulting Services will make all reasonable efforts to consult me, or my descendants, before using my information for purposes not indicated above;

7. I will receive financial compensation for my participation in accordance with DDMI policy;
8. While at the cultural camp or in the follow-up review session, I am free to request that any information I share is removed, erased or deleted and that I will have one chance during the fall verification meeting to review draft video-documentaries, reports and maps to make edits before I sign them off and that final copies will be provided to me;
9. I understand that DDMI cannot ensure the protection of the Traditional Knowledge Data from public release (e.g., via youtube.com, Facebook, other social media, or Aboriginal group websites);
10. The TK Data will be summarized and integrated with scientific data into a report, which will be publicly available.
11. The TK Data may also be stored at the following locations:
    - Inuit of Kugluktuk: Kitikmeot Inuit Association of Kugluktuk;
    - Yellowknife Dene First Nation: Land & Environment department;
    - Tłı̨chǫ First Nation: Tłı̨chǫ Lands Department;
    - Lutsel K'e Dene First Nation: Lutsel K'e Lands Department; and
    - North Slave Métis Association: NSMA Environment Department.
12. I have the option of being either anonymous or given credit by name as an author and/or for providing TEK during the cultural camp, in the documentary and final report.

Signed this 5th day of August 2018, in Ottawa, Northwest Territories.

Would you like your name to be used in the video-documentary and the final report related to the TK Data you provided during the DDMI AEMP activities?

- (●) Yes, I would like my name and images to be used in the report and video-documentary.
- ( ) No, I do not want my name or images to be used in the report and video-documentary.

Signatures:

[redacted]

~~Participant (Aboriginal Group)~~ Artless Collective

Megan [illegible], KHA

~~Artless Collective~~ Participant (Aboriginal Group)

Diavik Diamond Mines Inc.

Thorpe Consulting Services

Diavik Diamond Mines Inc. Aquatic Effects Monitoring Program 2018

Informed Consent Form

I (name) Bobby ALGONA on MAY 16, , 2018 give permission for Thorpe Consulting Services Inc., Barnaby Consulting, Artless Collective, C&E Consulting, Diavik Diamond Mines (2012) Inc. and other program participants (i.e. community youth) to take notes, photographs and/or audio and video recordings related to "my participation" in the DDMI Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) Study. I understand that "my participation" includes a planning meeting held on May 15-16, 2018 in Yellowknife, an on-the-land fish health and water quality study at a tent camp near the Diavik Diamond Mine from 2 to 6 August 2018 and a data verification (report and video) meeting in Yellowknife in the fall of 2018.

I understand that the Diavik TK Panel, the Environmental Monitoring Advisory Board (EMAB), established in 2001 with the signatories to the Environmental Agreement, and the Wek'èezhìi Land and Water Board have a mandate to review programs and results from TK monitoring activities. The DDMI AEMP has and will continue to engage local community members to collect samples, make observations and contribute to the design, format and methods of the ongoing aquatic monitoring during the operations of the Diavik Diamond Mine using both traditional ecological and western scientific knowledge.

Through my signature below, I understand that:

1. I consent to have my words, activities and responses regarding and related to my knowledge recorded on maps, in notes and photographs, on Global Positioning System (GPS) units, and using audio- and video-recording equipment (collectively referred to as Traditional Knowledge Data or TK Data);
2. I am free to choose not to respond to any questions that may be asked without penalty;
3. I am free to end the interview or refuse to participate in an activity at any time that I wish and / or choose to be anonymous in my participation without penalty;
4. My representative Aboriginal Organization, DDMI and / or Thorpe Consulting Services may use the information collected to contribute to aquatic and fisheries management and monitoring, in the identification of indicators, and inclusion with scientific results, discussions, and knowledge;
5. Camp participants, my representative Aboriginal organization, DDMI, Thorpe Consulting Services and the signatories of the DDMI Environmental Agreement may share my information which I have verified and given permission to share, for example, in either reports and/or video-documentaries;
6. I agree that my contributions to the TK Data may also be used for future educational, cultural, heritage, and environmental purposes that are outside the scope of the DDMI TEK Camp and that my representative Aboriginal organization, DDMI and/or Thorpe Consulting Services will make all reasonable efforts to consult me, or my descendants, before using my information for purposes not indicated above;

7. I will receive financial compensation for my participation in accordance with DDMI policy;
8. While at the cultural camp or in the follow-up review session, I am free to request that any information I share is removed, erased or deleted and that I will have one chance during the fall verification meeting to review draft video-documentaries, reports and maps to make edits before I sign them off and that final copies will be provided to me;
9. I understand that DDMI cannot ensure the protection of the Traditional Knowledge Data from public release (e.g., via youtube.com, Facebook, other social media, or Aboriginal group websites);
10. The TK Data will be summarized and integrated with scientific data into a report, which will be publicly available.
11. The TK Data may also be stored at the following locations:
    - Inuit of Kugluktuk: Kitikmeot Inuit Association of Kugluktuk;
    - Yellowknife Dene First Nation: Land & Environment department;
    - Tłı̨chǫ First Nation: Tłı̨chǫ Lands Department;
    - Lutsel K'e Dene First Nation: Lutsel K'e Lands Department; and
    - North Slave Métis Association: NSMA Environment Department.
12. I have the option of being either anonymous or given credit by name as an author and/or for providing TEK during the cultural camp, in the documentary and final report.

Signed this MAY 16 day of 16 2018, in YK, Northwest Territories.

Would you like your name to be used in the video-documentary and the final report related to the TK Data you provided during the DDMI AEMP activities?

- O Yes, I would like my name and images to be used in the report and video-documentary.
- O No, I do not want my name or images to be used in the report and video-documentary.

Signatures:

Bobby Algona, Committee of Kugluktuk

Participant (Aboriginal Group)

Artless Collective

Diavik Diamond Mines Inc.

Thorpe Consulting Services

Diavik Diamond Mines Inc. Aquatic Effects Monitoring Program 2018

Informed Consent Form

I (name) Mason Beaverho on August 2, 2018 give permission for Thorpe Consulting Services Inc., Barnaby Consulting, Artless Collective, C&E Consulting, Diavik Diamond Mines (2012) Inc. and other program participants (i.e. community youth) to take notes, photographs and/or audio and video recordings related to "my participation" in the DDMI Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) Study. I understand that "my participation" includes a planning meeting held on May 15-16, 2018 in Yellowknife, an on-the-land fish health and water quality study at a tent camp near the Diavik Diamond Mine from 2 to 6 August 2018 and a data verification (report and video) meeting in Yellowknife in the fall of 2018.

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7. I will receive financial compensation for my participation in accordance with DDMI policy;
8. While at the cultural camp or in the follow-up review session, I am free to request that any information I share is removed, erased or deleted and that I will have one chance during the fall verification meeting to review draft video-documentaries, reports and maps to make edits before I sign them off and that final copies will be provided to me;
9. I understand that DDMI cannot ensure the protection of the Traditional Knowledge Data from public release (e.g., via youtube.com, Facebook, other social media, or Aboriginal group websites);
10. The TK Data will be summarized and integrated with scientific data into a report, which will be publicly available.
11. The TK Data may also be stored at the following locations:
    - Inuit of Kugluktuk: Kitikmeot Inuit Association of Kugluktuk;
    - Yellowknife Dene First Nation: Land & Environment department;
    - Tłı̨chǫ First Nation: Tłı̨chǫ Lands Department;
    - Lutsel K'e Dene First Nation: Lutsel K'e Lands Department; and
    - North Slave Métis Association: NSMA Environment Department.
12. I have the option of being either anonymous or given credit by name as an author and/or for providing TEK during the cultural camp, in the documentary and final report.

Signed this 2nd day of August 2018, in Lac De Gras, Northwest Territories.

Would you like your name to be used in the video-documentary and the final report related to the TK Data you provided during the DDMI AEMP activities?

- ☑ Yes, I would like my name and images to be used in the report and video-documentary.
- ○ No, I do not want my name or images to be used in the report and video-documentary.

Signatures:

Participant (Aboriginal Group)

Artless Collective

Diavik Diamond Mines Inc.

Thorpe Consulting Services

Diavik Diamond Mines Inc. Aquatic Effects Monitoring Program 2018

Informed Consent Form

I (name) ERNEST Boucher on Aug 2., 2018 give permission for Thorpe Consulting Services Inc., Barnaby Consulting, Artless Collective, C&E Consulting, Diavik Diamond Mines (2012) Inc. and other program participants (i.e. community youth) to take notes, photographs and/or audio and video recordings related to "my participation" in the DDMI Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) Study. I understand that "my participation" includes a planning meeting held on May 15-16, 2018 in Yellowknife, an on-the-land fish health and water quality study at a tent camp near the Diavik Diamond Mine from 2 to 6 August 2018 and a data verification (report and video) meeting in Yellowknife in the fall of 2018.

I understand that the Diavik TK Panel, the Environmental Monitoring Advisory Board (EMAB), established in 2001 with the signatories to the Environmental Agreement, and the Wek'èezhìi Land and Water Board have a mandate to review programs and results from TK monitoring activities. The DDMI AEMP has and will continue to engage local community members to collect samples, make observations and contribute to the design, format and methods of the ongoing aquatic monitoring during the operations of the Diavik Diamond Mine using both traditional ecological and western scientific knowledge.

Through my signature below, I understand that:

1. I consent to have my words, activities and responses regarding and related to my knowledge recorded on maps, in notes and photographs, on Global Positioning System (GPS) units, and using audio- and video-recording equipment (collectively referred to as Traditional Knowledge Data or TK Data);
2. I am free to choose not to respond to any questions that may be asked without penalty;
3. I am free to end the interview or refuse to participate in an activity at any time that I wish and / or choose to be anonymous in my participation without penalty;
4. My representative Aboriginal Organization, DDMI and / or Thorpe Consulting Services may use the information collected to contribute to aquatic and fisheries management and monitoring, in the identification of indicators, and inclusion with scientific results, discussions, and knowledge;
5. Camp participants, my representative Aboriginal organization, DDMI, Thorpe Consulting Services and the signatories of the DDMI Environmental Agreement may share my information which I have verified and given permission to share, for example, in either reports and/or video-documentaries;
6. I agree that my contributions to the TK Data may also be used for future educational, cultural, heritage, and environmental purposes that are outside the scope of the DDMI TEK Camp and that my representative Aboriginal organization, DDMI and/or Thorpe Consulting Services will make all reasonable efforts to consult me, or my descendants, before using my information for purposes not indicated above;

7. I will receive financial compensation for my participation in accordance with DDMI policy;
8. While at the cultural camp or in the follow-up review session, I am free to request that any information I share is removed, erased or deleted and that I will have one chance during the fall verification meeting to review draft video-documentaries, reports and maps to make edits before I sign them off and that final copies will be provided to me;
9. I understand that DDMI cannot ensure the protection of the Traditional Knowledge Data from public release (e.g., via youtube.com, Facebook, other social media, or Aboriginal group websites);
10. The TK Data will be summarized and integrated with scientific data into a report, which will be publicly available.
11. The TK Data may also be stored at the following locations:
    - Inuit of Kugluktuk: Kitikmeot Inuit Association of Kugluktuk;
    - Yellowknife Dene First Nation: Land & Environment department;
    - Tłı̨chǫ First Nation: Tłı̨chǫ Lands Department;
    - Lutsel K'e Dene First Nation: Lutsel K'e Lands Department; and
    - North Slave Métis Association: NSMA Environment Department.
12. I have the option of being either anonymous or given credit by name as an author and/or for providing TEK during the cultural camp, in the documentary and final report.

Signed this 2 day of Aug 2018, in DAVIK, Northwest Territories.

Would you like your name to be used in the video-documentary and the final report related to the TK Data you provided during the DDMI AEMP activities?

- ✓ Yes, I would like my name and images to be used in the report and video-documentary.
- ○ No, I do not want my name or images to be used in the report and video-documentary.

Signatures:

Participant (Aboriginal Group)

Artless Collective

for Diavik Diamond Mines Inc.

Thorpe Consulting Services

Diavik Diamond Mines Inc. Aquatic Effects Monitoring Program 2018

Informed Consent Form

I (name) Georgina Chocolate on May 16, 2018 give permission for Thorpe Consulting Services Inc., Barnaby Consulting, Artless Collective, C&E Consulting, Diavik Diamond Mines (2012) Inc. and other program participants (i.e. community youth) to take notes, photographs and/or audio and video recordings related to "my participation" in the DDMI Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) Study. I understand that "my participation" includes a planning meeting held on May 15-16, 2018 in Yellowknife, an on-the-land fish health and water quality study at a tent camp near the Diavik Diamond Mine from 2 to 6 August 2018 and a data verification (report and video) meeting in Yellowknife in the fall of 2018.

I understand that the Diavik TK Panel, the Environmental Monitoring Advisory Board (EMAB), established in 2001 with the signatories to the Environmental Agreement, and the Wek'èezhìi Land and Water Board have a mandate to review programs and results from TK monitoring activities. The DDMI AEMP has and will continue to engage local community members to collect samples, make observations and contribute to the design, format and methods of the ongoing aquatic monitoring during the operations of the Diavik Diamond Mine using both traditional ecological and ~~western scientific knowledge~~.

Through my signature below, I understand that:

1. I consent to have my words, activities and responses regarding and related to my knowledge recorded on maps, in notes and photographs, on Global Positioning System (GPS) units, and using audio- and video-recording equipment (collectively referred to as Traditional Knowledge Data or TK Data);
2. I am free to choose not to respond to any questions that may be asked without penalty;
3. I am free to end the interview or refuse to participate in an activity at any time that I wish and / or choose to be anonymous in my participation without penalty;
4. My representative Aboriginal Organization, DDMI and / or Thorpe Consulting Services may use the information collected to contribute to aquatic and fisheries management and monitoring, in the identification of indicators, and inclusion with scientific results, discussions, and knowledge;
5. Camp participants, my representative Aboriginal organization, DDMI, Thorpe Consulting Services and the signatories of the DDMI Environmental Agreement may share my information which I have verified and given permission to share, for example, in either reports and/or video-documentaries;
6. I agree that my contributions to the TK Data may also be used for future educational, cultural, heritage, and environmental purposes that are outside the scope of the DDMI TEK Camp and that my representative Aboriginal organization, DDMI and/or Thorpe Consulting Services will make all reasonable efforts to consult me, or my descendants, before using my information for purposes not indicated above;

7. I will receive financial compensation for my participation in accordance with DDMI policy;
8. While at the cultural camp or in the follow-up review session, I am free to request that any information I share is removed, erased or deleted and that I will have one chance during the fall verification meeting to review draft video-documentaries, reports and maps to make edits before I sign them off and that final copies will be provided to me;
9. I understand that DDMI cannot ensure the protection of the Traditional Knowledge Data from public release (e.g., via youtube.com, Facebook, other social media, or Aboriginal group websites);
10. The TK Data will be summarized and integrated with scientific data into a report, which will be publicly available.
11. The TK Data may also be stored at the following locations:
    - Inuit of Kugluktuk: Kitikmeot Inuit Association of Kugluktuk;
    - Yellowknife Dene First Nation: Land & Environment department;
    - Tłı̨chǫ First Nation: Tłı̨chǫ Lands Department;
    - Lutsel K'e Dene First Nation: Lutsel K'e Lands Department; and
    - North Slave Métis Association: NSMA Environment Department.
12. I have the option of being either anonymous or given credit by name as an author and/or for providing TEK during the cultural camp, in the documentary and final report.

Signed this 16 day of May 2018, in Behchoko, Northwest Territories.

Would you like your name to be used in the video-documentary and the final report related to the TK Data you provided during the DDMI AEMP activities?

- ☑ Yes, I would like my name and images to be used in the report and video-documentary.
- ○ No, I do not want my name or images to be used in the report and video-documentary.

Signatures:

Participant (Aboriginal Group)

Artless Collective

Diavik Diamond Mines Inc.

Thorpe Consulting Services

Diavik Diamond Mines Inc. Aquatic Effects Monitoring Program 2018

Informed Consent Form

I (name) Narcisse Chocolat on May 16, , 2018 give permission for Thorpe Consulting Services Inc., Barnaby Consulting, Artless Collective, C&E Consulting, Diavik Diamond Mines (2012) Inc. and other program participants (i.e. community youth) to take notes, photographs and/or audio and video recordings related to "my participation" in the DDMI Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) Study. I understand that "my participation" includes a planning meeting held on May 15-16, 2018 in Yellowknife, an on-the-land fish health and water quality study at a tent camp near the Diavik Diamond Mine from 2 to 6 August 2018 and a data verification (report and video) meeting in Yellowknife in the fall of 2018.

I understand that the Diavik TK Panel, the Environmental Monitoring Advisory Board (EMAB), established in 2001 with the signatories to the Environmental Agreement, and the Wek'èezhìi Land and Water Board have a mandate to review programs and results from TK monitoring activities. The DDMI AEMP has and will continue to engage local community members to collect samples, make observations and contribute to the design, format and methods of the ongoing aquatic monitoring during the operations of the Diavik Diamond Mine using both traditional ecological and western scientific knowledge.

Through my signature below, I understand that:

1. I consent to have my words, activities and responses regarding and related to my knowledge recorded on maps, in notes and photographs, on Global Positioning System (GPS) units, and using audio- and video-recording equipment (collectively referred to as Traditional Knowledge Data or TK Data);
2. I am free to choose not to respond to any questions that may be asked without penalty;
3. I am free to end the interview or refuse to participate in an activity at any time that I wish and / or choose to be anonymous in my participation without penalty;
4. My representative Aboriginal Organization, DDMI and / or Thorpe Consulting Services may use the information collected to contribute to aquatic and fisheries management and monitoring, in the identification of indicators, and inclusion with scientific results, discussions, and knowledge;
5. Camp participants, my representative Aboriginal organization, DDMI, Thorpe Consulting Services and the signatories of the DDMI Environmental Agreement may share my information which I have verified and given permission to share, for example, in either reports and/or video-documentaries;
6. I agree that my contributions to the TK Data may also be used for future educational, cultural, heritage, and environmental purposes that are outside the scope of the DDMI TEK Camp and that my representative Aboriginal organization, DDMI and/or Thorpe Consulting Services will make all reasonable efforts to consult me, or my descendants, before using my information for purposes not indicated above;

7. I will receive financial compensation for my participation in accordance with DDMI policy;
8. While at the cultural camp or in the follow-up review session, I am free to request that any information I share is removed, erased or deleted and that I will have one chance during the fall verification meeting to review draft video-documentaries, reports and maps to make edits before I sign them off and that final copies will be provided to me;
9. I understand that DDMI cannot ensure the protection of the Traditional Knowledge Data from public release (e.g., via youtube.com, Facebook, other social media, or Aboriginal group websites);
10. The TK Data will be summarized and integrated with scientific data into a report, which will be publicly available.
11. The TK Data may also be stored at the following locations:
    - Inuit of Kugluktuk: Kitikmeot Inuit Association of Kugluktuk;
    - Yellowknife Dene First Nation: Land & Environment department;
    - Tłı̨chǫ First Nation: Tłı̨chǫ Lands Department;
    - Lutsel K'e Dene First Nation: Lutsel K'e Lands Department; and
    - North Slave Métis Association: NSMA Environment Department.
12. I have the option of being either anonymous or given credit by name as an author and/or for providing TEK during the cultural camp, in the documentary and final report.

Signed this 16 day of May 2018, in Behchoko, Northwest Territories.

Would you like your name to be used in the video-documentary and the final report related to the TK Data you provided during the DDMI AEMP activities?

- O Yes, I would like my name and images to be used in the report and video-documentary.
- O No, I do not want my name or images to be used in the report and video-documentary.

Signatures:

Participant (Aboriginal Group)

Artless Collective

for Diavik Diamond Mines Inc.

Thorpe Consulting Services

Diavik Diamond Mines Inc. Aquatic Effects Monitoring Program 2018

Informed Consent Form

I (name) Doris Tear Enoe on May 15, 2018 give permission for Thorpe Consulting Services Inc., Barnaby Consulting, Artless Collective, C&E Consulting, Diavik Diamond Mines (2012) Inc. and other program participants (i.e. community youth) to take notes, photographs and/or audio and video recordings related to "my participation" in the DDMI Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) Study. I understand that "my participation" includes a planning meeting held on May 15-16, 2018 in Yellowknife, an on-the-land fish health and water quality study at a tent camp near the Diavik Diamond Mine from 2 to 6 August 2018 and a data verification (report and video) meeting in Yellowknife in the fall of 2018.

I understand that the Diavik TK Panel, the Environmental Monitoring Advisory Board (EMAB), established in 2001 with the signatories to the Environmental Agreement, and the Wek'èezhìi Land and Water Board have a mandate to review programs and results from TK monitoring activities. The DDMI AEMP has and will continue to engage local community members to collect samples, make observations and contribute to the design, format and methods of the ongoing aquatic monitoring during the operations of the Diavik Diamond Mine using both traditional ecological and western scientific knowledge.

Through my signature below, I understand that:

1. I consent to have my words, activities and responses regarding and related to my knowledge recorded on maps, in notes and photographs, on Global Positioning System (GPS) units, and using audio- and video-recording equipment (collectively referred to as Traditional Knowledge Data or TK Data);
2. I am free to choose not to respond to any questions that may be asked without penalty;
3. I am free to end the interview or refuse to participate in an activity at any time that I wish and / or choose to be anonymous in my participation without penalty;
4. My representative Aboriginal Organization, DDMI and / or Thorpe Consulting Services may use the information collected to contribute to aquatic and fisheries management and monitoring, in the identification of indicators, and inclusion with scientific results, discussions, and knowledge;
5. Camp participants, my representative Aboriginal organization, DDMI, Thorpe Consulting Services and the signatories of the DDMI Environmental Agreement may share my information which I have verified and given permission to share, for example, in either reports and/or video-documentaries;
6. I agree that my contributions to the TK Data may also be used for future educational, cultural, heritage, and environmental purposes that are outside the scope of the DDMI TEK Camp and that my representative Aboriginal organization, DDMI and/or Thorpe Consulting Services will make all reasonable efforts to consult me, or my descendants, before using my information for purposes not indicated above;

7. I will receive financial compensation for my participation in accordance with DDMI policy;
8. While at the cultural camp or in the follow-up review session, I am free to request that any information I share is removed, erased or deleted and that I will have one chance during the fall verification meeting to review draft video-documentaries, reports and maps to make edits before I sign them off and that final copies will be provided to me;
9. I understand that DDMI cannot ensure the protection of the Traditional Knowledge Data from public release (e.g., via youtube.com, Facebook, other social media, or Aboriginal group websites);
10. The TK Data will be summarized and integrated with scientific data into a report, which will be publicly available.
11. The TK Data may also be stored at the following locations:
    - Inuit of Kugluktuk: Kitikmeot Inuit Association of Kugluktuk;
    - Yellowknife Dene First Nation: Land & Environment department;
    - Tłı̨chǫ First Nation: Tłı̨chǫ Lands Department;
    - Lutsel K'e Dene First Nation: Lutsel K'e Lands Department; and
    - North Slave Métis Association: NSMA Environment Department.
12. I have the option of being either anonymous or given credit by name as an author and/or for providing TEK during the cultural camp, in the documentary and final report.

Signed this 15 day of May 2018, in Trapper lodge, Northwest Territories.

Would you like your name to be used in the video-documentary and the final report related to the TK Data you provided during the DDMI AEMP activities?

- O Yes, I would like my name and images to be used in the report and video-documentary.
- O No, I do not want my name or images to be used in the report and video-documentary.

Signatures:

Participant (Aboriginal Group)

Artless Collective

Diavik Diamond Mines Inc.

Thorpe Consulting Services

Diavik Diamond Mines Inc. Aquatic Effects Monitoring Program 2018

Informed Consent Form

I (name) PETER HURLEY on Aug 2. 2018, 2018 give permission for Thorpe Consulting Services Inc., Barnaby Consulting, Artless Collective, C&E Consulting, Diavik Diamond Mines (2012) Inc. and other program participants (i.e. community youth) to take notes, photographs and/or audio and video recordings related to "my participation" in the DDMI Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) Study. I understand that "my participation" includes a planning meeting held on May 15-16, 2018 in Yellowknife, an on-the-land fish health and water quality study at a tent camp near the Diavik Diamond Mine from 2 to 6 August 2018 and a data verification (report and video) meeting in Yellowknife in the fall of 2018.

I understand that the Diavik TK Panel, the Environmental Monitoring Advisory Board (EMAB), established in 2001 with the signatories to the Environmental Agreement, and the Wek'èezhìi Land and Water Board have a mandate to review programs and results from TK monitoring activities. The DDMI AEMP has and will continue to engage local community members to collect samples, make observations and contribute to the design, format and methods of the ongoing aquatic monitoring during the operations of the Diavik Diamond Mine using both traditional ecological and western scientific knowledge.

Through my signature below, I understand that:

1. I consent to have my words, activities and responses regarding and related to my knowledge recorded on maps, in notes and photographs, on Global Positioning System (GPS) units, and using audio- and video-recording equipment (collectively referred to as Traditional Knowledge Data or TK Data);
2. I am free to choose not to respond to any questions that may be asked without penalty;
3. I am free to end the interview or refuse to participate in an activity at any time that I wish and / or choose to be anonymous in my participation without penalty;
4. My representative Aboriginal Organization, DDMI and / or Thorpe Consulting Services may use the information collected to contribute to aquatic and fisheries management and monitoring, in the identification of indicators, and inclusion with scientific results, discussions, and knowledge;
5. Camp participants, my representative Aboriginal organization, DDMI, Thorpe Consulting Services and the signatories of the DDMI Environmental Agreement may share my information which I have verified and given permission to share, for example, in either reports and/or video-documentaries;
6. I agree that my contributions to the TK Data may also be used for future educational, cultural, heritage, and environmental purposes that are outside the scope of the DDMI TEK Camp and that my representative Aboriginal organization, DDMI and/or Thorpe Consulting Services will make all reasonable efforts to consult me, or my descendants, before using my information for purposes not indicated above;

7. I will receive financial compensation for my participation in accordance with DDMI policy;
8. While at the cultural camp or in the follow-up review session, I am free to request that any information I share is removed, erased or deleted and that I will have one chance during the fall verification meeting to review draft video-documentaries, reports and maps to make edits before I sign them off and that final copies will be provided to me;
9. I understand that DDMI cannot ensure the protection of the Traditional Knowledge Data from public release (e.g., via youtube.com, Facebook, other social media, or Aboriginal group websites);
10. The TK Data will be summarized and integrated with scientific data into a report, which will be publicly available.
11. The TK Data may also be stored at the following locations:
    - Inuit of Kugluktuk: Kitikmeot Inuit Association of Kugluktuk;
    - Yellowknife Dene First Nation: Land & Environment department;
    - Tłı̨chǫ First Nation: Tłı̨chǫ Lands Department;
    - Lutsel K'e Dene First Nation: Lutsel K'e Lands Department; and
    - North Slave Métis Association: NSMA Environment Department.
12. I have the option of being either anonymous or given credit by name as an author and/or for providing TEK during the cultural camp, in the documentary and final report.

Signed this 02 day of August 2018, in Diavik, Northwest Territories.

Would you like your name to be used in the video-documentary and the final report related to the TK Data you provided during the DDMI AEMP activities?

- ✓ Yes, I would like my name and images to be used in the report and video-documentary.
- ○ No, I do not want my name or images to be used in the report and video-documentary.

Signatures:

Participant (Aboriginal Group)

Artless Collective

Diavik Diamond Mines Inc.

Thorpe Consulting Services

Diavik Diamond Mines Inc. Aquatic Effects Monitoring Program 2018

Informed Consent Form

I (name) Nancy Kadlun on May 15, 2018 give permission for Thorpe Consulting Services Inc., Barnaby Consulting, Artless Collective, C&E Consulting, Diavik Diamond Mines (2012) Inc. and other program participants (i.e. community youth) to take notes, photographs and/or audio and video recordings related to "my participation" in the DDMI Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) Study. I understand that "my participation" includes a planning meeting held on May 15-16, 2018 in Yellowknife, an on-the-land fish health and water quality study at a tent camp near the Diavik Diamond Mine from 2 to 6 August 2018 and a data verification (report and video) meeting in Yellowknife in the fall of 2018.

I understand that the Diavik TK Panel, the Environmental Monitoring Advisory Board (EMAB), established in 2001 with the signatories to the Environmental Agreement, and the Wek'èezhìi Land and Water Board have a mandate to review programs and results from TK monitoring activities. The DDMI AEMP has and will continue to engage local community members to collect samples, make observations and contribute to the design, format and methods of the ongoing aquatic monitoring during the operations of the Diavik Diamond Mine using both traditional ecological and western scientific knowledge.

Through my signature below, I understand that:

1. I consent to have my words, activities and responses regarding and related to my knowledge recorded on maps, in notes and photographs, on Global Positioning System (GPS) units, and using audio- and video-recording equipment (collectively referred to as Traditional Knowledge Data or TK Data);
2. I am free to choose not to respond to any questions that may be asked without penalty;
3. I am free to end the interview or refuse to participate in an activity at any time that I wish and / or choose to be anonymous in my participation without penalty;
4. My representative Aboriginal Organization, DDMI and / or Thorpe Consulting Services may use the information collected to contribute to aquatic and fisheries management and monitoring, in the identification of indicators, and inclusion with scientific results, discussions, and knowledge;
5. Camp participants, my representative Aboriginal organization, DDMI, Thorpe Consulting Services and the signatories of the DDMI Environmental Agreement may share my information which I have verified and given permission to share, for example, in either reports and/or video-documentaries;
6. I agree that my contributions to the TK Data may also be used for future educational, cultural, heritage, and environmental purposes that are outside the scope of the DDMI TEK Camp and that my representative Aboriginal organization, DDMI and/or Thorpe Consulting Services will make all reasonable efforts to consult me, or my descendants, before using my information for purposes not indicated above;

7. I will receive financial compensation for my participation in accordance with DDMI policy;
8. While at the cultural camp or in the follow-up review session, I am free to request that any information I share is removed, erased or deleted and that I will have one chance during the fall verification meeting to review draft video-documentaries, reports and maps to make edits before I sign them off and that final copies will be provided to me;
9. I understand that DDMI cannot ensure the protection of the Traditional Knowledge Data from public release (e.g., via youtube.com, Facebook, other social media, or Aboriginal group websites);
10. The TK Data will be summarized and integrated with scientific data into a report, which will be publicly available.
11. The TK Data may also be stored at the following locations:
    - ☒ Inuit of Kugluktuk: Kitikmeot Inuit Association of Kugluktuk;
    - ○ Yellowknife Dene First Nation: Land & Environment department;
    - ○ Tłı̨chǫ First Nation: Tłı̨chǫ Lands Department;
    - ○ Lutsel K'e Dene First Nation: Lutsel K'e Lands Department; and
    - ○ North Slave Métis Association: NSMA Environment Department.
12. I have the option of being either anonymous or given credit by name as an author and/or for providing TEK during the cultural camp, in the documentary and final report.

Signed this 15 day of May 2018, in Yellowknife, Northwest Territories.

Would you like your name to be used in the video-documentary and the final report related to the TK Data you provided during the DDMI AEMP activities?

- ◉ Yes, I would like my name and images to be used in the report and video-documentary.
- ○ No, I do not want my name or images to be used in the report and video-documentary.

Signatures: Nancy Kadlun

Participant (Aboriginal Group)

Artless Collective

Diavik Diamond Mines Inc.

Thorpe Consulting Services

Diavik Diamond Mines Inc. Aquatic Effects Monitoring Program 2018

Informed Consent Form

I (name) Wayne Thompson on May 16, 2018 give permission for Thorpe Consulting Services Inc., Barnaby Consulting, Artless Collective, C&E Consulting, Diavik Diamond Mines (2012) Inc. and other program participants (i.e. community youth) to take notes, photographs and/or audio and video recordings related to "my participation" in the DDMI Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) Study. I understand that "my participation" includes a planning meeting held on May 15-16, 2018 in Yellowknife, an on-the-land fish health and water quality study at a tent camp near the Diavik Diamond Mine from 2 to 6 August 2018 and a data verification (report and video) meeting in Yellowknife in the fall of 2018.

I understand that the Diavik TK Panel, the Environmental Monitoring Advisory Board (EMAB), established in 2001 with the signatories to the Environmental Agreement, and the Wek'èezhìi Land and Water Board have a mandate to review programs and results from TK monitoring activities. The DDMI AEMP has and will continue to engage local community members to collect samples, make observations and contribute to the design, format and methods of the ongoing aquatic monitoring during the operations of the Diavik Diamond Mine using both traditional ecological and western scientific knowledge.

Through my signature below, I understand that:

1. I consent to have my words, activities and responses regarding and related to my knowledge recorded on maps, in notes and photographs, on Global Positioning System (GPS) units, and using audio- and video-recording equipment (collectively referred to as Traditional Knowledge Data or TK Data);
2. I am free to choose not to respond to any questions that may be asked without penalty;
3. I am free to end the interview or refuse to participate in an activity at any time that I wish and / or choose to be anonymous in my participation without penalty;
4. My representative Aboriginal Organization, DDMI and / or Thorpe Consulting Services may use the information collected to contribute to aquatic and fisheries management and monitoring, in the identification of indicators, and inclusion with scientific results, discussions, and knowledge;
5. Camp participants, my representative Aboriginal organization, DDMI, Thorpe Consulting Services and the signatories of the DDMI Environmental Agreement may share my information which I have verified and given permission to share, for example, in either reports and/or video-documentaries;
6. I agree that my contributions to the TK Data may also be used for future educational, cultural, heritage, and environmental purposes that are outside the scope of the DDMI TEK Camp and that my representative Aboriginal organization, DDMI and/or Thorpe Consulting Services will make all reasonable efforts to consult me, or my descendants, before using my information for purposes not indicated above;

7. I will receive financial compensation for my participation in accordance with DDMI policy;
8. While at the cultural camp or in the follow-up review session, I am free to request that any information I share is removed, erased or deleted and that I will have one chance during the fall verification meeting to review draft video-documentaries, reports and maps to make edits before I sign them off and that final copies will be provided to me;
9. I understand that DDMI cannot ensure the protection of the Traditional Knowledge Data from public release (e.g., via youtube.com, Facebook, other social media, or Aboriginal group websites);
10. The TK Data will be summarized and integrated with scientific data into a report, which will be publicly available.
11. The TK Data may also be stored at the following locations:
    - Inuit of Kugluktuk: Kitikmeot Inuit Association of Kugluktuk;
    - Yellowknife Dene First Nation: Land & Environment department;
    - Tłı̨chǫ First Nation: Tłı̨chǫ Lands Department;
    - Lutsel K'e Dene First Nation: Lutsel K'e Lands Department; and
    - North Slave Métis Association: NSMA Environment Department.
12. I have the option of being either anonymous or given credit by name as an author and/or for providing TEK during the cultural camp, in the documentary and final report.

Signed this 16 day of May 2018, in Yellowknife, Northwest Territories.

Would you like your name to be used in the video-documentary and the final report related to the TK Data you provided during the DDMI AEMP activities?

- ○ Yes, I would like my name and images to be used in the report and video-documentary.
- ⓘ No, I do not want my name or images to be used in the report and video-documentary.

Signatures:

Participant (Aboriginal Group)

Artless Collective

for Diavik Diamond Mines Inc.

Thorpe Consulting Services

Diavik Diamond Mines Inc. Aquatic Effects Monitoring Program 2018

Informed Consent Form

I (name) Kathy Mai on 6 August, 2018 give permission for Thorpe Consulting Services Inc., Barnaby Consulting, Artless Collective, C&E Consulting, Diavik Diamond Mines (2012) Inc. and other program participants (i.e. community youth) to take notes, photographs and/or audio and video recordings related to "my participation" in the DDMI Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) Study. I understand that "my participation" includes a planning meeting held on May 15-16, 2018 in Yellowknife, an on-the-land fish health and water quality study at a tent camp near the Diavik Diamond Mine from 2 to 6 August 2018 and a data verification (report and video) meeting in Yellowknife in the fall of 2018.

I understand that the Diavik TK Panel, the Environmental Monitoring Advisory Board (EMAB), established in 2001 with the signatories to the Environmental Agreement, and the Wek'èezhìi Land and Water Board have a mandate to review programs and results from TK monitoring activities. The DDMI AEMP has and will continue to engage local community members to collect samples, make observations and contribute to the design, format and methods of the ongoing aquatic monitoring during the operations of the Diavik Diamond Mine using both traditional ecological and western scientific knowledge.

Through my signature below, I understand that:

1. I consent to have my words, activities and responses regarding and related to my knowledge recorded on maps, in notes and photographs, on Global Positioning System (GPS) units, and using audio- and video-recording equipment (collectively referred to as Traditional Knowledge Data or TK Data);
2. I am free to choose not to respond to any questions that may be asked without penalty;
3. I am free to end the interview or refuse to participate in an activity at any time that I wish and / or choose to be anonymous in my participation without penalty;
4. My representative Aboriginal Organization, DDMI and / or Thorpe Consulting Services may use the information collected to contribute to aquatic and fisheries management and monitoring, in the identification of indicators, and inclusion with scientific results, discussions, and knowledge;
5. Camp participants, my representative Aboriginal organization, DDMI, Thorpe Consulting Services and the signatories of the DDMI Environmental Agreement may share my information which I have verified and given permission to share, for example, in either reports and/or video-documentaries;
6. I agree that my contributions to the TK Data may also be used for future educational, cultural, heritage, and environmental purposes that are outside the scope of the DDMI TEK Camp and that my representative Aboriginal organization, DDMI and/or Thorpe Consulting Services will make all reasonable efforts to consult me, or my descendants, before using my information for purposes not indicated above;

7. I will receive financial compensation for my participation in accordance with DDMI policy;
8. While at the cultural camp or in the follow-up review session, I am free to request that any information I share is removed, erased or deleted and that I will have one chance during the fall verification meeting to review draft video-documentaries, reports and maps to make edits before I sign them off and that final copies will be provided to me;
9. I understand that DDMI cannot ensure the protection of the Traditional Knowledge Data from public release (e.g., via youtube.com, Facebook, other social media, or Aboriginal group websites);
10. The TK Data will be summarized and integrated with scientific data into a report, which will be publicly available.
11. The TK Data may also be stored at the following locations:
    - Inuit of Kugluktuk: Kitikmeot Inuit Association of Kugluktuk;
    - Yellowknife Dene First Nation: Land & Environment department;
    - Tłı̨chǫ First Nation: Tłı̨chǫ Lands Department;
    - Lutsel K'e Dene First Nation: Lutsel K'e Lands Department; and
    - North Slave Métis Association: NSMA Environment Department.
12. I have the option of being either anonymous or given credit by name as an author and/or for providing TEK during the cultural camp, in the documentary and final report.

Signed this 6 day of August 2018, in Diavik, Northwest Territories.

Would you like your name to be used in the video-documentary and the final report related to the TK Data you provided during the DDMI AEMP activities?

☒ Yes, I would like my name and images to be used in the report and video-documentary.
○ No, I do not want my name or images to be used in the report and video-documentary.

Signatures:

Participant (Aboriginal Group)

Artless Collective

Diavik Diamond Mines Inc.

Thorpe Consulting Services

Diavik Diamond Mines Inc. Aquatic Effects Monitoring Program 2018

Informed Consent Form

I (name) Eric Marlave on August 5, 2018 give permission for Thorpe Consulting Services Inc., Barnaby Consulting, Artless Collective, C&E Consulting, Diavik Diamond Mines (2012) Inc. and other program participants (i.e. community youth) to take notes, photographs and/or audio and video recordings related to "my participation" in the DDMI Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) Study. I understand that "my participation" includes a planning meeting held on May 15-16, 2018 in Yellowknife, an on-the-land fish health and water quality study at a tent camp near the Diavik Diamond Mine from 2 to 6 August 2018 and a data verification (report and video) meeting in Yellowknife in the fall of 2018.

I understand that the Diavik TK Panel, the Environmental Monitoring Advisory Board (EMAB), established in 2001 with the signatories to the Environmental Agreement, and the Wek'èezhìi Land and Water Board have a mandate to review programs and results from TK monitoring activities. The DDMI AEMP has and will continue to engage local community members to collect samples, make observations and contribute to the design, format and methods of the ongoing aquatic monitoring during the operations of the Diavik Diamond Mine using both traditional ecological and western scientific knowledge.

Through my signature below, I understand that:

1. I consent to have my words, activities and responses regarding and related to my knowledge recorded on maps, in notes and photographs, on Global Positioning System (GPS) units, and using audio- and video-recording equipment (collectively referred to as Traditional Knowledge Data or TK Data);
2. I am free to choose not to respond to any questions that may be asked without penalty;
3. I am free to end the interview or refuse to participate in an activity at any time that I wish and / or choose to be anonymous in my participation without penalty;
4. My representative Aboriginal Organization, DDMI and / or Thorpe Consulting Services may use the information collected to contribute to aquatic and fisheries management and monitoring, in the identification of indicators, and inclusion with scientific results, discussions, and knowledge;
5. Camp participants, my representative Aboriginal organization, DDMI, Thorpe Consulting Services and the signatories of the DDMI Environmental Agreement may share my information which I have verified and given permission to share, for example, in either reports and/or video-documentaries;
6. I agree that my contributions to the TK Data may also be used for future educational, cultural, heritage, and environmental purposes that are outside the scope of the DDMI TEK Camp and that my representative Aboriginal organization, DDMI and/or Thorpe Consulting Services will make all reasonable efforts to consult me, or my descendants, before using my information for purposes not indicated above;

7. I will receive financial compensation for my participation in accordance with DDMI policy;
8. While at the cultural camp or in the follow-up review session, I am free to request that any information I share is removed, erased or deleted and that I will have one chance during the fall verification meeting to review draft video-documentaries, reports and maps to make edits before I sign them off and that final copies will be provided to me;
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    - Yellowknife Dene First Nation: Land & Environment department;
    - Tłı̨chǫ First Nation: Tłı̨chǫ Lands Department;
    - Lutsel K'e Dene First Nation: Lutsel K'e Lands Department; and
    - North Slave Métis Association: NSMA Environment Department.
12. I have the option of being either anonymous or given credit by name as an author and/or for providing TEK during the cultural camp, in the documentary and final report.

Signed this 5 day of AUG 2018, in Diavik TK, Northwest Territories.

Would you like your name to be used in the video-documentary and the final report related to the TK Data you provided during the DDMI AEMP activities?

- ☑ Yes, I would like my name and images to be used in the report and video-documentary.
- ☐ No, I do not want my name or images to be used in the report and video-documentary.

Signatures:

LKDFN

Participant (Aboriginal Group)

Artless Collective

for Diavik Diamond Mines Inc.

Thorpe Consulting Services

Diavik Diamond Mines Inc. Aquatic Effects Monitoring Program 2018

Informed Consent Form

I (name) MORRIS MARTIN on 05/15, 2018 give permission for Thorpe Consulting Services Inc., Barnaby Consulting, Artless Collective, C&E Consulting, Diavik Diamond Mines (2012) Inc. and other program participants (i.e. community youth) to take notes, photographs and/or audio and video recordings related to "my participation" in the DDMI Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) Study. I understand that "my participation" includes a planning meeting held on May 15-16, 2018 in Yellowknife, an on-the-land fish health and water quality study at a tent camp near the Diavik Diamond Mine from 2 to 6 August 2018 and a data verification (report and video) meeting in Yellowknife in the fall of 2018.

I understand that the Diavik TK Panel, the Environmental Monitoring Advisory Board (EMAB), established in 2001 with the signatories to the Environmental Agreement, and the Wek'èezhìi Land and Water Board have a mandate to review programs and results from TK monitoring activities. The DDMI AEMP has and will continue to engage local community members to collect samples, make observations and contribute to the design, format and methods of the ongoing aquatic monitoring during the operations of the Diavik Diamond Mine using both traditional ecological and western scientific knowledge.

Through my signature below, I understand that:

1. I consent to have my words, activities and responses regarding and related to my knowledge recorded on maps, in notes and photographs, on Global Positioning System (GPS) units, and using audio- and video-recording equipment (collectively referred to as Traditional Knowledge Data or TK Data);
2. I am free to choose not to respond to any questions that may be asked without penalty;
3. I am free to end the interview or refuse to participate in an activity at any time that I wish and / or choose to be anonymous in my participation without penalty;
4. My representative Aboriginal Organization, DDMI and / or Thorpe Consulting Services may use the information collected to contribute to aquatic and fisheries management and monitoring, in the identification of indicators, and inclusion with scientific results, discussions, and knowledge;
5. Camp participants, my representative Aboriginal organization, DDMI, Thorpe Consulting Services and the signatories of the DDMI Environmental Agreement may share my information which I have verified and given permission to share, for example, in either reports and/or video-documentaries;
6. I agree that my contributions to the TK Data may also be used for future educational, cultural, heritage, and environmental purposes that are outside the scope of the DDMI TEK Camp and that my representative Aboriginal organization, DDMI and/or Thorpe Consulting Services will make all reasonable efforts to consult me, or my descendants, before using my information for purposes not indicated above;

7. I will receive financial compensation for my participation in accordance with DDMI policy;
8. While at the cultural camp or in the follow-up review session, I am free to request that any information I share is removed, erased or deleted and that I will have one chance during the fall verification meeting to review draft video-documentaries, reports and maps to make edits before I sign them off and that final copies will be provided to me;
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    - Tłı̨chǫ First Nation: Tłı̨chǫ Lands Department;
    - Lutsel K'e Dene First Nation: Lutsel K'e Lands Department; and
    - North Slave Métis Association: NSMA Environment Department.
12. I have the option of being either anonymous or given credit by name as an author and/or for providing TEK during the cultural camp, in the documentary and final report.

Signed this 15 day of MAY 2018, in Yellowknife, Northwest Territories.

Would you like your name to be used in the video-documentary and the final report related to the TK Data you provided during the DDMI AEMP activities?

- O Yes, I would like my name and images to be used in the report and video-documentary.
- O No, I do not want my name or images to be used in the report and video-documentary.

Signatures:

Participant (Aboriginal Group)

Artless Collective

for Diavik Diamond Mines Inc.

Thorpe Consulting Services

Diavik Diamond Mines Inc. Aquatic Effects Monitoring Program 2018

Informed Consent Form

I (name) JONAS SANGRIS on MAY 15/18, 2018 give permission for Thorpe Consulting Services Inc., Barnaby Consulting, Artless Collective, C&E Consulting, Diavik Diamond Mines (2012) Inc. and other program participants (i.e. community youth) to take notes, photographs and/or audio and video recordings related to "my participation" in the DDMI Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) Study. I understand that "my participation" includes a planning meeting held on May 15-16, 2018 in Yellowknife, an on-the-land fish health and water quality study at a tent camp near the Diavik Diamond Mine from 2 to 6 August 2018 and a data verification (report and video) meeting in Yellowknife in the fall of 2018.

I understand that the Diavik TK Panel, the Environmental Monitoring Advisory Board (EMAB), established in 2001 with the signatories to the Environmental Agreement, and the Wek'èezhìi Land and Water Board have a mandate to review programs and results from TK monitoring activities. The DDMI AEMP has and will continue to engage local community members to collect samples, make observations and contribute to the design, format and methods of the ongoing aquatic monitoring during the operations of the Diavik Diamond Mine using both traditional ecological and western scientific knowledge.

Through my signature below, I understand that:

1. I consent to have my words, activities and responses regarding and related to my knowledge recorded on maps, in notes and photographs, on Global Positioning System (GPS) units, and using audio- and video-recording equipment (collectively referred to as Traditional Knowledge Data or TK Data);
2. I am free to choose not to respond to any questions that may be asked without penalty;
3. I am free to end the interview or refuse to participate in an activity at any time that I wish and / or choose to be anonymous in my participation without penalty;
4. My representative Aboriginal Organization, DDMI and / or Thorpe Consulting Services may use the information collected to contribute to aquatic and fisheries management and monitoring, in the identification of indicators, and inclusion with scientific results, discussions, and knowledge;
5. Camp participants, my representative Aboriginal organization, DDMI, Thorpe Consulting Services and the signatories of the DDMI Environmental Agreement may share my information which I have verified and given permission to share, for example, in either reports and/or video-documentaries;
6. I agree that my contributions to the TK Data may also be used for future educational, cultural, heritage, and environmental purposes that are outside the scope of the DDMI TEK Camp and that my representative Aboriginal organization, DDMI and/or Thorpe Consulting Services will make all reasonable efforts to consult me, or my descendants, before using my information for purposes not indicated above;

7. I will receive financial compensation for my participation in accordance with DDMI policy;
8. While at the cultural camp or in the follow-up review session, I am free to request that any information I share is removed, erased or deleted and that I will have one chance during the fall verification meeting to review draft video-documentaries, reports and maps to make edits before I sign them off and that final copies will be provided to me;
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    - Lutsel K'e Dene First Nation: Lutsel K'e Lands Department; and
    - North Slave Métis Association: NSMA Environment Department.
12. I have the option of being either anonymous or given credit by name as an author and/or for providing TEK during the cultural camp, in the documentary and final report.

Signed this 15 day of May 2018, in Yk, Northwest Territories.

Would you like your name to be used in the video-documentary and the final report related to the TK Data you provided during the DDMI AEMP activities?

- ✓ Yes, I would like my name and images to be used in the report and video-documentary.
- ○ No, I do not want my name or images to be used in the report and video-documentary.

Signatures:

Participant (Aboriginal Group)

Artless Collective

Diavik Diamond Mines Inc.

Thorpe Consulting Services

Diavik Diamond Mines Inc. Aquatic Effects Monitoring Program 2018

Informed Consent Form

I (name) Zachary Sangris on August 2nd, 2018 give permission for Thorpe Consulting Services Inc., Barnaby Consulting, Artless Collective, C&E Consulting, Diavik Diamond Mines (2012) Inc. and other program participants (i.e. community youth) to take notes, photographs and/or audio and video recordings related to "my participation" in the DDMI Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) Study. I understand that "my participation" includes a planning meeting held on May 15-16, 2018 in Yellowknife, an on-the-land fish health and water quality study at a tent camp near the Diavik Diamond Mine from 2 to 6 August 2018 and a data verification (report and video) meeting in Yellowknife in the fall of 2018.

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Through my signature below, I understand that:

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5. Camp participants, my representative Aboriginal organization, DDMI, Thorpe Consulting Services and the signatories of the DDMI Environmental Agreement may share my information which I have verified and given permission to share, for example, in either reports and/or video-documentaries;
6. I agree that my contributions to the TK Data may also be used for future educational, cultural, heritage, and environmental purposes that are outside the scope of the DDMI TEK Camp and that my representative Aboriginal organization, DDMI and/or Thorpe Consulting Services will make all reasonable efforts to consult me, or my descendants, before using my information for purposes not indicated above;

7. I will receive financial compensation for my participation in accordance with DDMI policy;
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    - Lutsel K'e Dene First Nation: Lutsel K'e Lands Department; and
    - North Slave Métis Association: NSMA Environment Department.
12. I have the option of being either anonymous or given credit by name as an author and/or for providing TEK during the cultural camp, in the documentary and final report.

Signed this 2nd day of August 2018, in Fort De Gras, Northwest Territories.

Would you like your name to be used in the video-documentary and the final report related to the TK Data you provided during the DDMI AEMP activities?

- ☑ Yes, I would like my name and images to be used in the report and video-documentary.
- ○ No, I do not want my name or images to be used in the report and video-documentary.

Signatures:

Zachery Sangris

Participant (Aboriginal Group)

Artless Collective

Diavik Diamond Mines Inc.

Thorpe Consulting Services

Diavik Diamond Mines Inc. Aquatic Effects Monitoring Program 2018

Informed Consent Form

I (name) Julie Wedzin on May 16, 2018 give permission for Thorpe Consulting Services Inc., Barnaby Consulting, Artless Collective, C&E Consulting, Diavik Diamond Mines (2012) Inc. and other program participants (i.e. community youth) to take notes, photographs and/or audio and video recordings related to "my participation" in the DDMI Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) Study. I understand that "my participation" includes a planning meeting held on May 15-16, 2018 in Yellowknife, an on-the-land fish health and water quality study at a tent camp near the Diavik Diamond Mine from 2 to 6 August 2018 and a data verification (report and video) meeting in Yellowknife in the fall of 2018.

I understand that the Diavik TK Panel, the Environmental Monitoring Advisory Board (EMAB), established in 2001 with the signatories to the Environmental Agreement, and the Wek'èezhìi Land and Water Board have a mandate to review programs and results from TK monitoring activities. The DDMI AEMP has and will continue to engage local community members to collect samples, make observations and contribute to the design, format and methods of the ongoing aquatic monitoring during the operations of the Diavik Diamond Mine using both traditional ecological and western scientific knowledge.

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6. I agree that my contributions to the TK Data may also be used for future educational, cultural, heritage, and environmental purposes that are outside the scope of the DDMI TEK Camp and that my representative Aboriginal organization, DDMI and/or Thorpe Consulting Services will make all reasonable efforts to consult me, or my descendants, before using my information for purposes not indicated above;

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    - Yellowknife Dene First Nation: Land & Environment department;
    - Tłı̨chǫ First Nation: Tłı̨chǫ Lands Department;
    - Lutsel K'e Dene First Nation: Lutsel K'e Lands Department; and
    - North Slave Métis Association: NSMA Environment Department.
12. I have the option of being either anonymous or given credit by name as an author and/or for providing TEK during the cultural camp, in the documentary and final report.

Signed this 16 day of May 2018, in Behchoko, Northwest Territories.

Would you like your name to be used in the video-documentary and the final report related to the TK Data you provided during the DDMI AEMP activities?

- O Yes, I would like my name and images to be used in the report and video-documentary.
- O No, I do not want my name or images to be used in the report and video-documentary.

Signatures:

x Jackie Wedzin
Participant (Aboriginal Group)

Artless Collective

Diavik Diamond Mines Inc.

Thorpe Consulting Services

Appendix 2 Planning Session

- Planning Session Agenda
- Planning Session Presentation
- Planning Session Evaluation Forms
- Planning Session Evaluation Summary

Agenda

Diavik Diamond Mines Inc.
Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge Study
Planning Session

May 15-16, 2018
Trappers Lake Spirituality Center – Diocese of the Mackenzie
Yellowknife, NT

Tuesday, May 15: Focus on Fish

8:30 am	Arrive – Welcome Breakfast
9:00 am	Opening Prayer, Round Table Introductions, Workshop Overview, Review Draft Agenda, Safety and House-keeping
	Presentation: Overview of Aquatic Effects Monitoring Program
	Group Discussion
	Video 1: We Fish Today for Fish Tomorrow (aRTLeSS Collective Inc.)
	Group Discussion: What were the strengths and weaknesses of earlier AEMP or other on-the-land camps? What is important for the upcoming camp?
12:00	*Lunch (provided)*
12:30	Presentation: Overview of Fish Sampling and Tasting
	Fish Processing Demonstration: Practice preparing fish for sampling according to Traditional Knowledge
	Group Discussion: Are there any adjustments to the fish tasting and sampling program that should occur?
4:30 pm	Close

Wednesday, May 16: Focus on Water

8:30 am	Arrive – Welcome Breakfast
9:00 am	Review of Day One
	Presentation: Overview of Water Sampling and Tasting
	Water Sampling / Tea Tasting Demonstration
	Group Discussion: Are there any adjustments to the water program that should occur?
	Feedback and Suggestions from Previous AEMP Sessions
	Group Discussion: Are there activities that people would like to suggest or places that should be visited?
12:00 pm	*Lunch (provided)*
12:30 pm	Group Discussion: Are there any special lessons that Elders want to teach while on the land? If so, are there materials needed?
	Presentation: Participants, Logistics and Safety
	Group Discussion: Are there any considerations around planning, safety and participation that should be discussed?
3:45 pm	Closing Circle
4:00 pm	Closing Prayer

Notes: *This agenda may change further to discussion with participants. Regular breaks will take place mid-morning and mid-afternoon or as needed throughout the day. Although most of the session will take place inside, there are a few hours where we will be outside working with fish and water so please dress warmly.*

Questions? *For issues around logistics (hotel, transportation, etc.), please call Katie Heaphy (669.6500 ext. 2221). Otherwise, please call Joanne (867.876.1119) or Natasha (604.999.1004).*

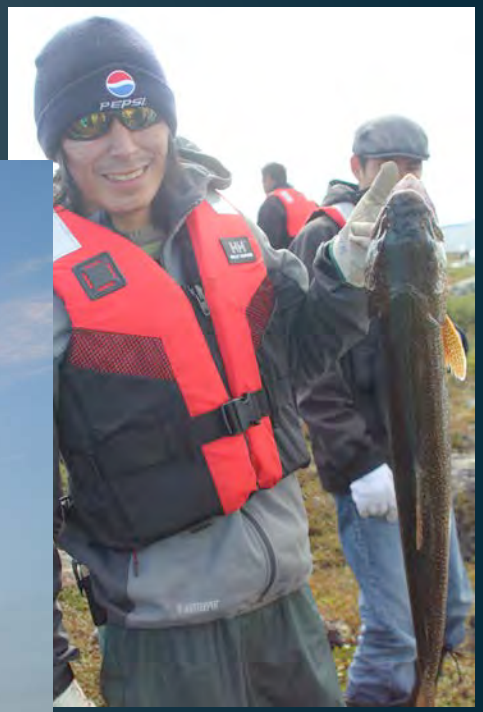
Diavik Diamond Mine
Aquatic Effects Monitoring Program: Planning for August, 2018

May 15, 2018

Thorpe Consulting Services

Outline

- What is the Aquatic Effects Monitoring Program (AEMP)?
- What are the key parts of the AEMP?
- What are the plans for 2018?

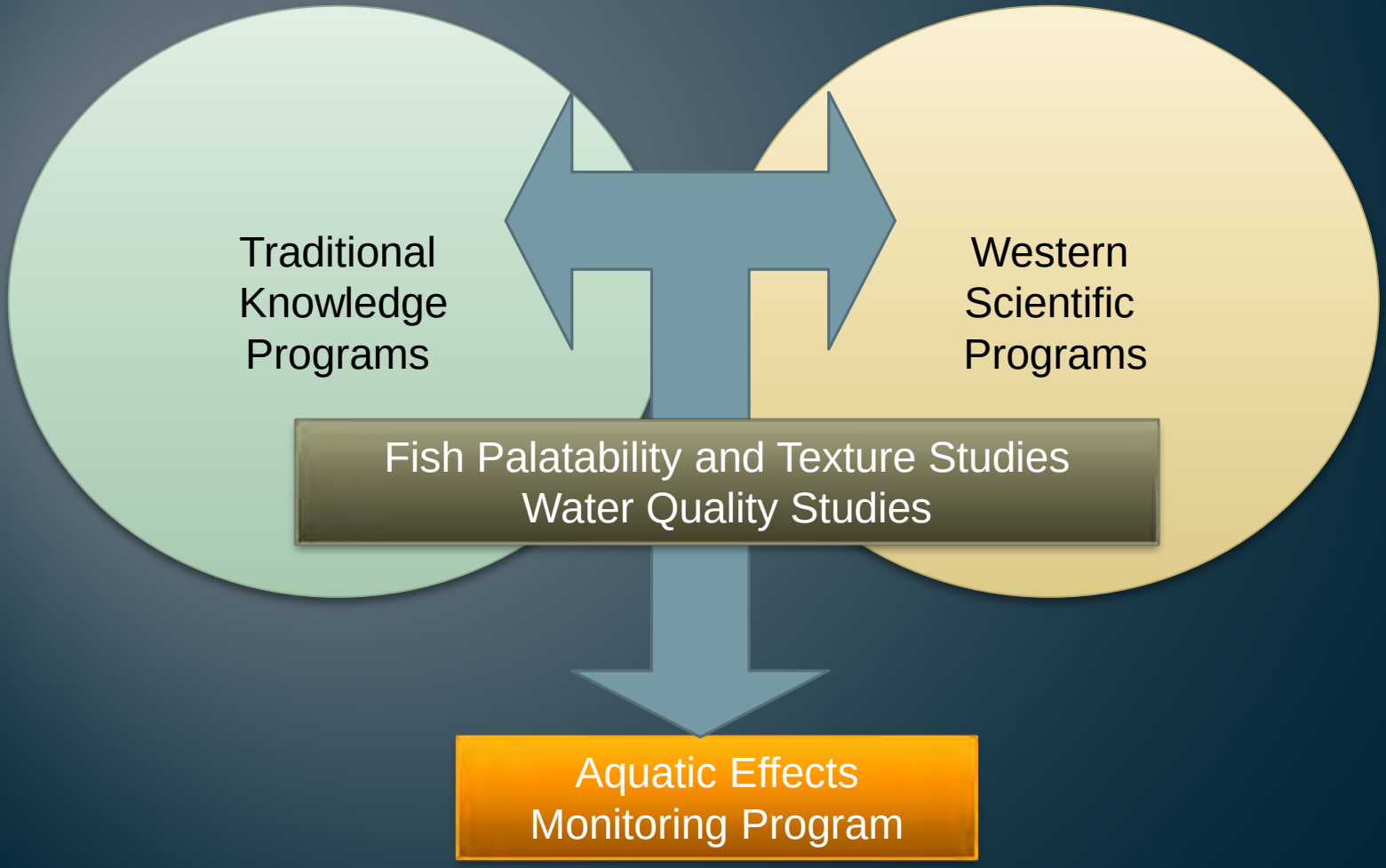


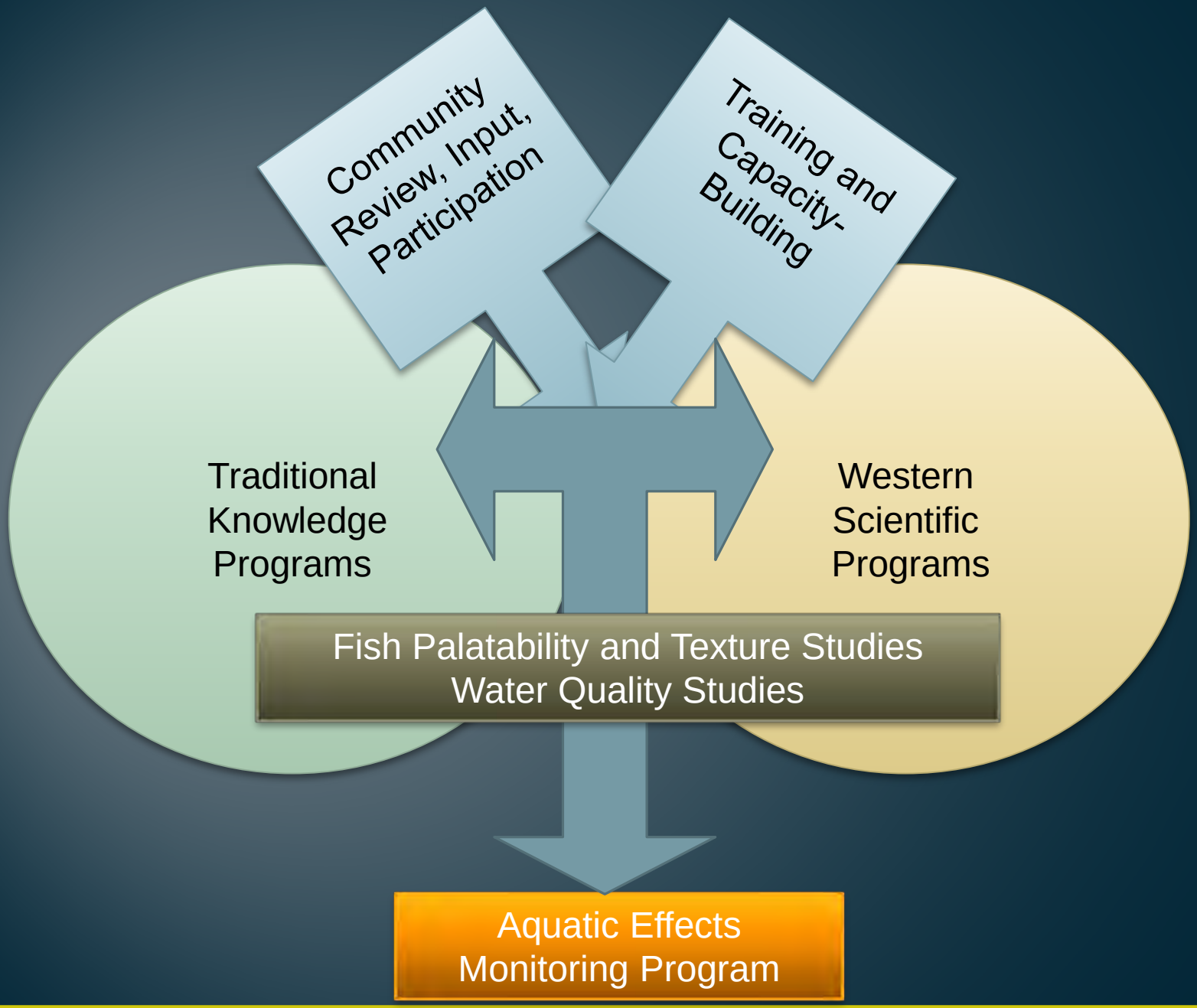
2015 Crew

What is the Aquatic Effects Monitoring Program (AEMP)?

- A way for community members to “watch” and “see with their own eyes” the health of the water and fish in Lac de Gras near Diavik Diamond Mine
- Participants: Elders and youth from the 5 signatory groups to the Environmental Agreement
- 5 days ‘on-the-land / water’
- Held many times:
  - 2002-2007, 2009, 2012, 2015

What is the Aquatic Effects Monitoring Program (AEMP)?




Community Review, Input, Participation
Training and Capacity-Building
Traditional Knowledge Programs
Western Scientific Programs
Fish Palatability and Texture Studies
Water Quality Studies
Aquatic Effects Monitoring Program

What changes in 2012?

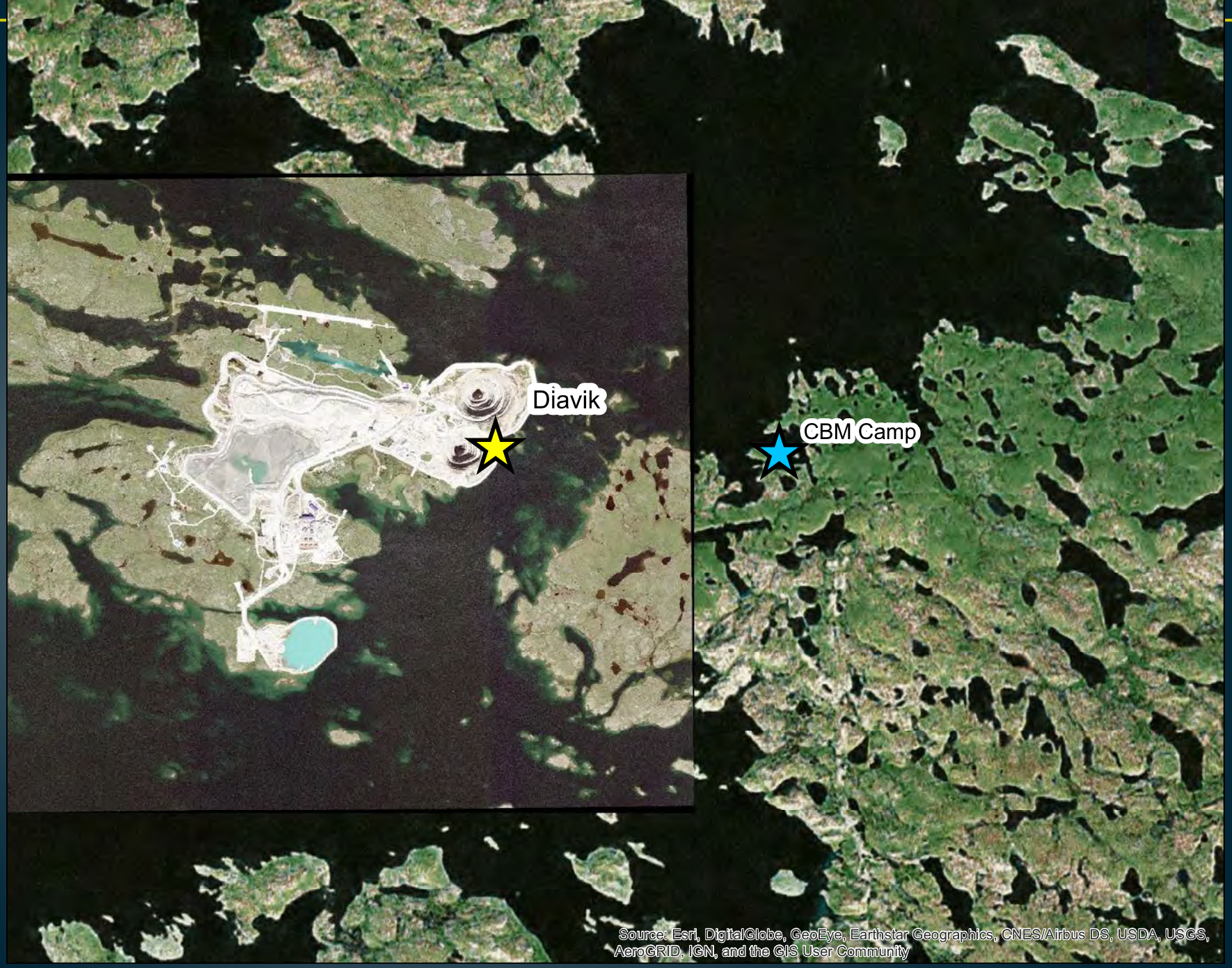
- Better ways of integrating TK
- New Fish Field Form
- New Water Field Form
- Interviews
- Youth Training
- Video Documentary
- Co-authored Report

AEMP Goals

1. Provide a forum for information exchange between community members, scientists and DDMI particularly around mining and environmental issues;
2. Increase engagement and capacity building opportunities for communities;
3. Improve community involvement in, and understanding of DDMI's monitoring programs;
4. Enhance ways to use Aboriginal languages and to draw from customs and stories;
5. Facilitate Elder-youth and cross-cultural exchange;

AEMP Goals

6. Improve contribution of 'TK data' in terms of collection, discussion, and verification;
7. Based on community feedback, expand on the standardized form used in the palatability studies, while continuing to collect data with the form such that data sets are standardized and comparable across years;
8. Initiate a TK interviewing element related to both water and fish that, for example, includes questions posed in the *Monitoring the Land by Watching and Using Caribou and Fish* (EMAB 2009)*;* and
9. Explore identifying indicators of water quality and fish health from a TK perspective.



12) In
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Satellite
Resoluti
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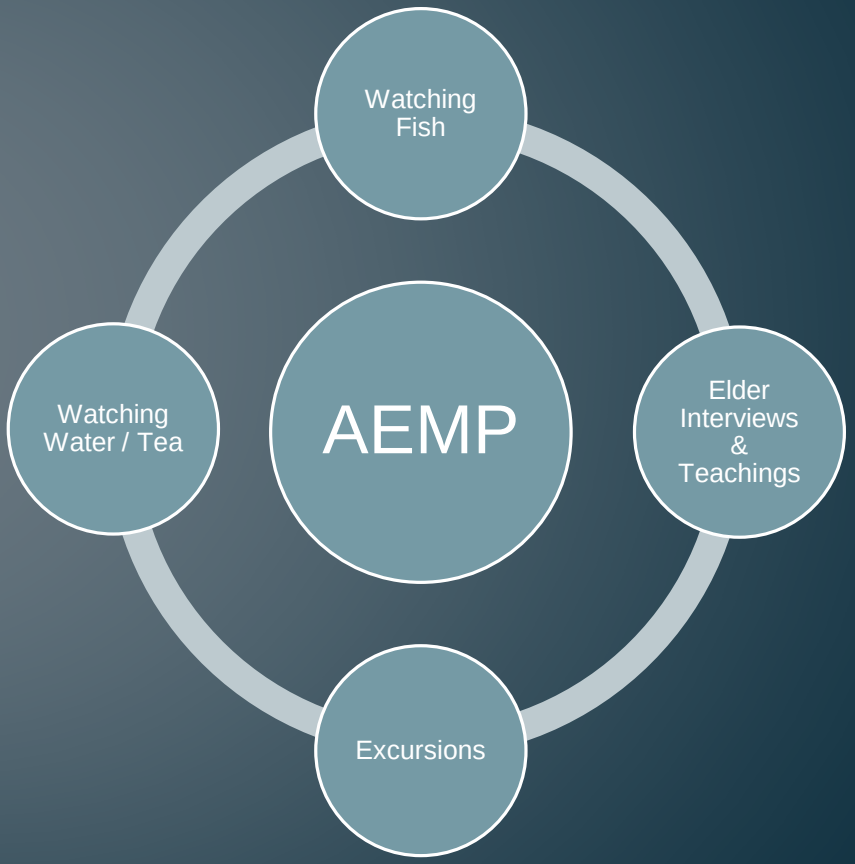
Where?

Components of the AEMP



Daily Schedule

Watching Fish

- community members set nets (at least twice), catch and examine fish
- interview and fill out field form about how the fish look and feel
- biologists teach fish sampling methods to youth

Tasting Fish

- community members prepare fish
  - grill
  - fry
  - bake
  - boil
- fill out field form about how fish taste and smell

External

Girth

- Skinny
- Average
- Fat

Gills

- Wine
- Red
- Pink
- White

Firmness

- Typical rebound
- Slow rebound
- Stays indented

Checklist of other indicators:

- Deformities
- Shape
- Scales

Fish type: _____

Fish ID (number):_____

Date: _____

Internal

Intestine

Colour: _____
Contents:_____

Deformities

☐ None ☐ Worms ☐ Tumours ☐ Parasites
Location? ☐ Tissue ☐ Stomach

Checklist of other indicators:

- Heart
- Kidney
- Liver
- Odour
- Eggs

Tissue

☐ Too Soft ☐ Typical ☐ Too Firm

Overall Determination:

☐ Would eat
☐ Would eat, but not enjoy
☐ Would not eat

Fish Taste Study Questions

- 1) this fish looks excellent for eating and looks better than fish we usually catch;
- 2) this fish looks good for eating and looks similar to fish we usually catch;
- 3) this fish looks okay for eating but does not look as good as fish we usually catch;
- 4) this fish does not look good for eating and looks much worse than fish we usually catch; and
- 5) we would not eat this fish.

Checking Water

- collect and test water samples from around Lac de Gras at locations selected by community members
- share knowledge of water, lake and surrounding area
- scientists demonstrate how to use equipment and take different types of water samples

Tasting Water

- test water from two places in Lac de Gras by preparing tea and tasting it
- Fill out field form

- Question: Do we want to taste water and tea in 2018?

Quality

Temperature

- Deep
- Cold
- Average
- Shallow
- Warm

Tea Test

- Good Tea
- Average Tea
- Poor Tea

Sample #: _____
Location: _____
Date: _____

Clarity

- See bottom of water
- Murky
- Cannot see your hand in the water

Movement

- Still Water
- Some Movement
- Running Water

Respect

- Tobacco
- Branch
- Use of Language

Water is Alive

Proper Protocols

Other??

Eldercare

Map of Fish Nets and Water Quality

Interviews

Time for each group to share their stories, teachings, and insights of healthy fish and water

Trips

Comments from 2015

Question	Very Good	Good	Neither Good nor Poor	Poor	Very Poor
How would you rate the camp for working together?	11	4	-	-	-
How would you rate the camp for Elder-youth teaching opportunities?	9	5	-	1	-
How would you rate the camp for communications among participants?	10	5	-	-	-
How would you rate the camp for respect among participants?	13	2	-	-	-
How would you rate the camp for Elder care and attention?	11	4	-	-	-
How would you rate the camp for Youth care and attention?	10	3	1		
How would you rate the camp for documentation of Traditional Knowledge?	8	5	2	-	-
How would you rate the camp for filming process?	9	3	2	-	-
How would you rate the camp for safety, food and support?	11	4	-	-	-
Overall, how would you rate the camp?	11	3	1	-	-

General Comments from 2015

- ✓Plan and organize sessions
- ✓Good interpreters; morning & evening planning sessions were good
- ✓Cleaned up garbage, shelter for fish cleaning, chairs with backs at the fire were great
- ✓Opportunity to document more stories
- ✓Pablo and Jay were fantastic
- ✓Wish to eat more fish and country food
- ✓Too much safety

What were the benefits and learnings to you?

- Science was cool; traditionally learned what I already knew but a good refresher
- Benefit of youth learning more from Elders
- Good for all northern Dene and Inuit people to work together for the betterment of the land and water
- Opportunity to see how others assessed fish and had different methods and tools for processing
- Varied ways that people respect and honour the environment, fish and water resources
- All different people from the north are one family
- Videography training
- Healing for mind, body, soul
- Learned from all people; Inuit, Dene, Metis and white man ways
- Learned a lot from Elders, and water and fish sampling, too
- Not here to learn but advise; the production of this water and land and fish is important to us
- Good talking to people from different localities
- TK of fish from different cultures; TK documentation; meeting Elders from different areas

What were the benefits to your organization?

- Elder-youth connections and teachings for the future of the people; recording TK for future use; engaging members and keeping them in the loop
- Engaged in monitoring environment and natural resources; this is important to our community in a mine development area
- They see what Elders and youth are doing at this mine site so other mines will do the same
- Learning experience by way of stories among the group and also mine personnel telling us techniques and ways of monitoring cleanliness of mine activities
- Keep the water clean, land and air
- The want/need to do an Elder-Youth summit in our community, with Elders from our region
- We need more members and youth to take part in TK programs and in the community as well
- Community will know what is happening at the mine
- It's good for overall benefit, but mostly for the youth
- To have it every 2 years, rather than 3 years apart
- Cleaner water and land for the future

How would you describe the program to others?

- Engaging in monitoring the environment that is important to communities
- Amazing opportunity to learn about other northern cultures, as well as my own; invaluable time spent out on the land with wise and interesting people
- Amazing experience, awesome participants and camp leaders
- To monitor the mine close by
- Openness and helpful in ways of helping one another
- Good for youth; anywhere similar teaching on land
- I would encourage Elders and youth to take this opportunity
- I think its good but needs more traditional games
- Could be better and involve all community members
- Whoever wants to come, we should invite them in
- Same group should come back every 2 years
- You get on a good boat and go to a camp
- Join in

How would you explain the value of this program to a senior leader at Diavik?

- Helped me understand what is being done to protect land and water and if Diavik is doing a good job; excellent community engagement; we can help with environment protocols having seen the land over many years; we need to work together
- The fish were in good shape so the water has to be, or the fish would be sick and dead
- Provided a hands-on, front-line exposure to the compliance monitoring and environmental impact management work that is required and aids in understanding how this is done and how complex and time consuming it can be
- Showed me what Diavik does to the water and what they're doing to help protect the land
- If we have Diavik and 5 regions report to their leaders on a regular basis, it would good all around
- If Diavik wants to help, why not?
- I think Diavik is a really good company to work with and understanding to accommodate what the Elders want to do
- Have this monitoring program on-going; more programs for youth and Elders; provide more for interpreting when we go into the evenings
- Dene involvement in on-going programs; check the water testing in spring time
- Very good program for it helps them to understand our ways of respecting the land and to help them in thinking of ways to pay more attention to stories; and for thinking about ways to do reclamation
- Protecting the environment is very important to us; work very close with First Nations
- Gives me ease knowing the mining does not have negative effects on the fish and water

Do you feel there was anything missing from the camp?

- ✓ More youth involvement (x3); an experience like this can be life changing for youth
- ✓ Could be more fun
- ✓ Perhaps a bit more time for an optional on land activity
- ✓ Would have like to eat more fish, berries, etc. Maybe if each group got to cook something with the help of the cook each night, it would be an opportunity for more teaching/TK, e.g. fish egg bannock, blueberry crisp, fish guts, fish soup/chowder (Hilda was amazing).
- Ice cream
- Urinals
- Direct contact with home community
- Calling home, if possible
- Maybe a caribou program, too
- Everything good

Aquatic Effects Monitoring Program Planning Session: Evaluation Form

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1. How would you rate the session for **working and communicating together**?
   - ○ Very good
   - ✓ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

2. How would you rate the session for **mutual respect among participants**?
   - ○ Very good
   - ✓ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

3. How would you rate the opportunities for you to **share your knowledge and experiences**?
   - ○ Too many opportunities
   - ✓ Enough opportunities
   - ○ Too few opportunities

4. How would you rate the **recording and documenting of TK during the session**?
   - ○ Very good
   - ✓ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

5. How would you rate the **facilitation of the session**?
   - ○ Very good
   - ✓ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

6. How would you rate the **outcomes and findings of the session**?
   - ○ Very good
   - ✓ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

7. How would you rate the **amount of time** to discuss the topic(s) during the session?
   - ○ Too much time
   - ✓ Enough time
   - ○ Too little time

8. How would you rate the **venue and food** for the session?

- O Very good
- ⊘ Good
- O Neither good nor poor
- O Poor
- O Very Poor

9. How would you rate the **logistics** for the session (e.g., hotel, travel, and honoraria)?

- O Very good
- ⊘ Good
- O Neither good nor poor
- O Poor
- O Very Poor

10. **Overall**, how would you rate the session?

- O Very good
- ⊘ Good
- O Neither good nor poor
- O Poor
- O Very Poor

11. What were the strengths of the session? What did you enjoy about the session? Is there anything you recommend for the upcoming camp that you could share?

The Strength of the Session?

This Meeting we had and the knowledge we shared I really enjoy it very much.

I see the video, the landscape is beautiful, and the youth are engine.

I see some berries on the ground looks beautiful.

12. How could the session be improved? Is there anything that could be changed?

In the future we are teaching the young people, so they can learn and teach the younger people after them. So that in the future our youth people can learn how to say prayer and be strong in Spiritual way of our way tradition language. We as Elder need to teach more about Drug and Alcohol, to teach them about this too in the Future.

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   - Poor
   - Very Poor

2. How would you rate the session for **mutual respect among participants**?
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   - Good
   - Neither good nor poor
   - Poor
   - Very Poor

3. How would you rate the opportunities for you to **share your knowledge and experiences**?
   - Too many opportunities
   - ✓ Enough opportunities
   - Too few opportunities

4. How would you rate the **recording and documenting of TK during the session**?
   - Very good
   - ✓ Good
   - Neither good nor poor
   - Poor
   - Very Poor

5. How would you rate the **facilitation of the session**?
   - Very good
   - ✓ Good
   - Neither good nor poor
   - Poor
   - Very Poor

6. How would you rate the **outcomes and findings of the session**?
   - Very good
   - ✓ Good
   - Neither good nor poor
   - Poor
   - Very Poor

7. How would you rate the **amount of time** to discuss the topic(s) during the session?
   - Too much time
   - ✓ Enough time
   - Too little time

8. How would you rate the **venue and food** for the session?

- ✓ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

9. How would you rate the **logistics** for the session (e.g., hotel, travel, and honoraria)?

- ✓ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

10. **Overall**, how would you rate the session?

- ○ Very good
- ✓ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

11. What were the strengths of the session? What did you enjoy about the session? Is there anything you recommend for the upcoming camp that you could share?

It's good not bad.

12. How could the session be improved? Is there anything that could be changed?

none.

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   - ○ Poor
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   - ✓ Good
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   - ○ Poor
   - ○ Very Poor

3. How would you rate the opportunities for you to **share your knowledge and experiences**?
   - ○ Too many opportunities
   - ✓ Enough opportunities
   - ○ Too few opportunities

4. How would you rate the **recording and documenting of TK during the session**?
   - ○ Very good
   - ✓ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

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   - ○ Very good
   - ✓ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

6. How would you rate the **outcomes and findings of the session**?
   - ○ Very good
   - ✓ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

7. How would you rate the **amount of time** to discuss the topic(s) during the session?
   - ○ Too much time
   - ✓ Enough time
   - ○ Too little time

8. How would you rate the **venue and food** for the session?

- ○ Very good
- ○ Good
- ◉ Neither good nor poor
- ○ Poor
- ○ Very Poor

9. How would you rate the **logistics** for the session (e.g., hotel, travel, and honoraria)? More honoraria

- ○ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

10. **Overall**, how would you rate the session?

- ◉ Very good
- ◉ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

11. What were the strengths of the session? What did you enjoy about the session? Is there anything you recommend for the upcoming camp that you could share?

12. How could the session be improved? Is there anything that could be changed?

More Traditional food for at Session and Camp.

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   - ○ Poor
   - ○ Very Poor

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   - ○ Neither good nor poor
   - ○ Poor
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3. How would you rate the opportunities for you to **share your knowledge and experiences**?
   - ○ Too many opportunities
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   - ○ Too few opportunities

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   - ○ Poor
   - ○ Very Poor

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   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

6. How would you rate the **outcomes and findings of the session**?
   - ✓ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

7. How would you rate the **amount of time** to discuss the topic(s) during the session?
   - ○ Too much time
   - ✓ Enough time
   - ○ Too little time

8. How would you rate the **venue and food** for the session?

- ✓ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

9. How would you rate the **logistics** for the session (e.g., hotel, travel, and honoraria)?

- ✓ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

10. **Overall**, how would you rate the session?

- ✓ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

11. What were the strengths of the session? What did you enjoy about the session? Is there anything you recommend for the upcoming camp that you could share?

The strengths of the Session was great.
I enjoy the Session of the Video of the Camp, and the youth talking was good.
I would like to share more for upcoming camp, Is that share Elders knowledge, the trails, Parts Medicine, and Caribou program to start up. Circle talk In Evening show more youth working on cutting up fish, the youth can tell stories of their own Experience.

12. How could the session be improved? Is there anything that could be changed?

Have fan, more Video of people on land, with the study, walk on the land, showing Caribou trails tell the youth to talk to Elders, a lot of Questions
Have activities and Events, like Hand games, drum dance and show the strong knowledge of Spiritual power of prayer and Song.

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1. How would you rate the session for **working and communicating together**?
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   - ○ Very Poor

2. How would you rate the session for **mutual respect among participants**?
   - ○ Very good
   - ✓ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

3. How would you rate the opportunities for you to **share your knowledge and experiences**?
   - ○ Too many opportunities
   - ✓ Enough opportunities
   - ○ Too few opportunities

4. How would you rate the **recording and documenting of TK during the session**?
   - ○ Very good
   - ○ Good
   - ✓ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

5. How would you rate the **facilitation of the session**?
   - ○ Very good
   - ✓ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

6. How would you rate the **outcomes and findings of the session**?
   - ○ Very good
   - ✓ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

7. How would you rate the **amount of time** to discuss the topic(s) during the session?
   - ○ Too much time
   - ✓ Enough time
   - ○ Too little time

8. How would you rate the **venue and food** for the session?

- ❍ Very good
- ☑ Good
- ❍ Neither good nor poor
- ❍ Poor
- ❍ Very Poor

9. How would you rate the **logistics** for the session (e.g., hotel, travel, and honoraria)?

- ❍ Very good
- ☑ Good
- ❍ Neither good nor poor
- ❍ Poor
- ❍ Very Poor

10. **Overall**, how would you rate the session?

- ☑ Very good
- ❍ Good
- ❍ Neither good nor poor
- ❍ Poor
- ❍ Very Poor

11. What were the strengths of the session? What did you enjoy about the session? Is there anything you recommend for the upcoming camp that you could share?

The Strengths of this Session was Good, Well Organize The food great, we have fun, show our knowledge, and help the youth.

12. How could the session be improved? Is there anything that could be changed?

More presentation and Slide, I think everything is good.

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- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

2. How would you rate the session for **mutual respect among participants**?
- ○ Very good
- ◉ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

3. How would you rate the opportunities for you to **share your knowledge and experiences**?
- ○ Too many opportunities
- ◉ Enough opportunities
- ○ Too few opportunities

4. How would you rate the **recording and documenting of TK during the session**?
- ◉ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

5. How would you rate the **facilitation of the session**?
- ◉ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

6. How would you rate the **outcomes and findings of the session**?
- ○ Very good
- ◉ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

7. How would you rate the **amount of time** to discuss the topic(s) during the session?
- ○ Too much time
- ◉ Enough time
- ○ Too little time

8. How would you rate the **venue and food** for the session?

- ◉ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

9. How would you rate the **logistics** for the session (e.g., hotel, travel, and honoraria)?

- ◉ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

10. **Overall**, how would you rate the session?

- ◉ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

11. What were the strengths of the session? What did you enjoy about the session? Is there anything you recommend for the upcoming camp that you could share?

12. How could the session be improved? Is there anything that could be changed?

Appendix 2d Results of the Planning Session Evaluation (2018)

Question	Very Good	Good	Neither Good nor Poor	Poor	Very Poor
How would you rate the session for working and communicating together? (N=6)	3	3	-	-	-
How would you rate the session for mutual respect among participants? (N=6)	1	5	-	-	-
How would you rate the recording and documenting of TK during the session (N=6)	2	3	1	-	-
How would you rate the facilitation of the session? (N=6)	2	4	-	-	-
Overall, how would you rate the outcomes and findings of the session? (N=6)	1	5	-	-	-
How would you're the venue and food for the session (N=6)	3	2	1	-	-
How would you rate the logistics of the session? (N=5)	3	2	-	-	-
Overall, how would you rate the session? (N=6)	4	2	-	-	-

Question	Too much time	Enough time	Too little time
How would you rate the amount of time to discuss the topic(s) during the session (N=6)	-	6	-

Question	Too many	Enough	Too few
How would you rate the opportunities for you to share your knowledge and experiences? (N=6)	-	6	-

Appendix 3 Camp

- Camp Daily Schedule
- Completed Camp Evaluations

Diavik Diamond Mines (2012) Inc. Aquatic Effects Monitoring Program

2018 Traditional Knowledge Study

Schedule of Daily Activities

Thursday, August 2 (Day 1)	
8:15 am	Camp participants meet at G & G for flight to site
9:00 am	Plane leaves for Diavik Mine
10:30 am	Travel by boat to Camp
10:45 am	Opening Prayer & Circle Fire feeding ceremony Tent selection and luggage
12:00 pm	Lunch
1:00 pm	Afternoon Gathering: housekeeping, health and safety, review study plan & evening plan
4:00 pm	Youth training on water testing forms
5:00 pm	Fishing off the dock (4 LKTR caught), Net inspections and preparations
6:00 pm	Dinner
7:30 pm	Evening Gathering: planning session for Day 2

Friday, August 3 (Day 2)	
7:00 – 8:00 am	Breakfast
8:00 am	Morning Gathering: review plans for day
9:00 am	Knife sharpening lesson for youth, TK interviews with Elders, drying rack built for fish
10:00 am	Fishing off dock, fish processing & TK observations
12:00 pm	Lunch
1:30 pm	Bannock making lesson with Nancy
2:30 pm	Water sampling demonstration – equipment use; TK interviews with Elders continue
3:30 pm	Fishing off dock (total of 16 fish caught this day), fish processing & TK observations
6:00 pm	Dinner
7:30 pm	Evening Gathering: planning session for Day 3

Saturday, August 4 (Day 3)	
7:00 – 8:00 am	Breakfast
8:00 am	Morning Gathering; review plans for day
9:00 am	Water sampling for TK1 (bay near camp); otolith retrieval lesson with elders and youth
11:30 am	Lunch
12:30 pm	Boat trip to the Narrows; 2 LKTR caught here; interviews, berry picking, time on the land
3:00 pm	Water sampling for TK2 (LDG near mine, en route back from the Narrows)

Saturday, August 4 (Day 3)	
5:30 pm	Dinner
6:30 pm	Fishing off dock (3 LKTR caught); fish processing
7:30 pm	Evening gathering: planning session for Day 4

Sunday, August 5 (Day 4)	
7:30 am	Breakfast
8:00 am	Morning Gathering: review plans for day
9:00 am	Net set 1
9:30 am	Fishing off dock, fish processing & TK observations (4 LKTR for tasting, 1 other LKTR), cook fish
11:00 am	Fish Tasting and filling out forms
2:00 pm	Water tasting – TK1 and TK2
3:00 pm	Interviews Youth viewed video documentary for 2015 AEMP TK Study Fish retrieved from net (5 LKTR, 1 LKWH), fish processing
6:00 pm	Dinner
7:30 pm	Evening gathering; planning session for Day 5 and return trip home

Monday, August 6 (Day 5)	
7:00 – 9:00 am	Breakfast Fishing off dock Bags packed and taken to site
9:00 am – noon	Morning Gathering Closing Circle Fish Processing
12:00 pm	Boats return participants to site Lunch
1:00 – 3:30 pm	Review of daily notes by camp participants (all days) Measuring success: participant evaluations completed
3:30 pm	Flight check-in
5:00 pm	Flight departs for Yellowknife

Diavik 2018 AEMP Evaluation Form

Thank you for participating in the Aquatic Effects Monitoring Program. We hope you enjoyed your time at the camp. We appreciate your honest and constructive feedback on your experience. Your responses will help us improve future camps.

1. How would you rate the camp for **working together**?

○ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

2. How would you rate the camp for **Elder-youth teaching opportunities**?

○ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

3. How would you rate the opportunities for you to **communications among participants?**

○ Too many opportunities	○ Enough opportunities	○ Too few opportunities

4. How would you rate the **respect among participants**?

○ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

5. How would you rate the **Elder care and attention**?

○ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

6. How would you rate the **documentation of Traditional Knowledge**?

○ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

7. How would you rate the **filming process**?

○ Too much time	○ Enough time	○ Too little time

8. How would you rate the **venue and food** for the camp?

○ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

9. How would you rate the **logistics** for the camp (e.g., hotel, travel, and honoraria)?

○ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

10. How would you rate the **camp for safety**?

- ○ Very good
- ① Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

11. **Overall**, how would you rate the camp?

- ○ Very good
- ① Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

12. What were the strengths of the camp? What did you enjoy about the camp?

GOOD SHITTER / EXCELENT COOKS
GOOD FOOD / GOOD COMPANY / GOOD FIRE ATTENDER

13. How could the camp be improved?

TIME MANAGEMENT BETTER PLANNING IN SOME AREAS

Diavik 2018 AEMP Evaluation Form

Thank you for participating in the Aquatic Effects Monitoring Program. We hope you enjoyed your time at the camp. We appreciate your honest and constructive feedback on your experience. Your responses will help us improve future camps.

1. How would you rate the camp for **working together**?

⊗ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

2. How would you rate the camp for **Elder-youth teaching opportunities**?

⊗ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

3. How would you rate the opportunities for you to **communications among participants?**

○ Too many opportunities	⊗ Enough opportunities	○ Too few opportunities

4. How would you rate the **respect among participants**?

⊗ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

5. How would you rate the **Elder care and attention**?

⊗ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

6. How would you rate the **documentation of Traditional Knowledge**?

⊗ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

7. How would you rate the **filming process**?

○ Too much time	⊗ Enough time	○ Too little time

8. How would you rate the **venue and food** for the camp?

⊗ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

9. How would you rate the **logistics** for the camp (e.g., hotel, travel, and honoraria)?

⊗ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

10. How would you rate the **camp for safety**?

- ⊘ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

11. **Overall**, how would you rate the camp?

- ⊘ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

12. What were the strengths of the camp? What did you enjoy about the camp?

13. How could the camp be improved?

Diavik 2018 AEMP Evaluation Form

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1. How would you rate the camp for **working together**?
   - ◉ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

2. How would you rate the camp for **Elder-youth teaching opportunities**?
   - ◉ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

3. How would you rate the opportunities for you to **communications among participants?**
   - ○ Too many opportunities
   - ◉ Enough opportunities
   - ○ Too few opportunities

4. How would you rate the **respect among participants**?
   - ◉ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

5. How would you rate the **Elder care and attention**?
   - ○ Very good
   - ◉ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

6. How would you rate the **documentation of Traditional Knowledge**?
   - ◉ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

7. How would you rate the **filming process**?
   - ○ Too much time
   - ◉ Enough time
   - ○ Too little time

8. How would you rate the **venue and food** for the camp?
   - ◉ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

9. How would you rate the **logistics** for the camp (e.g., hotel, travel, and honoraria)?
   - ◉ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

10. How would you rate the **camp for safety**?

O Very good	O Neither good nor poor	O Very Poor
O Good	O Poor	

11. **Overall**, how would you rate the camp?

O Very good	O Neither good nor poor	O Very Poor
O Good	O Poor	

12. What were the strengths of the camp? What did you enjoy about the camp?

Learning about Teaching Young about fishing & water Safety. When for Boat Ride to the Cap East of Dawson

13. How could the camp be improved?

Everything is good good meal & Camp Cleanup.

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1. How would you rate the camp for **working together**?

✓ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

2. How would you rate the camp for **Elder-youth teaching opportunities**?

○ Very good	○ Neither good nor poor	○ Very Poor
✓ Good	○ Poor	

3. How would you rate the opportunities for you to **communications among participants?**

○ Too many opportunities	✓ Enough opportunities	○ Too few opportunities

4. How would you rate the **respect among participants**?

○ Very good	○ Neither good nor poor	○ Very Poor
✓ Good	○ Poor	

5. How would you rate the **Elder care and attention**?

✓ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

6. How would you rate the **documentation of Traditional Knowledge**?

○ Very good	○ Neither good nor poor	○ Very Poor
✓ Good	○ Poor	

7. How would you rate the **filming process**?

○ Too much time	✓ Enough time	○ Too little time

8. How would you rate the **venue and food** for the camp?

✓ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

9. How would you rate the **logistics** for the camp (e.g., hotel, travel, and honoraria)?

○ Very good	○ Neither good nor poor	○ Very Poor
✓ Good	○ Poor	

10. How would you rate the **camp for safety**?

- ❍ Very good
- ❍ Good
- ❍ Neither good nor poor
- ❍ Poor
- ❍ Very Poor

11. **Overall**, how would you rate the camp?

- ❍ Very good
- ❍ Good
- ❍ Neither good nor poor
- ❍ Poor
- ❍ Very Poor

12. What were the strengths of the camp? What did you enjoy about the camp?

13. How could the camp be improved?

Diavik 2018 AEMP Evaluation Form

Thank you for participating in the Aquatic Effects Monitoring Program. We hope you enjoyed your time at the camp. We appreciate your honest and constructive feedback on your experience. Your responses will help us improve future camps.

1. How would you rate the camp for **working together**?
   - ☑ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

2. How would you rate the camp for **Elder-youth teaching opportunities**?
   - ☑ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

3. How would you rate the opportunities for you to **communications among participants?**
   - ○ Too many opportunities
   - ☑ Enough opportunities
   - ○ Too few opportunities

4. How would you rate the **respect among participants**?
   - ☑ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

5. How would you rate the **Elder care and attention**?
   - ☑ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

6. How would you rate the **documentation of Traditional Knowledge**?
   - ○ Very good
   - ☑ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

7. How would you rate the **filming process**?
   - ○ Too much time
   - ☑ Enough time
   - ○ Too little time

8. How would you rate the **venue and food** for the camp?
   - ☑ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

9. How would you rate the **logistics** for the camp (e.g., hotel, travel, and honoraria)?
   - ☑ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

10. How would you rate the **camp for safety**?

- ✓ Very good
- ✓ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

11. **Overall**, how would you rate the camp?

- ✓ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

12. What were the strengths of the camp? What did you enjoy about the camp?

playing with the sampling kits were exremely fun and talking my language with those who understand streghthens my Vocabulary. I also enjoyed the story telling, and the people's company and just mainly being out on the land. I've got to much to say that I'd like to comeback! and hopefully soon.

13. How could the camp be improved?

New drums, maybe an additional youths from each group of people. And the most important is longer days, sucks being out there for only 4 days.

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1. How would you rate the camp for **working together**?

○ Very good	○ Neither good nor poor	○ Very Poor
✓ Good	○ Poor	

2. How would you rate the camp for **Elder-youth teaching opportunities**?

✓ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

3. How would you rate the opportunities for you to **communications among participants?**

○ Too many opportunities	✓ Enough opportunities	○ Too few opportunities

4. How would you rate the **respect among participants**?

✓ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

5. How would you rate the **Elder care and attention**?

✓ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

6. How would you rate the **documentation of Traditional Knowledge**?

✓ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

7. How would you rate the **filming process**?

○ Too much time	✓ Enough time	○ Too little time

8. How would you rate the **venue and food** for the camp?

✓ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

9. How would you rate the **logistics** for the camp (e.g., hotel, travel, and honoraria)?

✓ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

10. How would you rate the **camp for safety**?

- ⊘ Very good
- O Good
- O Neither good nor poor
- O Poor
- O Very Poor

11. **Overall**, how would you rate the camp?

- ⊘ Very good
- O Good
- O Neither good nor poor
- O Poor
- O Very Poor

12. What were the strengths of the camp? What did you enjoy about the camp?

PARTICIPATION AMONG YOUTH + ELDERS + LOCAL CAMP WAS VERY GOOD. YOUTH - VERY EASY TO UNDERSTAND ALL TRADITIONAL KNOWLEDGE TOLD TO THEM AND ALWAYS ASKING FOR MORE

13. How could the camp be improved?

FISH PROCESSING TABLE too AWKWARD AND Too High

Diavik 2018 AEMP Evaluation Form

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1. How would you rate the camp for **working together**?

✓ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

2. How would you rate the camp for **Elder-youth teaching opportunities**?

✓ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

3. How would you rate the opportunities for you to **communications among participants?**

✓ Too many opportunities	○ Enough opportunities	○ Too few opportunities

4. How would you rate the **respect among participants**?

✓ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

5. How would you rate the **Elder care and attention**?

✓ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

6. How would you rate the **documentation of Traditional Knowledge**?

✓ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

7. How would you rate the **filming process**?

○ Too much time	✓ Enough time	○ Too little time

8. How would you rate the **venue and food** for the camp?

✓ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

9. How would you rate the **logistics** for the camp (e.g., hotel, travel, and honoraria)?

✓ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

10. How would you rate the **camp for safety**?

- ◉ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

11. **Overall**, how would you rate the camp?

- ◉ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

12. What were the strengths of the camp? What did you enjoy about the camp?

Cooks. Safety of personnel was #1

13. How could the camp be improved?

Diavik 2018 AEMP Evaluation Form

Thank you for participating in the Aquatic Effects Monitoring Program. We hope you enjoyed your time at the camp. We appreciate your honest and constructive feedback on your experience. Your responses will help us improve future camps.

1. How would you rate the camp for **working together**?

☑ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

2. How would you rate the camp for **Elder-youth teaching opportunities**?

○ Very good	○ Neither good nor poor	○ Very Poor
☑ Good	○ Poor	

3. How would you rate the opportunities for you to **communications among participants?**

○ Too many opportunities	☑ Enough opportunities	○ Too few opportunities

4. How would you rate the **respect among participants**?

☑ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

5. How would you rate the **Elder care and attention**?

☑ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

6. How would you rate the **documentation of Traditional Knowledge**?

☑ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

7. How would you rate the **filming process**?

○ Too much time	☑ Enough time	○ Too little time

8. How would you rate the **venue and food** for the camp?

☑ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

9. How would you rate the **logistics** for the camp (e.g., hotel, travel, and honoraria)?

☑ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

10. How would you rate the **camp for safety**?

- ○ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

11. **Overall**, how would you rate the camp?

- ⊘ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

12. What were the strengths of the camp? What did you enjoy about the camp?

food

13. How could the camp be improved?

Non

Diavik 2018 AEMP Evaluation Form

Thank you for participating in the Aquatic Effects Monitoring Program. We hope you enjoyed your time at the camp. We appreciate your honest and constructive feedback on your experience. Your responses will help us improve future camps.

1. How would you rate the camp for **working together**?
   - ◉ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

2. How would you rate the camp for **Elder-youth teaching opportunities**?
   - ◉ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

3. How would you rate the opportunities for you to **communications among participants?**
   - ○ Too many opportunities
   - ◉ Enough opportunities
   - ○ Too few opportunities

4. How would you rate the **respect among participants**?
   - ◉ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

5. How would you rate the **Elder care and attention**?
   - ○ Very good
   - ◉ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

6. How would you rate the **documentation of Traditional Knowledge**?
   - ○ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

7. How would you rate the **filming process**?
   - ○ Too much time
   - ◉ Enough time
   - ○ Too little time

8. How would you rate the **venue and food** for the camp?
   - ◉ Very good x3
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

9. How would you rate the **logistics** for the camp (e.g., hotel, travel, and honoraria)?
   - ◉ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

10. How would you rate the **camp for safety**?

- ○ Very good
- ◉ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

11. **Overall**, how would you rate the camp?

- ◉ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor
- ◉ Excellent ✓

12. What were the strengths of the camp? What did you enjoy about the camp?

Having us youth to post/stale with the elders, people sharing stories, I have enjoyed fishing and catching all fish with ~~the~~ or fishing pod with Eric, Zach, mason learning how to play the lake trout able to jump in boat an do water samples, Tea & Science together. great people, make new friends, Listing to the elders talking about water animals. Great stories from each culture, gathering at camp fire pit. Strengths about the camp is seeing doing samples with your own two eyes, experience along other youth doing these types of knowledge teachings.

Work hard, play harder.....

13. How could the camp be improved?

improve the big baddies near tent's, pathway. Better fishing rod's with stronger line.

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1. How would you rate the camp for **working together**?
   - ● Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

2. How would you rate the camp for **Elder-youth teaching opportunities**?
   - ● Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

3. How would you rate the opportunities for you to **communications among participants?**
   - ● Too many opportunities
   - ○ Enough opportunities
   - ○ Too few opportunities

4. How would you rate the **respect among participants**?
   - ○ Very good
   - ● Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

5. How would you rate the **Elder care and attention**?
   - ○ Very good
   - ● Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

6. How would you rate the **documentation of Traditional Knowledge**?
   - ○ Very good
   - ● Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

7. How would you rate the **filming process**?
   - ○ Too much time
   - ● Enough time
   - ○ Too little time

8. How would you rate the **venue and food** for the camp?
   - ● Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

9. How would you rate the **logistics** for the camp (e.g., hotel, travel, and honoraria)?
   - ○ Very good
   - ● Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

10. How would you rate the **camp for safety**?

- ● Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

11. **Overall**, how would you rate the camp?

- ● Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

12. What were the strengths of the camp? What did you enjoy about the camp?

The thing I enjoyed the most was seeing people from different communities come together and report what was happening here at Lac De Gras. My time here was amazing, especially talking with the youth/elders. Sharing our knowledge so we can go back to our hometown and remember what a good time we all had.

13. How could the camp be improved?

More Youth!!!

Diavik 2018 AEMP Evaluation Form

Thank you for participating in the Aquatic Effects Monitoring Program. We hope you enjoyed your time at the camp. We appreciate your honest and constructive feedback on your experience. Your responses will help us improve future camps.

1. How would you rate the camp for **working together**?
   - (●) Very good
   - ( ) Good
   - ( ) Neither good nor poor
   - ( ) Poor
   - ( ) Very Poor

2. How would you rate the camp for **Elder-youth teaching opportunities**?
   - (●) Very good
   - ( ) Good
   - ( ) Neither good nor poor
   - ( ) Poor
   - ( ) Very Poor

3. How would you rate the opportunities for you to **communications among participants?**
   - ( ) Too many opportunities
   - (●) Enough opportunities
   - ( ) Too few opportunities

4. How would you rate the **respect among participants**?
   - (●) Very good
   - ( ) Good
   - ( ) Neither good nor poor
   - ( ) Poor
   - ( ) Very Poor

5. How would you rate the **Elder care and attention**?
   - (●) Very good
   - ( ) Good
   - ( ) Neither good nor poor
   - ( ) Poor
   - ( ) Very Poor

6. How would you rate the **documentation of Traditional Knowledge**?
   - (●) Very good
   - ( ) Good
   - ( ) Neither good nor poor
   - ( ) Poor
   - ( ) Very Poor

7. How would you rate the **filming process**?
   - ( ) Too much time
   - (●) Enough time
   - ( ) Too little time

8. How would you rate the **venue and food** for the camp?
   - (●) Very good
   - ( ) Good
   - ( ) Neither good nor poor
   - ( ) Poor
   - ( ) Very Poor

9. How would you rate the **logistics** for the camp (e.g., hotel, travel, and honoraria)?
   - (●) Very good
   - ( ) Good
   - ( ) Neither good nor poor
   - ( ) Poor
   - ( ) Very Poor

10. How would you rate the **camp for safety**?

◉ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

11. **Overall**, how would you rate the camp?

◉ Very good	○ Neither good nor poor	○ Very Poor
○ Good	○ Poor	

12. What were the strengths of the camp? What did you enjoy about the camp?

13. How could the camp be improved?

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Thank you for participating in the Aquatic Effects Monitoring Program. We hope you enjoyed your time at the camp. We appreciate your honest and constructive feedback on your experience. Your responses will help us improve future camps.

1. How would you rate the camp for **working together**?
   - ⊗ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

2. How would you rate the camp for **Elder-youth teaching opportunities**?
   - ○ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

3. How would you rate the opportunities for you to **communications among participants?**
   - ○ Too many opportunities
   - ○ Enough opportunities
   - ○ Too few opportunities

4. How would you rate the **respect among participants**?
   - ⊗ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

5. How would you rate the **Elder care and attention**?
   - ⊗ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

6. How would you rate the **documentation of Traditional Knowledge**?
   - ○ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

7. How would you rate the **filming process?**
   - ○ Too much time
   - ⊗ Enough time
   - ○ Too little time

8. How would you rate the **venue and food** for the camp?
   - ⊗ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

9. How would you rate the **logistics** for the camp (e.g., hotel, travel, and honoraria)?
   - ⊗ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

10. How would you rate the **camp for safety**?

- ⊗ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

11. **Overall**, how would you rate the camp?

- ⊗ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

12. What were the strengths of the camp? What did you enjoy about the camp?

13. How could the camp be improved?

Diavik 2018 AEMP Evaluation Form

Thank you for participating in the Aquatic Effects Monitoring Program. We hope you enjoyed your time at the camp. We appreciate your honest and constructive feedback on your experience. Your responses will help us improve future camps.

1. How would you rate the camp for **working together**?
   - ⊘ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

2. How would you rate the camp for **Elder-youth teaching opportunities**?
   - ⊘ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

3. How would you rate the opportunities for you to **communications among participants?**
   - ○ Too many opportunities
   - ⊘ Enough opportunities
   - ○ Too few opportunities

4. How would you rate the **respect among participants**?
   - ○ Very good
   - ⊘ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

5. How would you rate the **Elder care and attention**?
   - ○ Very good
   - ⊘ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

6. How would you rate the **documentation of Traditional Knowledge**?
   - ○ Very good
   - ⊘ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

7. How would you rate the **filming process**?
   - ○ Too much time
   - ⊘ Enough time
   - ○ Too little time

8. How would you rate the **venue and food** for the camp?
   - ⊘ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

9. How would you rate the **logistics** for the camp (e.g., hotel, travel, and honoraria)?
   - ⊘ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

10. How would you rate the **camp for safety**?

- Ø Very good
- O Good
- O Neither good nor poor
- O Poor
- O Very Poor

11. **Overall**, how would you rate the camp?

- Ø Very good
- O Good
- O Neither good nor poor
- O Poor
- O Very Poor

12. What were the strengths of the camp? What did you enjoy about the camp?

Mostly Knowledge of the camp and the seince Part of camp I engayed my self i got to me Some old friends and got new friends.

13. How could the camp be improved?

Need better fishing supplys also ~~Nets~~ Nets should be 6'5" for ~~big~~ Average and decent size fish

Diavik 2018 AEMP Evaluation Form

Thank you for participating in the Aquatic Effects Monitoring Program. We hope you enjoyed your time at the camp. We appreciate your honest and constructive feedback on your experience. Your responses will help us improve future camps.

1. How would you rate the camp for **working together**?
   - ○ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ⊘ Very Poor

   Need new kitchen

2. How would you rate the camp for **Elder-youth teaching opportunities**?
   - ⊘ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

3. How would you rate the opportunities for you to **communications among participants?**
   - ○ Too many opportunities
   - ⊘ Enough opportunities
   - ○ Too few opportunities

4. How would you rate the **respect among participants**?
   - ⊘ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

5. How would you rate the **Elder care and attention**?
   - ⊘ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

6. How would you rate the **documentation of Traditional Knowledge**?
   - ⊘ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

7. How would you rate the **filming process**?
   - ○ Too much time
   - ⊘ Enough time
   - ○ Too little time

8. How would you rate the **venue and food** for the camp?
   - ⊘ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

9. How would you rate the **logistics** for the camp (e.g., hotel, travel, and honoraria)?
   - ⊘ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

10. How would you rate the **camp for safety**?

- [x] Very good
- [ ] Good
- [ ] Neither good nor poor
- [ ] Poor
- [ ] Very Poor

11. **Overall**, how would you rate the camp?

- [ ] Very good
- [x] Good
- [ ] Neither good nor poor
- [ ] Poor
- [ ] Very Poor

12. What were the strengths of the camp? What did you enjoy about the camp?

Going out for boat ride also making dryfish. Sitting around camp fish tell stories

13. How could the camp be improved?

Need new kicthene It well be nice if we can phone home once.

Appendix 4 Camp Fish Testing

- TK Fish Inspection Form Completed (2018)
- TK Fish Inspection Notes
- TK Fish Palatability Forms Completed (2018)
- Scientific Fish Testing Results - summary tables and laboratory results

NSMA

2018 AEMP at Diavik/LdG

TK of Fish

Wayne

Date: 2018 – August - 5

Recorder: Joanne

Fish Type: Lake Trout (LKTR) Lake Whitefish (LKWH) Other: _____

LKTR 27

Fish ID: _____

Group/Person: Jonas - YKDFN

9 3/4 16

62 cm

Features:	***(Circle what best describes the feature.)***			***Comments***
Girth:	Skinny	Average	Fat	_____
Firmness:	Typical rebound	Slow rebound	Stays Indented	_____
Gills:	Dark Red (Wine)	Red	Pink	White _____

Other: _____

Signs of Health: (Describe if present)

Deformities _____

Shape _____

Scales _____

Other (What else do you look for in a healthy fish?) _____

General:

Why was this fish chosen? _____

How do people tell when a fish is healthy or unhealthy? _____

Is there anything unusual about this fish? _____

What can you teach us about the outside of this fish? _____

2018 AEMP at Diavik/LdG TK of Fish

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour good	Contents fish		Fat Y/ N
Tissue	Too soft/watery	Typical	Too Firm	
Worms:	Tissues	Stomach	Other	
Tumours:	Tissues	Stomach	Other	
Parasites:	Tissues	Stomach	Other	

Indicators: (Describe/discuss)

Heart good

Liver good - brown - shiny

Kidney

Pipe good

Eggs / Milt? M

Odour

Overall Description:

What can you teach us about the insides of this fish? good colour

Is there anything unusual about this fish?

I would eat this fish Y I would eat this fish, but it would not be my first choice I would <u>not</u> eat this fish

NSMA

2018 AEMP at Diavik/LdG TK of Fish

Date: 2018 – August - 5 Recorder: Joanne

Fish Type: Lake Trout (LKTR) Lake Whitefish (LKWH) Other: _____

Fish ID: 28 Group/Person: Nancy - KIA

9 16.5
6.98

Features:	***(Circle what best describes the feature.)***			***Comments***
Girth:	Skinny	Average	Fat	_____
Firmness:	Typical rebound	Slow rebound	Stays Indented	_____
Gills:	Dark Red (Wine)	Red	Pink	White _____

Other: _____

Signs of Health: (Describe if present)

Deformities Scars

Shape _____

Scales _____

Other (What else do you look for in a healthy fish?) _____

General:

Why was this fish chosen? Only 2 to choose from

How do people tell when a fish is healthy or unhealthy? _____

Is there anything unusual about this fish? _____

What can you teach us about the outside of this fish? _____

2018 AEMP at Diavik/LdG TK of Fish

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour good	Contents		Fat Y / N average
Tissue	Too soft/watery	Typical	Too Firm	
Worms:	Tissues	Stomach	Other	
Tumours:	Tissues	Stomach	Other	digestion
Parasites:	Tissues	Stomach	Other	

Indicators: (Describe/discuss)

Heart good size & colour

Liver light brown - looks good

Kidney

Pipe

Eggs / Milt? F - lots of eggs - red/orange - good colour - no whitestuff

Odour

Overall Description:

What can you teach us about the insides of this fish? just wounded - not

Is there anything unusual about this fish? looks good

I would eat this fish ✓ I would eat this fish, but it would not be my first choice I would <u>not</u> eat this fish

2018 AEMP at Diavik/LdG TK of Fish

Terry ~~Wayne~~. LKTR 26 NSMA

Date: 2018 – August - 5 Recorder: Joanne

Fish Type: Lake Trout (LKTR) Lake Whitefish (LKWH) Other: _____

Fish ID: 21 Group/Person: LKDFN - Terry

Features:	***(Circle what best describes the feature.)***			***Comments***
Girth:	Skinny	Average	Fat	looks normal eyes
Firmness:	Typical rebound	Slow rebound	Stays Indented	Liver is huge - has a white cyst
Gills:	Dark Red (Wine)	Red	Pink	White
Other:	heart looks good. 3 small white fish in stomach			

Signs of Health: (Describe if present)

Deformities ✓

Shape ✓

Scales ✓

Other (What else do you look for in a healthy fish?) _____

General:

Why was this fish chosen? _____

How do people tell when a fish is healthy or unhealthy? _____

Is there anything unusual about this fish? _____

What can you teach us about the outside of this fish? _____

2018 AEMP at Diavik/LdG TK of Fish

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour good	Contents		Fat Y / N
Tissue	Too soft/watery	Typical	Too Firm	
Worms:	Tissues	Stomach	Other	
Tumours:	Tissues	Stomach	Other	
Parasites:	Tissues	Stomach	Other	good

Indicators: (Describe/discuss)

Heart good

Liver good

Kidney good

Pipe

Eggs / Milt?

Odour

Overall Description:

What can you teach us about the insides of this fish? in good shape

Is there anything unusual about this fish?

I would eat this fish | I would eat this fish, but it would not be my first choice | I would not eat this fish

NSMA

2018 AEMP at Diavik/LdG TK of Fish

Date: 2018 – August - 5 Recorder: Jeanne Wayne

Fish Type: Lake Trout (LKTR) Lake Whitefish (LKWH) Other: Julie

Fish ID: 29 Group/Person: Nicho - Julie.

Features:	***(Circle what best describes the feature.)***			***Comments***
Girth:	Skinny	Average	Fat	
Firmness:	Typical rebound	Slow rebound	Stays Indented	
Gills:	Dark Red (Wine)	Red	Pink	White
Other:	colour is good			

Signs of Health: (Describe if present)

Deformities

Shape good

Scales

Other (What else do you look for in a healthy fish?)

General:

Why was this fish chosen?

How do people tell when a fish is healthy or unhealthy?

Is there anything unusual about this fish?

What can you teach us about the outside of this fish?

2018 AEMP at Diavik/LdG TK of Fish

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour white	Contents eyes		Fat (Y) / N
Tissue	Too soft/watery	Typical	Too Firm	
Worms:	Tissues	Stomach	Other	3 fish in stomach
Tumours:	Tissues	(Stomach)	Other	
Parasites:	Tissues	Stomach	Other	

Indicators: (Describe/discuss)

Heart looks

Liver looks good - brownish

Kidney

Pipe white on intestines

Eggs / Milt? Male

Odour

Overall Description:

What can you teach us about the insides of this fish?

Is there anything unusual about this fish?

I would eat this fish ✓ I would eat this fish, but it would not be my first choice I would not eat this fish

2018 AEMP at Diavik/LdG TK of Fish

K14 LKDFN

Date: 2018 – August 5 Recorder: Terri

Fish Type: ✓ Lake Trout (LKTR) Lake Whitefish (LKWH) 28 Other: _____

Fish ID: Healthy fish 28 Group/Person: K1A - Nancy

Features:	***(Circle what best describes the feature.)***			***Comments***
Girth:	Skinny	(Average)	Fat	Good
Firmness:	(Typical rebound)	Slow rebound	Stays Indented	
Gills:	Dark Red (Wine)	(Red)	(Pink) White	
Other:				

Signs of Health: (Describe if present)

Deformities _____

Shape looks healthy

Scales Good

Other (What else do you look for in a healthy fish?) everything looks good

General:

Why was this fish chosen? This the fish I pick for us to eat looks healthy

How do people tell when a fish is healthy or unhealthy? Just by looking at it

Is there anything unusual about this fish? No

What can you teach us about the outside of this fish? By looking at it for any it looks healthy

2018 AEMP at Diavik/LdG TK of Fish

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour _____	Contents_____		Fat Y / N
Tissue	Too soft/watery	Typical	Too Firm	save
Worms:	Tissues	Stomach	Other	"
Tumours:	Tissues	Stomach	Other	"
Parasites:	Tissues	Stomach	Other	"

Indicators: (Describe/discuss)

Heart good

Liver good

Kidney good

Pipe healthy

Eggs / Milt? healthy

Odour looks good No smell

Overall Description:

What can you teach us about the insides of this fish? Bake it and put season salt on it

Is there anything unusual about this fish? NO

I would eat this fish

I would eat this fish, but it would not be my first choice

I would not eat this fish

2018 AEMP at Diavik/LdG TK of Fish LKDFN

Date: 2018 – August - 5 Recorder: Eric

Fish Type: ✓ Lake Trout (LKTR) Lake Whitefish (LKWH) 2b Other: Grilling

Fish ID: 2b Group/Person: LKDFN - Terri

Features:	***(Circle what best describes the feature.)***			***Comments***
Girth:	Skinny	(Average)	Fat	Eat we don't big fish!
Firmness:	~~Typical rebound~~	Slow rebound	Stays Indented	
Gills:	Dark Red (Wine)	(Red)	Pink	White
Other:				

Signs of Health: (Describe if present)

Deformities Healthy Fish!!!

Shape

Scales

Other (What else do you look for in a healthy fish?) Little White thing on the Liver

General:

Why was this fish chosen? Because we only eat small fish

How do people tell when a fish is healthy or unhealthy? When there is cyst of other white

Is there anything unusual about this fish? Nope everything is healthy

What can you teach us about the outside of this fish? Looks healthy

Lutselke

2018 AEMP at Diavik/LdG TK of Fish

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour Fine	Contents		Fat Y / N
Tissue	Too soft/watery	Typical	Too Firm	
Worms:	Tissues	Stomach	Other	Nothing
Tumours:	Tissues	Stomach	Other	Nothing
Parasites:	Tissues	Stomach	Other	Nothing

Indicators: (Describe/discuss)

Heart good

Liver cyst

Kidney good

Pipe good

Eggs / Milt? Healthy

Odour smells like a healthy fish

Overall Description:

What can you teach us about the insides of this fish? It's good.

Is there anything unusual about this fish? Nothing.

I would eat this fish | I would eat this fish, but it would not be my first choice | I would not eat this fish

2018 AEMP at Diavik/LdG TK of Fish Dettah LKDFN

Date: 2018 – August - 5 Recorder: Terri

Fish Type: Lake Trout (LKTR) Lake Whitefish (LKWH) 27 Other: grilling

Fish ID: 27 Group/Person: YKDFN - Jonas

Features:	***(Circle what best describes the feature.)***			***Comments***
Girth:	Skinny	(Average)	(Fat)	too to eat
Firmness:	(Typical rebound)	Slow rebound	Stays Indented	
Gills:	Dark Red (Wine)	(Red)	Pink	White
Other:				

Signs of Health: (Describe if present)

Deformities healthy fish

Shape

Scales

Other (What else do you look for in a healthy fish?) healthy fish good to eat

General:

Why was this fish chosen? small fish is good to eat what we are told

How do people tell when a fish is healthy or unhealthy? just by looking at it

Is there anything unusual about this fish? No

What can you teach us about the outside of this fish? looking very healthy to eat

2018 AEMP at Diavik/LdG TK of Fish

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour fine	Contents		Fat Y (N)
Tissue	Too soft/watery	(Typical)	Too Firm	healthy fish
Worms:	Tissues	Stomach	Other	healthy fish
Tumours:	Tissues	Stomach	Other	healthy fish
Parasites:	Tissues	Stomach	Other	healthy fish

Indicators: (Describe/discuss)

Heart good

Liver Cute

Kidney good

Pipe good

Eggs / Milt? healthy

Odour looks healthy fish

Overall Description:

What can you teach us about the insides of this fish? It's good

Is there anything unusual about this fish? Nothing

(I would eat this fish) I would eat this fish, but it would not be my first choice I would <u>not</u> eat this fish

2018 AEMP at Diavik/LdG TK of Fish Behchoko LKDFN

Date: 2018 – August - 5 Recorder: Terri & Eric

Fish Type: ✓ Lake Trout (LKTR) Lake Whitefish (LKWH) 29 Other: 1546

Fish ID: 29 Group/Person: ~~LKDFN~~ Tlicho - Jonas Julie

Features:	***(Circle what best describes the feature.)***			***Comments***
Girth:	Skinny	Average	(Fat)	
Firmness:	Typical rebound	Slow rebound	Stays Indented	Good
Gills:	Dark Red (Wine)	Red	Pink	(White)

Other: _____

Signs of Health: (Describe if present)

Deformities Nothing

Shape Good

Scales Alright

Other (What else do you look for in a healthy fish?) _____

General:

Why was this fish chosen? _____

How do people tell when a fish is healthy or unhealthy? _____

Is there anything unusual about this fish? _____

What can you teach us about the outside of this fish? _____

2018 AEMP at Diavik/LdG TK of Fish

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour Good	Contents		Fat (Y) / N
Tissue	Too soft/watery	(Typical)	Too Firm	
Worms:	Tissues	Stomach	Other	
Tumours:	Tissues	Stomach	Other	Somewhere
Parasites:	Tissues	Stomach	Other	Somewhere

Indicators: (Describe/discuss)

Heart Healthy

Liver Unhealthy

Kidney N/A

Pipe Looks good

Eggs / Milt? N/A

Odour

Overall Description:

What can you teach us about the insides of this fish? Too much

Is there anything unusual about this fish? A lot Not so much

(I would eat this fish) I would eat this fish, but it would not be my first choice I would <u>not</u> eat this fish

YKDFN

2018 AEMP at Diavik/LdG TK of Fish

Date: 2018 – August - 5 Recorder: Zach

Fish Type: Lake Trout (LKTR) Lake Whitefish (LKWH) Other: _____

Fish ID: LKTR 29 Group/Person: Tlicho - Jonas.

Features:	***(Circle what best describes the feature.)***			***Comments***
Girth:	Skinny	Average	(Fat)	_____
Firmness:	Typical rebound	Slow rebound	(Stays Indented)	_____
Gills:	(Dark Red (Wine))	Red	Pink	White _____
Other: _____				

Signs of Health: (Describe if present)

Deformities _____

Shape N/A

Scales _____

Other (What else do you look for in a healthy fish?) _____

General:

Why was this fish chosen? The very last fish

How do people tell when a fish is healthy or unhealthy? Examine the entire outside of the fish

Is there anything unusual about this fish? _____

What can you teach us about the outside of this fish? Very healthy

2018 AEMP at Diavik/LdG TK of Fish

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour White-ish	Contents		Fat Y / N
Tissue	Too soft/watery	Typical	Too Firm	
Worms:	Tissues	Stomach	Other	
Tumours:	Tissues	Stomach	Other	
Parasites:	Tissues	Stomach	(Other)	intestines might have parasites

Indicators: (Describe/discuss)

Heart Unknown

Liver healthy

Kidney Healthy

Pipe fishes in the stomach

Eggs / Milt? None

Odour Smells healthy / good

Overall Description:

What can you teach us about the insides of this fish? The meat on the inside is healthy

Is there anything unusual about this fish?

(I would eat this fish) I would eat this fish, but it would not be my first choice I would <u>not</u> eat this fish

2018 AEMP at Diavik/LdG TK of Fish YKDFN

Date: 2018 – August - 5 Recorder: Zach

Fish Type: Lake Trout (LKTR) Lake Whitefish (LKWH) Other: _____

Fish ID: LKTR 28 Group/Person: KIA - Nancy

Features:	***(Circle what best describes the feature.)***			***Comments***
Girth:	Skinny	Average	(Fat)	_____
Firmness:	Typical rebound	Slow rebound	Stays Indented	Dried _____
Gills:	Dark Red (Wine)	(Red)	Pink	White _____

Other: _____

Signs of Health: (Describe if present)

Deformities _____

Shape _____

Scales Scars _____

Other (What else do you look for in a healthy fish?) _____

General:

Why was this fish chosen? Because I only have 2 choices

How do people tell when a fish is healthy or unhealthy? _____

Is there anything unusual about this fish? _____

What can you teach us about the outside of this fish? inspect the fish everywhere

2018 AEMP at Diavik/LdG TK of Fish

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour _____	Contents_____		Fat Y / N
Tissue	Too soft/watery	Typical	Too Firm	_____
Worms:	Tissues	Stomach	Other	_____
Tumours:	Tissues	Stomach	Other	_____
Parasites:	Tissues	Stomach	Other	_____

Indicators: (Describe/discuss)

Heart Healthy

Liver light brown, really healthy

Kidney Healthy

Pipe healthy

Eggs / Milt? really healthy

Odour No smell

Overall Description:

What can you teach us about the insides of this fish? _____

Is there anything unusual about this fish?_____

I would eat this fish I would eat this fish, but it would not be my first choice I would <u>not</u> eat this fish

YKDFN

2018 AEMP at Diavik/LdG TK of Fish

Date: 2018 – August - 5 Recorder: Zach

Fish Type: 21 Lake Trout (LKTR) Lake Whitefish (LKWH) Other: _____

Fish ID: LKTR 27 Group/Person: YKDFN - Jonas

Features:	***(Circle what best describes the feature.)***			***Comments***
Girth:	Skinny	(Average)	Fat	
Firmness:	Typical rebound	Slow rebound	Stays Indented	firm
Gills:	(Dark Red (Wine))	Red	Pink	White
Other:				

Signs of Health: (Describe if present)

Deformities _____

Shape _____

Scales _____

Other (What else do you look for in a healthy fish?) _____

General:

Why was this fish chosen? _____

How do people tell when a fish is healthy or unhealthy? both inside and outside

Is there anything unusual about this fish? Different from Great Slave Lake fish

What can you teach us about the outside of this fish? _____

2018 AEMP at Diavik/LdG TK of Fish

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour _____	Contents_____		Fat Y / N
Tissue	Too soft/watery	Typical	Too Firm	_____
Worms:	Tissues	Stomach	Other	_____
Tumours:	Tissues	Stomach	Other	_____
Parasites:	Tissues	Stomach	Other	_____

Indicators: (Describe/discuss)

Heart Healthy

Liver Healthy

Kidney Healthy

Pipe Food, I like

Eggs / Milt? N/A

Odour N/A

Overall Description:

What can you teach us about the insides of this fish? Eat-able

Is there anything unusual about this fish?_____

(I would eat this fish) I would eat this fish, but it would not be my first choice I would <u>not</u> eat this fish

2018 AEMP at Diavik/LdG TK of Fish YKDFN

Date: 2018 – August - 5 Recorder: Zach

Fish Type: Lake Trout (LKTR) Lake Whitefish (LKWH) Other: _____

Fish ID: LKR 26 Group/Person: YKDFN - Terri

Features:	***(Circle what best describes the feature.)***			***Comments***
Girth:	Skinny	(Average)	Fat	
Firmness:	Typical rebound	Slow rebound	Stays Indented	Dried out
Gills:	Dark Red (Wine)	(Red)	Pink	White
Other:				

Signs of Health: (Describe if present)

Deformities N/A

Shape

Scales

Other (What else do you look for in a healthy fish?)

General:

Why was this fish chosen?

How do people tell when a fish is healthy or unhealthy? from the inside

Is there anything unusual about this fish? N/A

What can you teach us about the outside of this fish? White belly shows its healthy

2018 AEMP at Diavik/LdG TK of Fish

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour _____	Contents_____		Fat Y / N
Tissue	Too soft/watery	Typical	Too Firm	_____
Worms:	Tissues	Stomach	Other	_____
Tumours:	Tissues	Stomach	Other	_____
Parasites:	Tissues	Stomach	Other	_____

Indicators: (Describe/discuss)

Heart healthy

Liver White piece on the liver

Kidney healthy

Pipe healthy

Eggs / Milt? healthy

Odour _____

Overall Description:

What can you teach us about the insides of this fish? It was ate

Is there anything unusual about this fish? _____

I would eat this fish I would eat this fish, but it would not be my first choice I would not eat this fish

16 lbs, 77cm

Behchokö

KIA

Amissing #26

2018 AEMP at Diavik/LdG

TK of Fish

Date: 2018 – August - 5th

Recorder: ____

Fish Type: ✓ Lake Trout (LKTR) Lake Whitefish (LKWH) Other: ____

Fish ID: 29

Group/Person: - Julie Tlicho

Features: ***(Circle what best describes the feature.)*** ***Comments***

Girth:	Skinny	Average (circled)	Fat		
Firmness:	Typical rebound	Slow rebound	Stays Indented	good	
Gills:	Dark Red (Wine) (circled)	Red	Pink	White	

Other: outside is good health

Signs of Health: ***(Describe if present)***

Deformities Nothing

Shape healthy.

Scales Alright

Other (What else do you look for in a healthy fish?) No parasites

General:

Why was this fish chosen? ____

How do people tell when a fish is healthy or unhealthy? ____

Is there anything unusual about this fish? NO

What can you teach us about the outside of this fish? N/a

2018 AEMP at Diavik/LdG TK of Fish

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour red	Contents		Fat Y / N
Tissue	Too soft/watery	Typical	Too Firm	
Worms:	Tissues	Stomach	Other	N/a
Tumours:	Tissues	Stomach	Other	N/a
Parasites:	Tissues	Stomach	Other	N/a

Indicators: (Describe/discuss)

Heart white healthy

Liver healthy

Kidney Same healthy

Pipe [illegible]

Eggs / Milt? N/A

Odour Smells healthy

Overall Description:

What can you teach us about the insides of this fish?

Is there anything unusual about this fish?

I would eat this fish | I would eat this fish, but it would not be my first choice | I would not eat this fish

3 fish in belly.

9 185/186 4

KIA

2018 AEMP at Diavik/LdG TK of Fish

Date: 2018 – August - 8th

Recorder: Megan Adlem

Fish Type: ✓ Lake Trout (LKTR) Lake Whitefish (LKWH) Other:

Fish ID: KIA 28

Group/Person: ~~Wilma~~ Nancy KIA

Features: ***(Circle what best describes the feature.)*** ***Comments***

Girth: Skinny ~~Average~~ (Fat)

Firmness: Typical rebound Slow rebound (Stays Indented)

Gills: Dark Red (Wine) Red ~~Pink~~ White

Other: 69 cm, female

Signs of Health: (Describe if present)

Deformities

Shape scars

Scales Average

Other (What else do you look for in a healthy fish?)

General:

Why was this fish chosen? only two choose between big and small

How do people tell when a fish is healthy or unhealthy? White Gills

Is there anything unusual about this fish? Scars, No bugs or worms

What can you teach us about the outside of this fish?

2018 AEMP at Diavik/LdG TK of Fish

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour Orange	Contents		Fat Y / N
Tissue	Too soft/watery	(Typical)	Too Firm	Just right
Worms:	Tissues	Stomach	Other	N/a
Tumours:	Tissues	Stomach	Other	on skin, one small
Parasites:	Tissues	Stomach	Other	N/a

Indicators: (Describe/discuss)

Heart looks good, right size for the fish

Liver healthy, nice size, light brown,

Kidney Darkish Black healthy,

Pipe

Eggs / Milt? healthy, orange colour

Odour NO Smell,

Overall Description:

What can you teach us about the insides of this fish?

Is there anything unusual about this fish? Grass on Back

(I would eat this fish) I would eat this fish, but it would not be my first choice I would not eat this fish

KIA

2018 AEMP at Diavik/LdG

TK of Fish

Date: 2018 – August - 5th

Recorder: Bryson Gibbins

Fish Type: ✓ Lake Trout (LKTR) Lake Whitefish (LKWH) Other: _____

Fish ID: LKTR27

Group/Person: ~~ELF~~ YKDFN - Doris

Features:	***(Circle what best describes the feature.)***			***Comments***
Girth:	Skinny	Average	Fat	
Firmness:	Typical rebound	Slow rebound	Stays Indented	
Gills:	Dark Red (Wine)	Red	Pink	White
Other:	female, male. No eggs, one white fish in stomach.			

Signs of Health: (Describe if present)

Deformities _____

Shape _____

Scales _____

Other (What else do you look for in a healthy fish?) wine coloured gills.

General:

Why was this fish chosen? _____

How do people tell when a fish is healthy or unhealthy? _____

Is there anything unusual about this fish? _____

What can you teach us about the outside of this fish? _____

2018 AEMP at Diavik/LdG TK of Fish

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour _____	Contents_____		Fat Y / N
Tissue	Too soft/watery	Typical	(Too Firm)	_____
Worms:	Tissues	Stomach	Other	N/a
Tumours:	Tissues	Stomach	Other	N/a
Parasites:	Tissues	Stomach	Other	N/a

Indicators: (Describe/discuss)

Heart Still moving

Liver looks healthy, typical also

Kidney Dark red colour

Pipe _____

Eggs / Milt? No eggs

Odour NO odour

Overall Description:

What can you teach us about the insides of this fish? _____

Is there anything unusual about this fish?_____

(I would eat this fish) I would eat this fish, but it would not be my first choice I would <u>not</u> eat this fish

TG

2018 AEMP at Diavik/LdG TK of Fish

Date: 2018 – August - 5 Recorder: Mason

Fish Type: Lake Trout (LKTR) Lake Whitefish (LKWH) Other: _____

Fish ID: 29 LKTR Group/Person: Tricha - Julie

Features:	***(Circle what best describes the feature.)***			***Comments***
Girth:	Skinny	Average	Fat	
Firmness:	Typical rebound	Slow rebound	Stays Indented	
Gills:	Dark Red (Wine)	Red	Pink	White

Other: _____

Signs of Health: (Describe if present)

Deformities good

Shape

Scales

Other (What else do you look for in a healthy fish?) _____

General:

Why was this fish chosen? last Choice

How do people tell when a fish is healthy or unhealthy? if gills aren't white, it's healthy

Is there anything unusual about this fish? _____

What can you teach us about the outside of this fish? _____

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour ~~orange~~ red	Contents unknown		Fat (Y) / N
Tissue	Too soft/watery	Typical	Too Firm	
Worms:	Tissues	Stomach	Other	intestine
Tumours:	Tissues	Stomach	Other	
Parasites:	Tissues	Stomach	Other	intestine

Indicators: (Describe/discuss)

Heart white cysts on top

Liver looks healthy, dark colour

Kidney some white lines

Pipe Good

Eggs / Milt? ____

Odour Smells good/healthy

Overall Description:

What can you teach us about the insides of this fish? if it's dark orange/red, it's healthy. anything has white it could be sick.

Is there anything unusual about this fish? Small cysts ~~in the guts~~

(I would eat this fish) I would eat this fish, but it would not be my first choice I would not eat this fish

TG

2018 AEMP at Diavik/LdG TK of Fish

Date: 2018 – August - 6 Recorder: Mason

Fish Type: Lake Trout (LKTR) Lake Whitefish (LKWH) Other: _____

Fish ID: LKTR 98 Group/Person: KIA - Jonas

Features:	***(Circle what best describes the feature.)***			***Comments***
Girth:	Skinny	(Average)	Fat	_____
Firmness:	(Typical rebound)	Slow rebound	Stays Indented	_____
Gills:	Dark Red (Wine)	(Red)	(Pink) White	_____

Other: _____

Signs of Health: (Describe if present)

Deformities Good

Shape

Scales

Other (What else do you look for in a healthy fish?) _____

General:

Why was this fish chosen? Wanted the small fish than the big one

How do people tell when a fish is healthy or unhealthy? _____

Is there anything unusual about this fish? _____

What can you teach us about the outside of this fish? _____

2018 AEMP at Diavik/LdG TK of Fish

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour dark orange	Contents Average		Fat (Y) N
Tissue	Too soft/watery	(Typical)	Too Firm	
Worms:	Tissues	Stomach	Other	
Tumours:	Tissues	Stomach	Other	
Parasites:	Tissues	Stomach	Other	

Indicators: (Describe/discuss)

Heart good & healthy

Liver

Kidney

Pipe

Eggs / Milt?

Odour

Overall Description:

What can you teach us about the insides of this fish? healthy

Is there anything unusual about this fish?

(I would eat this fish) I would eat this fish, but it would not be my first choice I would not eat this fish

T6

2018 AEMP at Diavik/LdG TK of Fish

Date: 2018 – August - 6 Recorder: Mason

Fish Type: 22 Lake Trout (LKTR) Lake Whitefish (LKWH) Other: _____

Fish ID: 27 Group/Person: YKDFN - Jonas

Features:	***(Circle what best describes the feature.)***			***Comments***
Girth:	Skinny	(Average)	Fat	_____
Firmness:	Typical rebound	Slow rebound	(Stays Indented)	_____
Gills:	(Dark Red (Wine))	Red	Pink	White _____
Other: _____				

Signs of Health: (Describe if present)

Deformities _____

Shape Average

Scales dark and white

Other (What else do you look for in a healthy fish?) _____

General:

Why was this fish chosen? _____

How do people tell when a fish is healthy or unhealthy? _____

Is there anything unusual about this fish? Small guts

What can you teach us about the outside of this fish? _____

2018 AEMP at Diavik/LdG TK of Fish

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour orange	Contents		Fat Y / N
Tissue	Too soft/watery	Typical	Too Firm	
Worms:	Tissues	Stomach	Other	
Tumours:	Tissues	Stomach	Other	
Parasites:	Tissues	Stomach	Other	

Indicators: (Describe/discuss)

Heart good

Liver

Kidney

Pipe

Eggs / Milt?

Odour

Overall Description:

What can you teach us about the insides of this fish? good, fat

Is there anything unusual about this fish?

I would eat this fish | I would eat this fish, but it would not be my first choice | I would not eat this fish

TG

2018 AEMP at Diavik/LdG TK of Fish

Date: 2018 – August - 5 Recorder: Mason

Fish Type: 26 Lake Trout (LKTR) Lake Whitefish (LKWH) Other: _____

Fish ID: 26 Group/Person: LKDFN - Doris

Features:	***(Circle what best describes the feature.)***			***Comments***
Girth:	Skinny	(Average)	Fat	_____
Firmness:	Typical rebound	Slow rebound	(Stays Indented)	_____
Gills:	Dark Red (Wine)	(Red)	Pink	White _____

Other: _____

Signs of Health: (Describe if present)

Deformities _____

Shape good size

Scales _____

Other (What else do you look for in a healthy fish?) _____

General:

Why was this fish chosen? Average size

How do people tell when a fish is healthy or unhealthy? tissues is orange

Is there anything unusual about this fish? small cysts on liver

What can you teach us about the outside of this fish? Soft

2018 AEMP at Diavik/LdG TK of Fish

Features:	***(Circle what best describes the feature)***			***Comments***
Intestine:	Colour orange	Contents		Fat Y / (N)
Tissue	Too soft/watery	(Typical)	Too Firm	
Worms:	Tissues	Stomach	Other	
Tumours:	Tissues	Stomach	Other	
Parasites:	Tissues	Stomach	Other	

Indicators: (Describe/discuss)

Heart good

Liver Small cysts

Kidney good

Pipe Good

Eggs / Milt? lots and fat

Odour

Overall Description:

What can you teach us about the insides of this fish? nice and orange

Is there anything unusual about this fish? Small cysts on liver

(I would eat this fish) I would eat this fish, but it would not be my first choice I would not eat this fish

→ discard samples

DIAVIK
DIAMOND MINES

DAY	MONTH	YEAR
2	AUG	2018

LAKE: LDG Lac de Gras

Page: 1 of 1

CAPTURE METHOD (note in comments if by angling): Gill Net

FISH #	SPECIES	FORK LENGTH (mm)	TOTAL WEIGHT (g)	AGE STRUCTURE	LIFE HISTORY (mature, immature, resting, unknown)	SEX	STOMACH CONTENTS	CONDITION (note parasites)	COMMENTS
1	LKTR Trout	810 mm	14.5 lbs	NO OTOLITH	Mature	Female	Small whitefish	Parasite in tissue Worm in tissue Large liver	CANNOT DETERMINE AGE WITHOUT OTOLITH LIVER SAMPLE OBTAINED
2	LKTR	850 mm	16.0 lbs	OTOLITH.	Mature	female	Small fish x2		Heartworm. Discard samples. Tissue in chain of custody
3	LKTR	725 mm	8.5 lbs	NO OTOLITH					
4	LKTR	810 mm	13 lbs	NO OTOLITH					

3 HOOK & LINE ANGLERS 9:30 → 12:00 3:30 → 6:00

DIAVIK DIAMOND MINES 0930 fishing off dock with 5 diamond lures

DAY	MONTH	YEAR
03	AUG	2018

LAKE: Lac de Gras

CAPTURE METHOD (note in comments if by angling): Gill Net

Page: ____ of ____

	FISH #	SPECIES	FORK LENGTH (mm)	TOTAL WEIGHT (g)	AGE STRUCTURE	LIFE HISTORY (mature, immature, resting, unknown)	SEX	STOMACH CONTENTS	CONDITION (note parasites)	COMMENTS
✓	5	LKTR	760	10.25 lbs	OT ✓	Mature	M	empty	Healthy - no para	All communities TK
✓	6	LKTR	655	12.50 lbs	" ✓	Immature	F	juvenile white fish	~~parasites~~ worms	Nancy,
✓	7.	LKTR	630	7.50 lbs	M " ✓	Mature	M	juvenile white fish	[illegible] parasites	Nancy, unhealthy would not eat, poor fish
✓	8.	LKTR	880	15.00 lbs.	" ✓	Mature	M	juvenile white fish	Healthy - no para	Nancy, [illegible] healthy
✓	9.	LKTR	770	10.25 lbs	" ✓	Mature	F	juvenile white fish	Healthy - no para	Kathy processed
✓	10	LKTR.	700	9.50 lbs	" ✓	Mature	M	juvenile white fish	Healthy - no para	Kathy processed nancy guided
✓	11.	LKTR	680	10.00 lbs	" ✓	Mature	M	juvenile white fish	Healthy - no para	Kathy processed nancy guided
✓	12.	LKTR	565	4.25 lbs	" ✓	Mature	M	juvenile white fish	worms	~~K[illegible]~~
✓	13	LKTR.	705	8.7 lbs	" ✓	Mature	M	2 juvenile whitefish	healthy	Julie
✓	14	LKTR	630	5.5 lbs	" ✓	MATURE	M	3 [illegible] WHITEFISH	GOOD/ HEALTHY	Julie
✓	15	LKTR	710	8.[illegible] lbs	" ✓	MATURE	M	2 juvenile whitefish	GOOD/ HEALTHY	Julie
✓	16	LKTR.	730	12.00 lbs	" ✓	Mature	M	white fish	Healthy	Julie
✓	17	LKTR	630	6.00 lbs	" ✓	Mature	M	White fish	Healthy	Nancy
✓	18.	LKTR	681	9.00 lbs	" ✓	Mature	M	White fish	Healthy	Julie
✓	19.	LKTR	630	6.50 lbs	" ✓	Mature	M	White fish	cysts	Nancy
✓	20	LKTR	770	14.5 lbs	" ✓	Mature	M	White fish	~~Health~~ Healthy	Nancy
					"					

DIAVIK DIAMOND MINES

DAY	MONTH	YEAR
4	AUG	2018

LAKE: Lac de Gras

Page: 1 of 1

CAPTURE METHOD (note in comments if by angling): Gill Net

FISH #	SPECIES	FORK LENGTH (mm)	TOTAL WEIGHT (g)	AGE STRUCTURE	LIFE HISTORY (mature, immature, resting, unknown)	SEX	STOMACH CONTENTS	CONDITION (note parasites)	COMMENTS
21	LKTR								NARROWS - NO DATA
22	LKTR								NARROWS - NO DATA
23	LKTR	700	10 lbs	OT ✓	RIPE	F	100% WHITE FISH	NONE / HEALTHY	CAUGHT AT DUCK
24	LKTR								
25	LKTR								

DIAVIK DIAMOND MINES

Nets
5 LKTR
1 White Fish

DAY	MONTH	YEAR
05	AUG	2018

Page: 1 of 1

LAKE: Lac de Gras

CAPTURE METHOD (note in comments if by angling): Gill Net

FISH #	SPECIES	FORK LENGTH (mm)	TOTAL WEIGHT (g)	AGE STRUCTURE	LIFE HISTORY (mature, immature, resting, unknown)	SEX	STOMACH CONTENTS	CONDITION (note parasites)	COMMENTS
26	LKTR	660mm	11.00lbs		Mature	F	Fish	cyst*	Teri white thing on liver looks healthy, average weight don't see to much fish in stomach
27	LKTR	620mm	9.75lbs		Mature	M	Fish	Healthy	Jonis
28	LKTR	698mm	9.00lbs		Mature	F	1 well digested fish	Healthy	Nancy
29	LKTR	830mm	15.00lbs		Mature	M	~~cyst on~~ Fish at least three	cysts on intestines	Julie
30	LKTR								NET
31	LKTR								NET
32	LKTR								NET
33	LKTR								NET
34	LKTR								NET
35	LKTR								ANGLING
1	LKWH								NET

KIA

Community Assessment of Fish Quality for Eating (2018 AEMP)

DATE: AUGUST 5th, 2018 **TYPE:** LkTR **COOKING METHOD** Boiling

COMMUNITY GROUP: KIA **RECORDER NAME:** [illegible]

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): #27

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments**.
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

Nancy 1. This fish tastes excellent and tastes better than what we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat.
3. This fish tastes alright but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

- fish is good taste tasty, smell is good, pretty good texture is chewy,
- good fat fish, very tasty, smell is very good, texture is good, No bitter taste, No after taste. Excellent, taste ground a little.

KIA

Community Assessment of Fish Quality for Eating (2018 AEMP)

DATE: AUGUST 5th**, 2018 TYPE:** LKTR **COOKING METHOD** Boiled,

COMMUNITY GROUP: KIA **RECORDER NAME:** Regan

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): 2B

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments**.
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. (circled) This fish tastes excellent and tastes better than what we usually eat. Nancy,
2. This fish tastes good and tastes similar to fish we usually eat.
3. (circled) This fish tastes alright but does not taste as good as fish we usually eat. Nancy,
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

Kinda strong taste, All trout have different taste, red & white meat, edible fish, stronger smell, trout smell.

Nancy. – Baked, under cooked but edible, smell is okay, taste is okay, texture is good.

Community Assessment of Fish Quality for Eating (2018 AEMP)

KIA ✓

DATE: AUGUST 5th, 2018 **TYPE:** LKTR **COOKING METHOD** Grilled

COMMUNITY GROUP: KIO **RECORDER NAME:** Meagan Ading

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): LK #26

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments**.
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. This fish tastes excellent and tastes better than what we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat. BoBBq
3. This fish tastes alright but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

BoBBq:

Very tasty, good, sometimes fish don't have a taste, meat is firm, not mushy, Very good. tender, no deduction from last fish eaten. No metal taste, smell very good. Very good texture.

grilled

uncooked, didn't taste any metal, tasted good, smelled good, #3. texture didn't break up when picking up with fork.

KIA

Community Assessment of Fish Quality for Eating (2018 AEMP)

DATE: AUGUST 5th, 2018 TYPE: LKTR COOKING METHOD Fry

COMMUNITY GROUP: KIA RECORDER NAME: Regan

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): #2a

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments**.
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. This fish tastes excellent and tastes better than what we usually eat.
2. (circled — Bobby) This fish tastes good and tastes similar to fish we usually eat.
3. (circled) This fish tastes alright but does not taste as good as fish we usually eat. Nancy
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

- Very tasty, texture is very good, didn't mush in mouth only, smelled very good. No aftertaste, No Bitter taste.
- Strong taste but it's edable, texture is okay, kinda strong for me.

NSMA

Community Assessment of Fish Quality for Eating (2018 AEMP)

DATE: AUGUST 5, 2018 TYPE: LKTR COOKING METHOD grill

COMMUNITY GROUP: NSMA RECORDER NAME: JB

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): 26

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments.**
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. This fish tastes excellent and tastes better than what we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat.
3. This fish tastes alright but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

I don't usually eat trout, it seems ok but I don't really have anything to compare it to. It was good

NSMA

Community Assessment of Fish Quality for Eating (2018 AEMP)

DATE: AUGUST 5, 2018 TYPE: LKTR COOKING METHOD boil

COMMUNITY GROUP: NSMA RECORDER NAME: JB

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): 27

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments.**
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. This fish tastes excellent and tastes better than what we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat.
3. This fish tastes alright but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

This better than the others. Blander. I didn't care for the stronger smell of the others.

NSMA

Community Assessment of Fish Quality for Eating (2018 AEMP)

DATE: AUGUST 5, 2018 TYPE: LKTR COOKING METHOD bake

COMMUNITY GROUP: NSMA RECORDER NAME: JB

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): 28

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments**.
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. This fish tastes excellent and tastes better than what we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat.
3. This fish tastes alright but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

- I prefer the one done on the fire
- I don't know what I'm looking for because I dont eat Trout
- IT was under-cooked

Community Assessment of Fish Quality for Eating (2018 AEMP)

NSMA

DATE: AUGUST 5, 2018 TYPE: LKTR COOKING METHOD fry

COMMUNITY GROUP: NSMA RECORDER NAME: JB

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): 29

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments**.
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. This fish tastes excellent and tastes better than what we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat.
3. This fish tastes alright but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

IT all tastes the same to me because it's all trout

Tlicho

Community Assessment of Fish Quality for Eating (2018 AEMP)

DATE: AUGUST 5, 2018 TYPE: LKTR COOKING METHOD Boil

COMMUNITY GROUP: Tlicho RECORDER NAME: Mason

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): #27

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments**.
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. This fish tastes excellent and tastes better than what we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat.
3. This fish tastes alright but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

Taste good, All the 4 methods of Cooking the fish, it's hard to tell which taste better.

Community Assessment of Fish Quality for Eating (2018 AEMP)

Tlicho

DATE: AUGUST 5, 2018 TYPE: LKTR COOKING METHOD Frying -

COMMUNITY GROUP: Tlicho RECORDER NAME: mason

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): #29 -

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments**.
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. This fish tastes excellent and tastes better than what we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat.
3. This fish tastes alright but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

Everything taste/looks good
I cook it, so I would know.
- Julie Wedzin.

Community Assessment of Fish Quality for Eating (2018 AEMP)

Tricho

DATE: AUGUST 5, 2018 TYPE: LKTR COOKING METHOD Baking

COMMUNITY GROUP: Tricho RECORDER NAME: Mason

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): #28

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments**.
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. This fish tastes excellent and tastes better than what we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat.
3. This fish tastes alright but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

Looks good
Taste good
Everything is good, but if it's baked longer it would taste much better.

Community Assessment of Fish Quality for Eating (2018 AEMP)

Ticho

DATE: AUGUST 5, 2018 TYPE: LKTR COOKING METHOD Grilled

COMMUNITY GROUP: Ticho RECORDER NAME: Mason

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): #26

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments**.
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. This fish tastes excellent and tastes better than what we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat.
3. This fish tastes alright but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

Everything taste good, looks good.
with salt it would be better.

Community Assessment of Fish Quality for Eating (2018 AEMP)

YKDFN

DATE: AUGUST 5, 2018 TYPE: LKTR COOKING METHOD Grill

YKDFN COMMUNITY GROUP: ~~YKDFN~~ RECORDER NAME: Zack

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): 26

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments.**
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. This fish tastes excellent and tastes better than what we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat.
3. This fish tastes alright but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

Smells good

Tastes good but better with salt

firm

Good the way it is as cooked

Should've went deeper waters, taste a bit Shallow

4KDFN

Community Assessment of Fish Quality for Eating (2018 AEMP)

DATE: AUGUST 5, 2018 TYPE: LKTR COOKING METHOD boil

COMMUNITY GROUP: 4KDFN RECORDER NAME: Zack

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): 27

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments**.
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. This fish tastes excellent and tastes better than what we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat.
3. This fish tastes alright but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

Tastes Good
Soft
Smooth taste
Smells good
Good the way it is
No Shallow taste

Community Assessment of Fish Quality for Eating (2018 AEMP)

YKDFN

DATE: AUGUST 5, 2018 TYPE: LKTR COOKING METHOD bake

COMMUNITY GROUP: YKDFN RECORDER NAME: Zack

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): 28

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments**.
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. This fish tastes excellent and tastes better than what we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat.
3. This fish tastes alright but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

Tastes good

Smells good

Shallow taste

better with salt

YKDFN

Community Assessment of Fish Quality for Eating (2018 AEMP)

DATE: AUGUST 5, 2018 TYPE: LKTR COOKING METHOD fry

COMMUNITY GROUP: YKDFN RECORDER NAME: Zack

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): 29

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments.**
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. This fish tastes excellent and tastes better than what we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat.
3. This fish tastes alright but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

Tastes good

Smells okay

firm taste

Cooked right, medium well

No shallow taste

4KDFN

Community Assessment of Fish Quality for Eating (2018 AEMP)

DATE: AUGUST 5, 2018 **TYPE:** LKTR **COOKING METHOD** Grilling

COMMUNITY GROUP: LKDFN **RECORDER NAME:** Eric

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): 26 (LKDFN)

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments**.
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. This fish tastes excellent and tastes better than what we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat.
3. This fish tastes alright but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

EB: Cold water fish is different

Doris: Different than GSL fish

EB: Tastes Like Bay water fish

Doris: same as above

Community Assessment of Fish Quality for Eating (2018 AEMP)

4KDFN

DATE: AUGUST 5, 2018 TYPE: LKTR COOKING METHOD fry

COMMUNITY GROUP: LKDFN RECORDER NAME: Eric

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): 29

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments**.
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. This fish tastes excellent and tastes better than what we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat.
3. This fish tastes alright but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

EB: Just about the same as bake.
Doris: It tastes swampy and dry

Community Assessment of Fish Quality for Eating (2018 AEMP)

4KDFN

DATE: AUGUST 5, 2018 TYPE: LKTR COOKING METHOD bake

COMMUNITY GROUP: LKDFN RECORDER NAME: Eric

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): 28

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments.**
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. This fish tastes excellent and tastes better than what we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat.
3. This fish tastes alright but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

Doris: Its too Rich Richer then home
EB: Good but kind of Rich.
Doris: Its shiny an too greasy
Both say its Fat.

YKDFN

Community Assessment of Fish Quality for Eating (2018 AEMP)

DATE: AUGUST 5, 2018 TYPE: LKTR COOKING METHOD boil

COMMUNITY GROUP: LKDFN RECORDER NAME: Eric

FISH SAMPLE NUMBER (FROM SAMPLE RECORD SHEET): 07

Instructions:

- Each community group is to complete one form for each fish that is tasted; **please use the back of the form for any additional comments**.
- It is recommended that cooking methods include at a minimum boiling, frying, baking and grilling.
- It is understood that that communities evaluate the quality of a fish for eating continually from the time it is caught to the time it is eaten. This form is designed to try to record this information at each step.

Observations during EATING

Circle the most appropriate description:

1. This fish tastes excellent and tastes better than what we usually eat.
2. This fish tastes good and tastes similar to fish we usually eat.
3. This fish tastes alright but does not taste as good as fish we usually eat.
4. This fish does not taste good and tastes much worse than fish we usually eat.
5. We did not eat this fish.

Comments (describe why you circled the above descriptions – can include physical observations, smell, taste, texture, etc.):

EB: smells good, tastes good very good.
Doris: It tastes good still taste like swamp But smells good.

TK Fish Inspection Notes

Daily Notes
2018 AEMP TK Camp
Diavik, Lac de Gras
August 5, 2018: Day 4

FISH PROCESSING – LKTR-26, LKDFN, Grilling fish, TK processing

Terri – When asked to do something, should do it now. I don't like it when one youth runs off, one comes. It's good for youth to listen. When you're an elder, you need to teach your kids. You need to ask, is the water still okay to drink, is the land still healthy. That's how I was taught by my parents and I teach my brothers and sisters. I don't' have a mom and dad.

NT – Who's doing weight and length? We have our recorder and we're ready to go.

Terri – 11 lbs. 66 cm. What am I supposed to do here?

NT – Before we start cutting into it, can you tell us about what you see with this fish? Does it look healthy?

Terri – When you look at it, it can look healthy but you'll know when you open it if something is wrong. It looks healthy, kind of orange. For me, this is average size. We don't eat big fish at home because we were told there is mercury in bigger fish. When you look at fish, look to see if wounds or sores. Doesn't look like there is anything wrong with this fish. For me, it's a good fish. It will dry up as we talk. Okay, because I'm cooking my fish on the grill, don't worry about me because I'm left handed. Some people are worried about me when I cut a fish but I'm ok. I just cut the middle part of the stomach.

Peter – what number is this fish

CE – LKTR-26

NT – Doing one form for every fish. Youth, you fill out forms for your elders and ask them questions while the fish is being processed. Makes sense? I know it can be hard to feel the fish drying out but this is part of doing a thorough assessment of the fish.

Terri – This fish is healthy, lots of eggs. Not looking at colour of eggs. No sores or cysts or white stuff on them. Liver is good, nothing wrong with it. A youth should look to see – well this one does now, I see something on here, it has a little white thing on it. There is a little white spot on the liver. The heart looks healthy by colour and shape. Nothing else wrong with that fish. Fish in stomach – 2.5 fish found in there. Looks like it just ate. No bugs in stomach. Didn't see any worms or parasites. Nothing on the pipe or kidney, everything looks healthy. Gives head to do (otolith). Take all the blood out of the inside of the fish once the guts are out. I cut it in half. (removes fins). The colour of the tissue and meat, it doesn't have any cysts on it. Its an orange colour here because of the deeper cold water it gets like this. In shallower and warmer water it's a bit more pink. I would eat this fish as soon as it gets off the grill. I would. I've been waiting how many days now? Waiting for fish! Where take sample from? Terri cuts from center strip. I might as well just give you all of it!

NT – Think about teaching a youth who's never caught a fish before or who's never seen a fish before. As much detail as you can give is helpful to teach not only the youth here, but those back home who will see the video or read the report. Describe the gills, the flesh, anything that is helpful for them to learn from.

LKTR-27, Jonas, YKDFN, boiling

Zack – 9-3/4 lbs. 62 cm long

Jonas – Looks like a pretty healthy fish. When you cut the fish up here especially inland, on GSL this would be white. Here its dark on the back and yellow. This looks different from GSL fish. There they are more white. Gills look good, dark wine colour. It's good. I'll open it up and I'll tell you if its skinny or fat. The fish is firm and hard, he did a lot of exercise. Its good. There are some fish (1) in the stomach. It's a male, no eggs. The liver looks good, no sign of any cysts or anything. Liver should be brown and nice and shiny. Pipe looks firm. Heart – anybody want it? Good heart. Oh, this is a good fish, eh? It has a lot of fat around it, its average. Smells okay. Looks good – wait until I cook it! The creator put this fish on this earth for us to eat. I'm going to cut it up to prepare it for boiling. You've got to cut it up. Cuts head off. Cuts through backbone all along fish. Cuts tail off. Cuts through bone and flank into pieces. The colour of the meat is eatable. Its good. Meat is just right, healthy – not soft. Cuts first fillet into pieces. Gives samples to Kathy.

LKTR-28, Nancy, Kitikmeot, baking

Bobby – 9 lbs, 698 mm.

Nancy – I'm going to fillet this for Bobby to bake. You could prepare it any way you want and eat every part of the fish. His gills look good. I'm looking and they look pink and healthy. There is one little scar and a few more along the dorsal fin. There are scars that have been there awhile. They are healed. Maybe by going through river or it got away from something. It looks average in size and its firm. It feels good, it rebounds. Uses ulu to cut. Cuts down belly, along gills, over the top and back down the other side. There is no right or wrong to cutting fish. If you're hungry, you do whatever you need. Its food. You can eat all of it and not waste. Didn't open the belly until after removing the head. Guts came off with (attached to the head). It's a female, lots of eggs. The eggs look really healthy, they are red and orangey, no white stuff. If they're healthy, you can tell because there is no white stuff on them. The liver looks healthy and it's a nice size. The colour looks great, it's a light brown. Its healthy. To see if this is edible, I would like to check on the inside of where the little wound was that I saw on the outside. I'm going to check to see if anything is growing under the wound. The wound we saw before is not a parasite or any worm, it's just a little scar where it was wounded from something. Its just a wound (up near gill). Removed tail. Average fat content inside. Looks good and healthy. What I usually do if I'm going to bake this at home is I would spice it and put onions in the middle and some lemon and then bake it. It's a really healthy fish to bake. I'll get a sample for Kathy. Passes left and right fillet. Colour looks good. If there is a difference between colours, and if I have lots of fish, I choose the really red meat because they taste

better than the light ones. The tissue of this fish is just right. Looking at stomach to see whats in there. The stomach is good, there is some fish in there, 1 well digested fish. The heart looks good. Well this is sometimes really enlarged or almost nothing so this is the right size heart for the fish. There were no cysts or worms in this fish. I will eat this fish.

Regan – what can you teach us about the inside of the fish

Nancy - Just told you about it. Sometimes if the fish are really sick, they would have something white or watery in between in places where they shouldn't. There was no smell- it was good fish.

LKTR-29, Julie, Tlicho, frying

(Everyone left the big fish for the queen)

Regan – 15 lbs, 83 cm.

Julie – I'm going to prepare this for cooking in the pan. Those other people are doing boiling baking and over fire grilling. You see how this fish looks. I've been working with fish for 40 years and this looks healthy, the coloration is good. On this side, too. There are no parasites or anything from the outside. When you see the gill it looks dark because it was alive. When the gill is white, the fish may be sick or unhealthy. We turn the fish and we look at the texture. When we see any deformities on the fish, there may be some parasites or bites from other fish. And then we cut it open and examine the guts and the internal content. If its deformed or has internal injuries, we don't eat it, its not our first choice. I've been working with fish for many years. I look at the outside and I know the health of the fish. There is never a day I don't work on a fish. The texture is good, the rebound is good. It looks healthy on the outside. Sometimes there may be when the gill is white it may be unhealthy or may die soon. If they are white, we just let it be and don't fix it up. I'm going to cut the head off. We may not prepare fish in a similar way. We cut underneath the bone by the gills. The knife is not that sharp. Removes head. Cuts along backbone. We see the meat and this colour looks healthy. When it's this colour, it seems to be healthy. I'm going to cook it with flour, can I cook it with flour? Not really because we want to taste the fish without any other things on it that may change the taste, in order to know that its healthy. There is something here, white stuff, some kind of bugs or cysts on the intestines. You see this, the pylorus, if it's a little bit whiter it's fat. So this would contain eggs in this thing if it's a female or if this is a male. When fish breathe, this looks like a balloon (swim bladder). It's a male fish. The fish may look healthy but because of the…you can see some growth on the guts. We'll see by the time we cook it and do the tasting we can see if its good or not. We can't do without the samples, I'm aware of it. When we cook this, it tastes very good but today we'll get rid of it (collar). I can't really give you some because it looks too good and might taste too good for the sample! I don't want to give it to you but I have to! (laughs). The colour is orange and almost red. It looks healthy, apart from the guts. You want another piece? If I cut a small piece, you might say its too small so I cut a big chunk. Its going to be cooked now. The coloration, those lines you are talking about, its where the bones would go. If it was unhealthy, the meat would be somewhat white. It looks white on the lines because of the bones. This is the heart. The heart looks good, but I don't know what this white part is. The intestines have some white coloration. The liver here looks healthy. It doesn't have any. But the intestines have some white-ish coloring, maybe that's parasites. If the liver is whiteish than its no good, its unhealthy. So this is healthy, it's darker. Seems like there is lots of small fish inside. (cuts open stomach) At least 3 fish in the belly. We can cook the stomach but nobody has bothered to cook it so far. If we don't want to eat it, we don't have to. Cuts fish

into fillets. Cleans out kidney. Cuts off tail. Keeps middle section of fish with all the bones but guts cleaned out – this we can cook on the fire. Cuts up fillets.

Kathy – please let Julie know that the fish I took goes to a lab and tests for things you cannot see with your eyes. So its not wasted. If there was bad stuff in the fish that you can't see, it will tell you that, it tests for that.

Julie – we are not biologists but we are aware that you will test it scientifically for those things that we are not aware of. How do you feel watching me prepare a fish? Everyone here is preparing their fish well. I feel good about that. We may not be coming from the same community but I've been working with fish for 40 years. I want to cook this middle section of the fish on the grill. I just want to keep it in water until we put it on the grill. So this is how we prepare. I'm going to prepare it and cook it and its my first choice. It smells healthy, it smells good. Masi.

NT – for youth and those that haven't been here before, everyone will cook their fish. Then we'll all gather around the fire and taste test the fish. And youth will fill out another form for each fish on how it tastes. Sounds good? (yes)

FISH TASTING

NT - for those that haven't been here before, we are going to taste a small piece of each of the fish and the youth will record your responses. We want to know if this fish tastes okay compared with what you're used to or what you know from this area before. We're looking at the texture, taste and any other comments you have.

Grilled – 26, LKDFN

JS – Tastes similar. No smell. Tastes good. Better with salt though!

BA – Very good tasting. Very tasty. You can taste the fish whereas sometimes when you cook it doen't have a taste. This still has a fish taste. Firm meat. When it is cooked, it doesn't get mushy.

I don't detect any taste difference from the last session and now.

DE – Tastes fishier because we are in the bay. It tastes swampy. Still a good fish. Only the taste is different.

EB – Ya, swampy. Still good.

JW – Tastes good and similar to the fish we usually eat. Texture is good. Taste is good too. Even without the salt!

NK – This fish kind of has a strong taste. All the trout from each different lake, it tastes different. Red meat usually tastes good, better that the white meat. This is edible and good. Kind of a stronger taste than what I usually eat at home.

Baked – 28 (undercooked but still edible)

DE – Really rich, too rich. Not cooked right. You could taste how it is shiny, greasy. Too fat.

EB – Rich but good. Kinda fat.

NK – Undercooked but still edible. Good smell, not too strong. Taste is okay.

Julie – this is going to take awhile. I can't stand beside it with that heat.

BAKED, 28, Kitikmeot also tasted – no notes, refer to forms

BOILED, 27, YKDFN

JW – I'm comparing it to the cooked and fried fish. It tasted good. It is boiled good. It is very difficult to say our favourite because the four ways it has been cooked, it all tasted very good.

Q How does she feel about health of fish in LdG now that she has tasted these four fish?

JW – The fish taste good in all the ways that we cooked. When we were fixing the fish, processing the fish, they looked healthy. Also when we first took a look at the fish, we checked the gills so that they are read. If they are red, we know it is a healthy fish. That is the first thing that we see.

BA – Could taste the ground a little in this fish. What it has probably been eating. Feeding from the bottom feeder.

NK – Very fishy taste again.

FRIED, 29, Tlicho

JS – Deadly good!

When you cut it, it had a cyst on it, and you said when you tasted it, you would know?

JW – If it was a deformity on the outside, we wouldn't eat it. Because it was internal, we can cook it. It tastes good. It tasted excellent. I ate two pieces. Fish over the fire tasted good too. The smoke tastes good.

END

Fish tissue analysis from Lac de Gras Fish TK Camp 2018

Fish ID	DL	Units	LKTR 5	LKTR 7	LKTR 8-4	LKTR 8-5	RPD	LKTR 9-4	LKTR 9-5	RPD	LKTR 11	LKTR 13-4	LKTR 13-5	RPD	LKTR 14	LKTR 15-4	LKTR 15-5	RPD	LKTR 16	LKTR 17	LKTR 20	LKTR 26	LKTR 27	LKTR 28-4	LKTR 28-5	RPD	LKTR 29
																						Terri	Jonas	Nancy			Julie
Aluminum (Al)	0.2	mg/kg wwt	<0.20	<0.20	<0.20	<0.20	0.00	<0.20	<0.20	0.00	<0.20	0.22	<0.20	0.00	<0.20	<0.20	<0.20	0.00	<0.20	0.4	<0.20	<0.20	<0.20	<0.20	<0.20	0.00	<0.20
Antimony (Sb)	0.001	mg/kg wwt	0.0011	<0.0010	<0.0010	<0.0010	0.00	<0.0010	<0.0010	0.00	<0.0010	<0.0010	<0.0010	0.00	<0.0010	<0.0010	0.0012	0.00	0.002	0.0011	<0.0010	0.0034	<0.0010	0.004	0.0045	11.76	0.0045
Arsenic (As)	0.004	mg/kg wwt	0.0307	0.0349	0.0381	0.0445	15.50	0.0366	0.0432	16.54	0.059	0.0395	0.0329	18.23	0.0341	0.0468	0.0344	30.54	0.0419	0.0472	0.06	0.0428	0.0863	0.0538	0.0513	4.76	0.0513
Barium (Ba)	0.01	mg/kg wwt	<0.010	<0.010	<0.010	<0.010	0.00	<0.010	<0.010	0.00	<0.010	0.023	<0.010	0.00	0.011	0.011	<0.010	0.00	<0.010	0.014	<0.010	0.017	0.167	<0.010	<0.010	0.00	<0.010
Beryllium (Be)	0.001	mg/kg wwt	<0.0010	<0.0010	<0.0010	<0.0010	0.00	<0.0010	<0.0010	0.00	<0.0010	<0.0010	<0.0010	0.00	<0.0010	<0.0010	<0.0010	0.00	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00	<0.0010
Bismuth (Bi)	0.001	mg/kg wwt	<0.0010	<0.0010	<0.0010	<0.0010	0.00	<0.0010	<0.0010	0.00	<0.0010	<0.0010	<0.0010	0.00	<0.0010	<0.0010	<0.0010	0.00	<0.0010	<0.0010	<0.0010	0.0014	<0.0010	<0.0010	<0.0010	0.00	<0.0010
Boron (B)	0.2	mg/kg wwt	<0.20	<0.20	<0.20	<0.20	0.00	<0.20	<0.20	0.00	<0.20	<0.20	<0.20	0.00	<0.20	<0.20	<0.20	0.00	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.00	<0.20
Cadmium (Cd)	0.001	mg/kg wwt	<0.0010	<0.0010	<0.0010	<0.0010	0.00	<0.0010	<0.0010	0.00	<0.0010	<0.0010	<0.0010	0.00	<0.0010	<0.0010	<0.0010	0.00	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00	<0.0010
Calcium (Ca)	2	mg/kg wwt	44.5	48	52.9	66.7	23.08	159	106	40.00	141	709	145	132.08	198	151	99.7	40.93	77.9	241	85.3	375	2880	94	107	12.94	107
Cesium (Cs)	0.001	mg/kg wwt	0.13	0.0654	0.113	0.101	11.21	0.103	0.0909	12.48	0.0711	0.0984	0.109	10.22	0.1	0.0752	0.0783	4.04	0.0865	0.0333	0.0675	0.0795	0.0671	0.111	0.111	0.00	0.111
Chromium (Cr)	0.01	mg/kg wwt	<0.010	0.02	<0.010	<0.010	0.00	0.01	<0.010	0.00	<0.010	0.023	0.047	68.57	0.063	0.19	0.038	133.33	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.00	<0.010
Cobalt (Co)	0.0013	mg/kg wwt	0.0042	0.012	0.0067	0.0084	22.52	0.0031	0.0039	22.86	0.0035	0.004	0.0038	5.13	0.0029	0.0069	0.0037	60.38	0.0061	0.0156	0.0037	0.0049	0.0094	0.0087	0.0097	10.87	0.0097
Copper (Cu)	0.01	mg/kg wwt	0.397	0.586	0.687	0.839	19.92	0.38	0.47	21.18	0.489	0.386	0.407	5.30	0.369	0.366	0.26	33.87	0.267	0.465	0.535	0.262	0.233	0.36	0.354	1.68	0.354
Iron (Fe)	0.25	mg/kg wwt	5.04	7.65	8.01	11.5	35.78	3.41	5.68	49.94	6.19	3.25	3.36	3.33	3.52	4.4	3.01	37.52	3.4	7.99	7.08	3.03	4.1	5.59	5.04	10.35	5.04
Lead (Pb)	0.002	mg/kg wwt	<0.0020	<0.0020	<0.0020	<0.0020	0.00	<0.0010	<0.0010	0.00	<0.0020	<0.0020	<0.0020	0.00	<0.0010	<0.0010	<0.0010	0.00	<0.0010	0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.00	<0.0020
Lithium (Li)	0.1	mg/kg wwt	<0.10	<0.10	<0.10	<0.10	0.00	<0.10	<0.10	0.00	<0.10	<0.10	<0.10	0.00	<0.10	<0.10	<0.10	0.00	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.00	<0.10
Magnesium (Mg)	0.4	mg/kg wwt	245	242	225	217	3.62	251	250	0.40	258	280	261	7.02	271	259	274	5.63	255	229	223	258	254	239	246	2.89	246
Manganese (Mn)	0.01	mg/kg wwt	0.075	0.088	0.09	0.109	19.10	0.092	0.103	11.28	0.103	0.111	0.066	50.85	0.111	0.12	0.102	16.22	0.097	0.146	0.144	0.136	0.576	0.111	0.116	4.41	0.116
Mercury (Hg)	0.001	mg/kg wwt	0.424	0.112	0.367	0.348	5.31	0.25	0.241	3.67	0.174	0.156	0.193	21.20	0.142	0.158	0.173	9.06	0.281	0.194	0.177	0.371	0.284	0.172	0.114	40.56	0.114
Molybdenum (Mo)	0.004	mg/kg wwt	<0.0040	<0.0040	<0.0040	<0.0040	0.00	<0.0040	<0.0040	0.00	<0.0040	<0.0040	<0.0040	0.00	<0.0040	<0.0040	<0.0040	0.00	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	0.00	<0.0040
Nickel (Ni)	0.01	mg/kg wwt	0.015	0.013	0.02	0.025	22.22	0.014	0.013	7.41	0.019	0.016	0.014	13.33	0	0.084	<0.010	0.00	0.014	0.021	0.013	<0.010	<0.010	0.016	0.017	6.06	0.017
Phosphorus (P)	2	mg/kg wwt	2650	2580	2540	2440	4.02	2550	2540	0.39	2690	3040	2690	12.22	2850	2710	2830	4.33	2710	2450	2380	2740	3890	2530	2540	0.39	2540
Potassium (K)	2	mg/kg wwt	4540	4170	3980	3620	9.47	4020	4000	0.50	4240	4460	4350	2.50	4630	4180	4390	4.90	4570	3580	3580	4590	3720	4100	4020	1.97	4020
Rubidium (Rb)	0.01	mg/kg wwt	16.7	13.4	15.6	14.6	6.62	17.2	16.6	3.55	14.7	18.8	19.1	1.58	20.9	16.2	18	10.53	18	9.71	15.8	16.2	13.3	14.5	14.3	1.39	14.3
Selenium (Se)	0.01	mg/kg wwt	0.164	0.193	0.194	0.19	2.08	0.153	0.168	9.35	0.164	0.167	0.184	9.69	0.179	0.183	0.196	6.86	0.151	0.22	0.168	0.139	0.159	0.166	0.167	0.60	0.167
Silver (Ag)	0.001	mg/kg wwt	<0.0010	<0.0010	<0.0010	<0.0010	0.00	<0.0010	<0.0010	0.00	<0.0010	<0.0010	<0.0010	0.00	<0.0010	<0.0010	<0.0010	0.00	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00	<0.0010
Sodium (Na)	2	mg/kg wwt	391	450	510	720	34.15	402	585	37.08	569	318	289	9.56	313	380	286	28.23	306	667	501	304	405	451	475	5.18	475
Strontium (Sr)	0.01	mg/kg wwt	0.053	0.064	0.108	0.147	30.59	0.31	0.177	54.62	0.232	1.9	0.339	139.44	0.534	0.356	0.212	50.70	0.144	0.457	0.132	0.881	6.75	0.094	0.121	25.12	0.121
Sulphur (S)	60	mg/kg wwt	2180	2280	2300	2370	3.00	2150	2420	11.82	2240	2320	2240	3.51	2290	2340	2380	1.69	2200	2280	2080	2200	1990	2210	2230	0.90	2230
Tellurium (Te)	0.004	mg/kg wwt	<0.0040	<0.0040	<0.0040	<0.0040	0.00	<0.0040	<0.0040	0.00	<0.0040	<0.0040	<0.0040	0.00	<0.0040	<0.0040	<0.0040	0.00	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	0.00	<0.0040
Thallium (Tl)	0.0004	mg/kg wwt	0.0122	0.00968	0.0126	0.0116	8.26	0.00908	0.00893	1.67	0.00819	0.0113	0.012	6.01	0.00933	0.00748	0.00771	3.03	0.00743	0.00718	0.00762	0.00677	0.00778	0.0105	0.0104	0.96	0.0104
Tin (Sn)	0.02	mg/kg wwt	<0.020	<0.020	<0.020	<0.020	0.00	<0.020	<0.020	0.00	<0.020	<0.020	<0.020	0.00	0.026	<0.020	<0.020	0.00	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.00	<0.020
Titanium (Ti)	0.02	mg/kg wwt	0.142	0.107	0.111	0.129	15.00	0.085	0.086	1.17	0.149	0.15	0.102	38.10	0.102	0.098	0.087	11.89	0.115	0.114	0.12	0.129	0.173	0.105	0.111	5.56	0.111
Uranium (U)	0.0004	mg/kg wwt	<0.00040	<0.00040	<0.00040	<0.00040	0.00	<0.00040	<0.00040	0.00	<0.00040	<0.00040	<0.00040	0.00	<0.00040	<0.00040	<0.00040	0.00	<0.00040	<0.00040	0.00056	<0.00040	0.00079	<0.00040	<0.00040	0.00	<0.00040
Vanadium (V)	0.02	mg/kg wwt	<0.020	<0.020	<0.020	<0.020	0.00	<0.020	<0.020	0.00	<0.020	<0.020	<0.020	0.00	<0.020	<0.020	<0.020	0.00	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.00	<0.020
Zinc (Zn)	0.04	mg/kg wwt	3.61	3.95	4.58	5.76	22.82	4.14	4.73	13.30	4.77	3.65	3.09	16.62	3.55	4.02	3.35	18.18	3.4	8.77	4.61	3.51	5.75	3.95	4.33	9.18	4.33
Zirconium (Zr)	0.04	mg/kg wwt	<0.040	<0.040	<0.040	<0.040	0.00	<0.040	<0.040	0.00	<0.040	<0.040	<0.040	0.00	<0.040	<0.040	<0.040	0.00	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.00	<0.040

Notes:
Analysis Complete by Maxxam Analytics
LKTR = Lake Trout, mg/kg = milligram per kilogram,wwt = wet weight, -4 and -5 = Duplicate Analysis by Lab
Cells shaded in **green** represent tasting fish; the individual that processed the fish is listed below the fish numbe

Select Relative Percent Difference (RPD) values for field duplicates from the AEMP TK Study may exceed the 60% value assigned to the large-bodied trout surveys as per the AEMP Quality Assurance Project Plan.
These limits are not stringently applied to the TK fish tissue results as the sampling protocols, sample size, fishing locations and size of fish are not consistent between years as this is a not a focus or priority of the TK Study.
As such, statistical analysis and QA/QC evaluations of the AEMP TK Study fish tissue chemistry should be evaluated with caution.

Statistical summary of fish tissue analysis from Lac de Gras Fish TK Camp 2018

Fish ID	DL	Unit	Sample Size	Min Value	Median Value	Max Value	SD
Aluminum (Al)	0.2	mg/kg wwt	20	0.22	0.31	0.4	0.0998
Antimony (Sb)	0.001	mg/kg wwt	20	0.0011	0.0027	0.0045	0.0017
Arsenic (As)	0.004	mg/kg wwt	20	0.0307	0.043	0.0863	0.0129
Barium (Ba)	0.01	mg/kg wwt	20	0.011	0.0155	0.167	0.0371
Beryllium (Be)	0.001	mg/kg wwt	20	<DL	<DL	<DL	0.0000
Bismuth (Bi)	0.001	mg/kg wwt	20	0.0014	0.0014	0.0014	0.0003
Boron (B)	0.2	mg/kg wwt	20	<DL	<DL	<DL	0.0000
Cadmium (Cd)	0.001	mg/kg wwt	20	0.0011	0.0011	0.0011	0.0002
Calcium (Ca)	2	mg/kg wwt	20	44.5	107	2880	626.9533
Cesium (Cs)	0.001	mg/kg wwt	20	0.0333	0.09465	0.13	0.0229
Chromium (Cr)	0.01	mg/kg wwt	20	0.01	0.038	0.19	0.0442
Cobalt (Co)	0.0013	mg/kg wwt	20	0.0029	0.0055	0.0156	0.0035
Copper (Cu)	0.01	mg/kg wwt	20	0.233	0.383	0.839	0.1499
Iron (Fe)	0.25	mg/kg wwt	20	3.01	5.04	11.5	2.2230
Lead (Pb)	0.002	mg/kg wwt	20	0.002	0.002	0.002	0.0004
Lithium (Li)	0.1	mg/kg wwt	20	<DL	<DL	<DL	0.0000
Magnesium (Mg)	0.4	mg/kg wwt	20	217	250.5	280	16.8594
Manganese (Mn)	0.01	mg/kg wwt	20	0.066	0.11	0.576	0.1068
Mercury (Hg)	0.001	mg/kg wwt	20	0.112	0.185	0.424	0.0945
Molybdenum (Mo)	0.004	mg/kg wwt	20	<DL	<DL	<DL	0.0000
Nickel (Ni)	0.01	mg/kg wwt	20	0	0.016	0.084	0.0175
Phosphorus (P)	2	mg/kg wwt	20	2380	2615	3890	322.4654
Potassium (K)	2	mg/kg wwt	20	3580	4135	4630	338.1778
Rubidium (Rb)	0.01	mg/kg wwt	20	9.71	16	20.9	2.4826
Selenium (Se)	0.01	mg/kg wwt	20	0.139	0.1675	0.22	0.0188
Silver (Ag)	0.001	mg/kg wwt	20	<DL	<DL	<DL	0.0000
Sodium (Na)	2	mg/kg wwt	20	286	427.5	720	125.9780
Strontium (Sr)	0.01	mg/kg wwt	20	0.053	0.1945	6.75	1.4939
Sulphur (S)	60	mg/kg wwt	20	1990	2240	2420	102.0462
Tellurium (Te)	0.004	mg/kg wwt	20	<DL	<DL	<DL	0.0000
Thallium (Tl)	0.0004	mg/kg wwt	20	0.00677	0.009205	0.0126	0.0019
Tin (Sn)	0.02	mg/kg wwt	20	0.026	0.026	0.026	0.0058
Titanium (Ti)	0.02	mg/kg wwt	20	0.085	0.111	0.173	0.0232
Uranium (U)	0.0004	mg/kg wwt	20	0.00056	0.000675	0.00079	0.0002
Vanadium (V)	0.02	mg/kg wwt	20	<DL	<DL	<DL	0.0000
Zinc (Zn)	0.04	mg/kg wwt	20	3.09	4.08	8.77	1.2615
Zirconium (Zr)	0.04	mg/kg wwt	20	<DL	<DL	<DL	0.0000

Notes:
Analysis Complete by Maxxam Analytics
LKTR = Lake Trout, mg/kg = milligram per kilogram,wwt = wet weight, -4 and -5 = Duplicate Analysis by Lab
DL=detection limit, SD=standard deviation

Success Through Science®

Your P.O. #: K73160
Your C.O.C. #: 8882

Attention: DDMI Environment

DIAVIK DIAMOND MINES INC.
P.O. BOX 2498
300-5201 - 50th AVE.
YELLOWKNIFE, NT
CANADA X1A 2P8

Report Date: 2018/10/18
Report #: R2637092
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B883657
Received: 2018/09/26, 10:00

Sample Matrix: TISSUE
Samples Received: 13

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Mercury in Tissue by CVAF-Wet Wt	13	N/A	2018/10/17	BBY7SOP-00012	CMOE BCLM Oct2013 m
Elements by CRC ICPMS - Tissue Wet Wt	13	2018/10/09	2018/10/11	BBY7SOP-00021,	EPA 6020b R2 m
Moisture in Tissue	13	N/A	2018/10/11	BBY8SOP-00017	BCMOE BCLM Dec2000 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your P.O. #: K73160
Your C.O.C. #: 8882

Attention: DDMI Environment

DIAVIK DIAMOND MINES INC.
P.O. BOX 2498
300-5201 - 50th AVE.
YELLOWKNIFE, NT
CANADA X1A 2P8

Report Date: 2018/10/18
Report #: R2637092
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B883657
Received: 2018/09/26, 10:00

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Veronica De Guzman, B.Sc., Project Manager
Email: VDeGuzman@maxxam.ca
Phone# (604) 734 7276

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B883657
Report Date: 2018/10/18

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160
Sampler Initials: CE

ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

Maxxam ID		UK4418	UK4419	UK4420	UK4421	UK4422	UK4423		
Sampling Date		2018/08/03 00:00	2018/08/03 00:00	2018/08/03 00:00	2018/08/03 00:00	2018/08/03 00:00	2018/08/03 00:00		
COC Number		8882	8882	8882	8882	8882	8882		
	UNITS	LKTR 5	LKTR 7	LKTR 20	LKTR 11	LKTR 8-4	LKTR 8-5	RDL	QC Batch
Mercury by CVAA									
Total Mercury (Hg)	ug/g	0.424	0.112	0.177	0.174	0.367	0.348	0.0010	9178123
Total Metals by ICPMS									
Total Aluminum (Al)	ug/g	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	9176951
Total Antimony (Sb)	ug/g	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	9176951
Total Arsenic (As)	ug/g	0.0307	0.0349	0.0600	0.0590	0.0381	0.0445	0.0040	9176951
Total Barium (Ba)	ug/g	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	9176951
Total Beryllium (Be)	ug/g	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	9176951
Total Bismuth (Bi)	ug/g	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	9176951
Total Boron (B)	ug/g	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	9176951
Total Cadmium (Cd)	ug/g	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	9176951
Total Calcium (Ca)	ug/g	44.5	48.0	85.3	141	52.9	66.7	2.0	9176951
Total Cesium (Cs)	ug/g	0.130	0.0654	0.0675	0.0711	0.113	0.101	0.0010	9176951
Total Chromium (Cr)	ug/g	<0.010	0.020	<0.010	<0.010	<0.010	<0.010	0.010	9176951
Total Cobalt (Co)	ug/g	0.0042	0.0120	0.0037	0.0035	0.0067	0.0084	0.0013	9176951
Total Copper (Cu)	ug/g	0.397	0.586	0.535	0.489	0.687	0.839	0.010	9176951
Total Iron (Fe)	ug/g	5.04	7.65	7.08	6.19	8.01	11.5	0.25	9176951
Total Lead (Pb)	ug/g	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	9176951
Total Lithium (Li)	ug/g	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	9176951
Total Magnesium (Mg)	ug/g	245	242	223	258	225	217	0.40	9176951
Total Manganese (Mn)	ug/g	0.075	0.088	0.144	0.103	0.090	0.109	0.010	9176951
Total Molybdenum (Mo)	ug/g	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	9176951
Total Nickel (Ni)	ug/g	0.015	0.013	0.013	0.019	0.020	0.025	0.010	9176951
Total Phosphorus (P)	ug/g	2650	2580	2380	2690	2540	2440	2.0	9176951
Total Potassium (K)	ug/g	4540	4170	3580	4240	3980	3620	2.0	9176951
Total Rubidium (Rb)	ug/g	16.7	13.4	15.8	14.7	15.6	14.6	0.010	9176951
Total Selenium (Se)	ug/g	0.164	0.193	0.168	0.164	0.194	0.190	0.010	9176951
Total Silver (Ag)	ug/g	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	9176951
Total Sodium (Na)	ug/g	391	450	501	569	510	720	2.0	9176951
Total Strontium (Sr)	ug/g	0.053	0.064	0.132	0.232	0.108	0.147	0.010	9176951
Total Sulphur (S)	ug/g	2180	2280	2080	2240	2300	2370	60	9176951
Total Tellurium (Te)	ug/g	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	9176951
Total Thallium (Tl)	ug/g	0.0122	0.00968	0.00762	0.00819	0.0126	0.0116	0.00040	9176951

RDL = Reportable Detection Limit

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B883657
Report Date: 2018/10/18

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160
Sampler Initials: CE

ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

Maxxam ID		UK4418	UK4419	UK4420	UK4421	UK4422	UK4423		
Sampling Date		2018/08/03 00:00	2018/08/03 00:00	2018/08/03 00:00	2018/08/03 00:00	2018/08/03 00:00	2018/08/03 00:00		
COC Number		8882	8882	8882	8882	8882	8882		
	UNITS	LKTR 5	LKTR 7	LKTR 20	LKTR 11	LKTR 8-4	LKTR 8-5	RDL	QC Batch
Total Tin (Sn)	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	9176951
Total Titanium (Ti)	ug/g	0.142	0.107	0.120	0.149	0.111	0.129	0.020	9176951
Total Uranium (U)	ug/g	<0.00040	<0.00040	0.00056	<0.00040	<0.00040	<0.00040	0.00040	9176951
Total Vanadium (V)	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	9176951
Total Zinc (Zn)	ug/g	3.61	3.95	4.61	4.77	4.58	5.76	0.040	9176951
Total Zirconium (Zr)	ug/g	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	9176951

RDL = Reportable Detection Limit

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Maxxam Job #: B883657
Report Date: 2018/10/18

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160
Sampler Initials: CE

ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

Maxxam ID		UK4424	UK4425	UK4426	UK4427	UK4428	UK4429		
Sampling Date		2018/08/03 00:00	2018/08/03 00:00	2018/08/05 00:00	2018/08/05 00:00	2018/08/05 00:00	2018/08/05 00:00		
COC Number		8882	8882	8882	8882	8882	8882		
	UNITS	LKTR 13-4	LKTR 13-5	LKTR 26	LKTR 27	LKTR 28-4	LKTR 28-5	RDL	QC Batch
Mercury by CVAA									
Total Mercury (Hg)	ug/g	0.156	0.193	0.371	0.284	0.172	0.114	0.0010	9178123
Total Metals by ICPMS									
Total Aluminum (Al)	ug/g	0.22	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	9176951
Total Antimony (Sb)	ug/g	<0.0010	<0.0010	0.0034	<0.0010	0.0040	0.0045	0.0010	9176951
Total Arsenic (As)	ug/g	0.0395	0.0329	0.0428	0.0863	0.0538	0.0513	0.0040	9176951
Total Barium (Ba)	ug/g	0.023	<0.010	0.017	0.167	<0.010	<0.010	0.010	9176951
Total Beryllium (Be)	ug/g	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	9176951
Total Bismuth (Bi)	ug/g	<0.0010	<0.0010	0.0014	<0.0010	<0.0010	<0.0010	0.0010	9176951
Total Boron (B)	ug/g	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	9176951
Total Cadmium (Cd)	ug/g	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	9176951
Total Calcium (Ca)	ug/g	709	145	375	2880	94.0	107	2.0	9176951
Total Cesium (Cs)	ug/g	0.0984	0.109	0.0795	0.0671	0.111	0.111	0.0010	9176951
Total Chromium (Cr)	ug/g	0.023	0.047	<0.010	<0.010	<0.010	<0.010	0.010	9176951
Total Cobalt (Co)	ug/g	0.0040	0.0038	0.0049	0.0094	0.0087	0.0097	0.0013	9176951
Total Copper (Cu)	ug/g	0.386	0.407	0.262	0.233	0.360	0.354	0.010	9176951
Total Iron (Fe)	ug/g	3.25	3.36	3.03	4.10	5.59	5.04	0.25	9176951
Total Lead (Pb)	ug/g	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	9176951
Total Lithium (Li)	ug/g	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	9176951
Total Magnesium (Mg)	ug/g	280	261	258	254	239	246	0.40	9176951
Total Manganese (Mn)	ug/g	0.111	0.066	0.136	0.576	0.111	0.116	0.010	9176951
Total Molybdenum (Mo)	ug/g	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	9176951
Total Nickel (Ni)	ug/g	0.016	0.014	<0.010	<0.010	0.016	0.017	0.010	9176951
Total Phosphorus (P)	ug/g	3040	2690	2740	3890	2530	2540	2.0	9176951
Total Potassium (K)	ug/g	4460	4350	4590	3720	4100	4020	2.0	9176951
Total Rubidium (Rb)	ug/g	18.8	19.1	16.2	13.3	14.5	14.3	0.010	9176951
Total Selenium (Se)	ug/g	0.167	0.184	0.139	0.159	0.166	0.167	0.010	9176951
Total Silver (Ag)	ug/g	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	9176951
Total Sodium (Na)	ug/g	318	289	304	405	451	475	2.0	9176951
Total Strontium (Sr)	ug/g	1.90	0.339	0.881	6.75	0.094	0.121	0.010	9176951
Total Sulphur (S)	ug/g	2320	2240	2200	1990	2210	2230	60	9176951
Total Tellurium (Te)	ug/g	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	9176951
Total Thallium (Tl)	ug/g	0.0113	0.0120	0.00677	0.00778	0.0105	0.0104	0.00040	9176951

RDL = Reportable Detection Limit

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Maxxam Job #: B883657
Report Date: 2018/10/18

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160
Sampler Initials: CE

ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

Maxxam ID		UK4424	UK4425	UK4426	UK4427	UK4428	UK4429		
Sampling Date		2018/08/03 00:00	2018/08/03 00:00	2018/08/05 00:00	2018/08/05 00:00	2018/08/05 00:00	2018/08/05 00:00		
COC Number		8882	8882	8882	8882	8882	8882		
	UNITS	LKTR 13-4	LKTR 13-5	LKTR 26	LKTR 27	LKTR 28-4	LKTR 28-5	RDL	QC Batch
Total Tin (Sn)	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	9176951
Total Titanium (Ti)	ug/g	0.150	0.102	0.129	0.173	0.105	0.111	0.020	9176951
Total Uranium (U)	ug/g	<0.00040	<0.00040	<0.00040	0.00079	<0.00040	<0.00040	0.00040	9176951
Total Vanadium (V)	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	9176951
Total Zinc (Zn)	ug/g	3.65	3.09	3.51	5.75	3.95	4.33	0.040	9176951
Total Zirconium (Zr)	ug/g	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	9176951

RDL = Reportable Detection Limit

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Maxxam Job #: B883657
Report Date: 2018/10/18

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160
Sampler Initials: CE

ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

Maxxam ID		UK4430		
Sampling Date		2018/08/05 00:00		
COC Number		8882		
	UNITS	LKTR 29	RDL	QC Batch
Mercury by CVAA				
Total Mercury (Hg)	ug/g	0.387	0.0010	9178123
Total Metals by ICPMS				
Total Aluminum (Al)	ug/g	<0.20	0.20	9176951
Total Antimony (Sb)	ug/g	<0.0010	0.0010	9176951
Total Arsenic (As)	ug/g	0.0470	0.0040	9176951
Total Barium (Ba)	ug/g	<0.010	0.010	9176951
Total Beryllium (Be)	ug/g	<0.0010	0.0010	9176951
Total Bismuth (Bi)	ug/g	<0.0010	0.0010	9176951
Total Boron (B)	ug/g	<0.20	0.20	9176951
Total Cadmium (Cd)	ug/g	<0.0010	0.0010	9176951
Total Calcium (Ca)	ug/g	39.8	2.0	9176951
Total Cesium (Cs)	ug/g	0.0927	0.0010	9176951
Total Chromium (Cr)	ug/g	<0.010	0.010	9176951
Total Cobalt (Co)	ug/g	0.0060	0.0013	9176951
Total Copper (Cu)	ug/g	0.587	0.010	9176951
Total Iron (Fe)	ug/g	7.02	0.25	9176951
Total Lead (Pb)	ug/g	<0.0020	0.0020	9176951
Total Lithium (Li)	ug/g	<0.10	0.10	9176951
Total Magnesium (Mg)	ug/g	198	0.40	9176951
Total Manganese (Mn)	ug/g	0.085	0.010	9176951
Total Molybdenum (Mo)	ug/g	<0.0040	0.0040	9176951
Total Nickel (Ni)	ug/g	0.012	0.010	9176951
Total Phosphorus (P)	ug/g	2450	2.0	9176951
Total Potassium (K)	ug/g	3710	2.0	9176951
Total Rubidium (Rb)	ug/g	13.7	0.010	9176951
Total Selenium (Se)	ug/g	0.152	0.010	9176951
Total Silver (Ag)	ug/g	<0.0010	0.0010	9176951
Total Sodium (Na)	ug/g	494	2.0	9176951
Total Strontium (Sr)	ug/g	0.083	0.010	9176951
Total Sulphur (S)	ug/g	2300	60	9176951
Total Tellurium (Te)	ug/g	<0.0040	0.0040	9176951
Total Thallium (Tl)	ug/g	0.0109	0.00040	9176951
RDL = Reportable Detection Limit				

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Maxxam Job #: B883657
Report Date: 2018/10/18

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160
Sampler Initials: CE

ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

Maxxam ID		UK4430		
Sampling Date		2018/08/05 00:00		
COC Number		8882		
	UNITS	**LKTR 29**	**RDL**	**QC Batch**
Total Tin (Sn)	ug/g	<0.020	0.020	9176951
Total Titanium (Ti)	ug/g	0.130	0.020	9176951
Total Uranium (U)	ug/g	<0.00040	0.00040	9176951
Total Vanadium (V)	ug/g	<0.020	0.020	9176951
Total Zinc (Zn)	ug/g	4.20	0.040	9176951
Total Zirconium (Zr)	ug/g	<0.040	0.040	9176951
RDL = Reportable Detection Limit				

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Maxxam Job #: B883657
Report Date: 2018/10/18

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160
Sampler Initials: CE

PHYSICAL TESTING (TISSUE)

Maxxam ID		UK4418	UK4419	UK4420	UK4421	UK4422	UK4423	UK4424		
Sampling Date		2018/08/03 00:00	2018/08/03 00:00	2018/08/03 00:00	2018/08/03 00:00	2018/08/03 00:00	2018/08/03 00:00	2018/08/03 00:00		
COC Number		8882	8882	8882	8882	8882	8882	8882		
	UNITS	LKTR 5	LKTR 7	LKTR 20	LKTR 11	LKTR 8-4	LKTR 8-5	LKTR 13-4	RDL	QC Batch
Physical Properties										
Moisture	%	76	73	70	73	76	77	73	0.30	9178649
RDL = Reportable Detection Limit										

Maxxam ID		UK4425	UK4426	UK4427	UK4428	UK4429	UK4430		
Sampling Date		2018/08/03 00:00	2018/08/05 00:00	2018/08/05 00:00	2018/08/05 00:00	2018/08/05 00:00	2018/08/05 00:00		
COC Number		8882	8882	8882	8882	8882	8882		
	UNITS	LKTR 13-5	LKTR 26	LKTR 27	LKTR 28-4	LKTR 28-5	LKTR 29	RDL	QC Batch
Physical Properties									
Moisture	%	72	76	65	73	74	75	0.30	9178649
RDL = Reportable Detection Limit									

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Maxxam Job #: B883657
Report Date: 2018/10/18

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160
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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	1.0°C

Results relate only to the items tested.

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Maxxam Job #: B883657
Report Date: 2018/10/18

QUALITY ASSURANCE REPORT

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160
Sampler Initials: CE

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9176951	Total Aluminum (Al)	2018/10/11					<0.20	ug/g	NC	40	96	75 - 125
9176951	Total Antimony (Sb)	2018/10/11	98	75 - 125	97	75 - 125	<0.0010	ug/g	NC	40		
9176951	Total Arsenic (As)	2018/10/11	106	75 - 125	103	75 - 125	<0.0040	ug/g	2.0	40	89	75 - 125
9176951	Total Barium (Ba)	2018/10/11	109	75 - 125	113	75 - 125	<0.010	ug/g	NC	40		
9176951	Total Beryllium (Be)	2018/10/11	102	75 - 125	99	75 - 125	<0.0010	ug/g	NC	40		
9176951	Total Bismuth (Bi)	2018/10/11					<0.0010	ug/g	NC	40		
9176951	Total Boron (B)	2018/10/11					<0.20	ug/g	NC	40		
9176951	Total Cadmium (Cd)	2018/10/11	96	75 - 125	97	75 - 125	<0.0010	ug/g	NC	40	93	75 - 125
9176951	Total Calcium (Ca)	2018/10/11					<2.0	ug/g	0.97	60		
9176951	Total Cesium (Cs)	2018/10/11					<0.0010	ug/g				
9176951	Total Chromium (Cr)	2018/10/11	88	75 - 125	93	75 - 125	<0.010	ug/g	4.7	40	76	75 - 125
9176951	Total Cobalt (Co)	2018/10/11	89	75 - 125	94	75 - 125	<0.0013	ug/g	3.4	40	88	75 - 125
9176951	Total Copper (Cu)	2018/10/11	89	75 - 125	92	75 - 125	<0.010	ug/g	6.1	40	84	75 - 125
9176951	Total Iron (Fe)	2018/10/11					<0.25	ug/g	1.4	40	88	75 - 125
9176951	Total Lead (Pb)	2018/10/11	95	75 - 125	98	75 - 125	<0.0020	ug/g	NC	40	53 (1)	75 - 125
9176951	Total Lithium (Li)	2018/10/11	99	75 - 125	100	75 - 125	<0.10	ug/g			94	75 - 125
9176951	Total Magnesium (Mg)	2018/10/11					<0.40	ug/g	7.5	40		
9176951	Total Manganese (Mn)	2018/10/11	94	75 - 125	97	75 - 125	<0.010	ug/g	4.3	40		
9176951	Total Molybdenum (Mo)	2018/10/11	94	75 - 125	97	75 - 125	<0.0040	ug/g	NC	40	91	75 - 125
9176951	Total Nickel (Ni)	2018/10/11	89	75 - 125	94	75 - 125	<0.010	ug/g	13	40	77	75 - 125
9176951	Total Phosphorus (P)	2018/10/11					<2.0	ug/g	7.4	40	89	75 - 125
9176951	Total Potassium (K)	2018/10/11					<2.0	ug/g	7.7	40		
9176951	Total Rubidium (Rb)	2018/10/11					<0.010	ug/g				
9176951	Total Selenium (Se)	2018/10/11	98	75 - 125	99	75 - 125	<0.010	ug/g	0.28	40	97	75 - 125
9176951	Total Silver (Ag)	2018/10/11	86	75 - 125	87	75 - 125	<0.0010	ug/g	NC	40		
9176951	Total Sodium (Na)	2018/10/11					<2.0	ug/g	11	40	91	75 - 125
9176951	Total Strontium (Sr)	2018/10/11	95	75 - 125	98	75 - 125	<0.010	ug/g	6.0	60		
9176951	Total Sulphur (S)	2018/10/11					<60	ug/g	14	40		
9176951	Total Tellurium (Te)	2018/10/11					<0.0040	ug/g				
9176951	Total Thallium (Tl)	2018/10/11	96	75 - 125	96	75 - 125	<0.00040	ug/g	5.2	40		
9176951	Total Tin (Sn)	2018/10/11	96	75 - 125	96	75 - 125	<0.020	ug/g	NC	40	96	75 - 125

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QUALITY ASSURANCE REPORT(CONT'D)

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160
Sampler Initials: CE

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9176951	Total Titanium (Ti)	2018/10/11	93	75 - 125	95	75 - 125	<0.020	ug/g	39	40		
9176951	Total Uranium (U)	2018/10/11	100	75 - 125	98	75 - 125	<0.00040	ug/g	NC	40	92	75 - 125
9176951	Total Vanadium (V)	2018/10/11	94	75 - 125	93	75 - 125	<0.020	ug/g	NC	40		
9176951	Total Zinc (Zn)	2018/10/11	NC	75 - 125	96	75 - 125	<0.040	ug/g	7.7	40	85	75 - 125
9176951	Total Zirconium (Zr)	2018/10/11					<0.040	ug/g				
9178123	Total Mercury (Hg)	2018/10/17	NC	75 - 125	92	75 - 125	<0.0010	ug/g	15	20	75	75 - 125
9178649	Moisture	2018/10/11					<0.30	%	0.92	20		

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Reference outside acceptance criteria - re-analysis yields similar results.

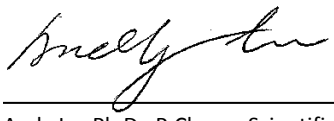
Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B883657
Report Date: 2018/10/18

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160
Sampler Initials: CE

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Andy Lu, Ph.D., P.Chem., Scientific Specialist

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1307

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Custody Tracking Form

W8882

Please use this form for custody tracking when submitting the work instructions via eTR (electronic Test Requisition).
Please ensure your form has a barcode or a Maxxam eTR confirmation number in the top right hand side. This number links your electronic submission to your samples.

First Sample: LKTR 5
Last Sample: Otoliths
Sample Count: 14

Relinquished By				Received By			
Nelson, Mark (DDMI)	Digitally signed by Nelson, Mark (DDMI) Date: 2018.09.25	Date		MICHAEL FABER	[signature]	Date	2018/09/25
		Time (24 HR)				Time (24 HR)	15:55
		Date		Kevin Gill	[signature]	Date	2018/09/26
		Time (24 HR)				Time (24 HR)	10:00
		Date				Date	
		Time (24 HR)				Time (24 HR)	

Submission Triage Information

Sampled By: Kyla Gray

# of Coolers/Pkgs: 1

Rush ☐ Micro ☐ Immediate Test ☐ Food Residue ☐ Food Chemistry ☐

*** LAB USE ONLY ***

Received At:

Labeled By:

Verified By:

Comments:

B883657_COC

Custody Seal		Cooling	Temperature °C		
Present (Y/N)	Intact (Y/N)	Media	1	2	3
N	N	Y	2	1	1
4	4	4	1	1	1

1877

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your P.O. #: K73160
Your C.O.C. #: 9417

Attention: DDMI Environment

DIAVIK DIAMOND MINES INC.
P.O. BOX 2498
300-5201 - 50th AVE.
YELLOWKNIFE, NT
CANADA X1A 2P8

Report Date: 2018/10/31
Report #: R2643774
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B890906
Received: 2018/10/17, 14:15

Sample Matrix: TISSUE
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Mercury in Tissue by CVAF-Wet Wt	7	N/A	2018/10/30	BBY7SOP-00012	CMOE BCLM Oct2013 m
Elements by CRC ICPMS - Tissue Wet Wt	7	2018/10/23	2018/10/24	BBY7SOP-00021,	EPA 6020b R2 m
Moisture in Tissue	7	2018/10/23	2018/10/23	BBY8SOP-00017	BCMOE BCLM Dec2000 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

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Your P.O. #: K73160
Your C.O.C. #: 9417

Attention: DDMI Environment

DIAVIK DIAMOND MINES INC.
P.O. BOX 2498
300-5201 - 50th AVE.
YELLOWKNIFE, NT
CANADA X1A 2P8

Report Date: 2018/10/31
Report #: R2643774
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B890906
Received: 2018/10/17, 14:15

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Veronica De Guzman, B.Sc., Project Manager
Email: VDeGuzman@maxxam.ca
Phone# (604) 734 7276

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Job #: B890906
Report Date: 2018/10/31

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160

ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

Maxxam ID		UO6058	UO6059	UO6060	UO6061	UO6062	UO6063		
Sampling Date		2018/08/03 12:00	2018/08/03 12:00	2018/08/03 12:00	2018/08/03 12:00	2018/08/03 12:00	2018/08/03 12:00		
COC Number		9417	9417	9417	9417	9417	9417		
	UNITS	LKTR-9-4	LKTR-9-5	LKTR-14	LKTR-15-4	LKTR-15-5	LKTR-16	RDL	QC Batch
Mercury by CVAA									
Total Mercury (Hg)	mg/kg	0.259 (1)	0.205	0.130	0.121	0.166	0.260	0.010	9198028
Total Metals by ICPMS									
Total Aluminum (Al)	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	9196705
Total Antimony (Sb)	mg/kg	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	0.0020	0.0010	9196705
Total Arsenic (As)	mg/kg	0.0366	0.0432	0.0341	0.0468	0.0344	0.0419	0.0040	9196705
Total Barium (Ba)	mg/kg	<0.010	<0.010	0.011	0.011	<0.010	<0.010	0.010	9196705
Total Beryllium (Be)	mg/kg	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	9196705
Total Bismuth (Bi)	mg/kg	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	9196705
Total Boron (B)	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	9196705
Total Cadmium (Cd)	mg/kg	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	9196705
Total Calcium (Ca)	mg/kg	159	106	198	151	99.7	77.9	2.0	9196705
Total Cesium (Cs)	mg/kg	0.103	0.0909	0.100	0.0752	0.0783	0.0865	0.0010	9196705
Total Chromium (Cr)	mg/kg	0.010	<0.010	0.063	0.190	0.038	<0.010	0.010	9196705
Total Cobalt (Co)	mg/kg	0.0031	0.0039	0.0029	0.0069	0.0037	0.0061	0.0013	9196705
Total Copper (Cu)	mg/kg	0.380	0.470	0.369	0.366	0.260	0.267	0.010	9196705
Total Iron (Fe)	mg/kg	3.41	5.68	3.52	4.36	3.01	3.40	0.25	9196705
Total Lead (Pb)	mg/kg	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	9196705
Total Lithium (Li)	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	9196705
Total Magnesium (Mg)	mg/kg	251	250	271	259	274	255	0.40	9196705
Total Manganese (Mn)	mg/kg	0.092	0.103	0.111	0.123	0.102	0.097	0.010	9196705
Total Mercury (Hg)	mg/kg	0.250	0.241	0.142	0.158	0.173	0.281	0.0020	9196705
Total Molybdenum (Mo)	mg/kg	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	9196705
Total Nickel (Ni)	mg/kg	0.014	0.013	0.016	0.084	<0.010	0.014	0.010	9196705
Total Phosphorus (P)	mg/kg	2550	2540	2850	2710	2830	2710	2.0	9196705
Total Potassium (K)	mg/kg	4020	4000	4630	4180	4390	4570	2.0	9196705
Total Rubidium (Rb)	mg/kg	17.2	16.6	20.9	16.2	18.0	18.0	0.010	9196705
Total Selenium (Se)	mg/kg	0.153	0.168	0.179	0.183	0.196	0.151	0.010	9196705
Total Silver (Ag)	mg/kg	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	9196705
Total Sodium (Na)	mg/kg	402	585	313	380	286	306	2.0	9196705
Total Strontium (Sr)	mg/kg	0.310 (2)	0.177	0.534	0.356	0.212	0.144	0.010	9196705
Total Sulphur (S)	mg/kg	2150	2420	2290	2340	2380	2200	50	9196705

RDL = Reportable Detection Limit

(1) Matrix spike non calculable due to high concentration of original analyte.

(2) Duplicate RPD above control limit - Non-homogenous sample - Increased variability of results.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B890906
Report Date: 2018/10/31

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160

ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

Maxxam ID		UO6058	UO6059	UO6060	UO6061	UO6062	UO6063		
Sampling Date		2018/08/03 12:00	2018/08/03 12:00	2018/08/03 12:00	2018/08/03 12:00	2018/08/03 12:00	2018/08/03 12:00		
COC Number		9417	9417	9417	9417	9417	9417		
	UNITS	**LKTR-9-4**	**LKTR-9-5**	**LKTR-14**	**LKTR-15-4**	**LKTR-15-5**	**LKTR-16**	**RDL**	**QC Batch**
Total Tellurium (Te)	mg/kg	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	9196705
Total Thallium (Tl)	mg/kg	0.00908	0.00893	0.00933	0.00748	0.00771	0.00743	0.00040	9196705
Total Tin (Sn)	mg/kg	<0.020	<0.020	0.026	<0.020	<0.020	<0.020	0.020	9196705
Total Titanium (Ti)	mg/kg	0.085	0.086	0.102	0.098	0.087	0.115	0.020	9196705
Total Uranium (U)	mg/kg	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00040	9196705
Total Vanadium (V)	mg/kg	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	9196705
Total Zinc (Zn)	mg/kg	4.14	4.73	3.55	4.02	3.35	3.40	0.040	9196705
Total Zirconium (Zr)	mg/kg	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	9196705

RDL = Reportable Detection Limit

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Maxxam Job #: B890906
Report Date: 2018/10/31

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160

ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

Maxxam ID		UO6064		
Sampling Date		2018/08/03 12:00		
COC Number		9417		
	UNITS	LKTR-17	RDL	QC Batch
Mercury by CVAA				
Total Mercury (Hg)	mg/kg	0.164	0.010	9198028
Total Metals by ICPMS				
Total Aluminum (Al)	mg/kg	0.40	0.20	9196705
Total Antimony (Sb)	mg/kg	0.0011	0.0010	9196705
Total Arsenic (As)	mg/kg	0.0472	0.0040	9196705
Total Barium (Ba)	mg/kg	0.014	0.010	9196705
Total Beryllium (Be)	mg/kg	<0.0010	0.0010	9196705
Total Bismuth (Bi)	mg/kg	<0.0010	0.0010	9196705
Total Boron (B)	mg/kg	<0.20	0.20	9196705
Total Cadmium (Cd)	mg/kg	0.0011	0.0010	9196705
Total Calcium (Ca)	mg/kg	241	2.0	9196705
Total Cesium (Cs)	mg/kg	0.0333	0.0010	9196705
Total Chromium (Cr)	mg/kg	<0.010	0.010	9196705
Total Cobalt (Co)	mg/kg	0.0156	0.0013	9196705
Total Copper (Cu)	mg/kg	0.465	0.010	9196705
Total Iron (Fe)	mg/kg	7.99	0.25	9196705
Total Lead (Pb)	mg/kg	0.0020	0.0010	9196705
Total Lithium (Li)	mg/kg	<0.10	0.10	9196705
Total Magnesium (Mg)	mg/kg	229	0.40	9196705
Total Manganese (Mn)	mg/kg	0.146	0.010	9196705
Total Mercury (Hg)	mg/kg	0.194	0.0020	9196705
Total Molybdenum (Mo)	mg/kg	<0.0040	0.0040	9196705
Total Nickel (Ni)	mg/kg	0.021	0.010	9196705
Total Phosphorus (P)	mg/kg	2450	2.0	9196705
Total Potassium (K)	mg/kg	3580	2.0	9196705
Total Rubidium (Rb)	mg/kg	9.71	0.010	9196705
Total Selenium (Se)	mg/kg	0.220	0.010	9196705
Total Silver (Ag)	mg/kg	<0.0010	0.0010	9196705
Total Sodium (Na)	mg/kg	667	2.0	9196705
Total Strontium (Sr)	mg/kg	0.457	0.010	9196705
Total Sulphur (S)	mg/kg	2280	50	9196705
Total Tellurium (Te)	mg/kg	<0.0040	0.0040	9196705
Total Thallium (Tl)	mg/kg	0.00718	0.00040	9196705
RDL = Reportable Detection Limit				

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Maxxam Job #: B890906
Report Date: 2018/10/31

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160

ELEMENTS BY ATOMIC SPECTROSCOPY - WET WT (TISSUE)

Maxxam ID		UO6064		
Sampling Date		2018/08/03 12:00		
COC Number		9417		
	UNITS	**LKTR-17**	**RDL**	**QC Batch**
Total Tin (Sn)	mg/kg	<0.020	0.020	9196705
Total Titanium (Ti)	mg/kg	0.114	0.020	9196705
Total Uranium (U)	mg/kg	<0.00040	0.00040	9196705
Total Vanadium (V)	mg/kg	<0.020	0.020	9196705
Total Zinc (Zn)	mg/kg	8.77	0.040	9196705
Total Zirconium (Zr)	mg/kg	<0.040	0.040	9196705
RDL = Reportable Detection Limit				

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Maxxam Job #: B890906
Report Date: 2018/10/31

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160

PHYSICAL TESTING (TISSUE)

Maxxam ID		UO6058	UO6059	UO6060	UO6061	UO6062	UO6063	UO6064		
Sampling Date		2018/08/03 12:00	2018/08/03 12:00	2018/08/03 12:00	2018/08/03 12:00	2018/08/03 12:00	2018/08/03 12:00	2018/08/03 12:00		
COC Number		9417	9417	9417	9417	9417	9417	9417		
	UNITS	LKTR-9-4	LKTR-9-5	LKTR-14	LKTR-15-4	LKTR-15-5	LKTR-16	LKTR-17	RDL	QC Batch
Physical Properties										
Moisture	%	71	74	70	70	71	70	68	0.30	9196662
RDL = Reportable Detection Limit										

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Maxxam Job #: B890906
Report Date: 2018/10/31

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	-0.3°C

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B890906
Report Date: 2018/10/31

QUALITY ASSURANCE REPORT

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9196662	Moisture	2018/10/23					<0.30	%	3.3	20		
9196705	Total Aluminum (Al)	2018/10/24					<0.20	mg/kg	NC	40	100	75 - 125
9196705	Total Antimony (Sb)	2018/10/24	92	75 - 125	101	75 - 125	<0.0010	mg/kg	NC	40		
9196705	Total Arsenic (As)	2018/10/24	99	75 - 125	104	75 - 125	<0.0040	mg/kg	7.6	40	95	75 - 125
9196705	Total Barium (Ba)	2018/10/24	101	75 - 125	115	75 - 125	<0.010	mg/kg	NC	40		
9196705	Total Beryllium (Be)	2018/10/24	90	75 - 125	96	75 - 125	<0.0010	mg/kg	NC	40		
9196705	Total Bismuth (Bi)	2018/10/24					<0.0010	mg/kg	NC	40		
9196705	Total Boron (B)	2018/10/24					<0.20	mg/kg	NC	40		
9196705	Total Cadmium (Cd)	2018/10/24	89	75 - 125	99	75 - 125	<0.0010	mg/kg	NC	40	91	75 - 125
9196705	Total Calcium (Ca)	2018/10/24					<2.0	mg/kg	58	60		
9196705	Total Cesium (Cs)	2018/10/24					<0.0010	mg/kg	3.7	40		
9196705	Total Chromium (Cr)	2018/10/24	88	75 - 125	103	75 - 125	<0.010	mg/kg	35	40	83	75 - 125
9196705	Total Cobalt (Co)	2018/10/24	89	75 - 125	105	75 - 125	<0.0013	mg/kg	7.5	40	97	75 - 125
9196705	Total Copper (Cu)	2018/10/24	97	75 - 125	105	75 - 125	<0.010	mg/kg	13	40	89	75 - 125
9196705	Total Iron (Fe)	2018/10/24					<0.25	mg/kg	0.27	40	96	75 - 125
9196705	Total Lead (Pb)	2018/10/24	88	75 - 125	104	75 - 125	<0.0010	mg/kg	NC	40	60 (1)	75 - 125
9196705	Total Lithium (Li)	2018/10/24	93	75 - 125	103	75 - 125	<0.10	mg/kg	NC	40	90	75 - 125
9196705	Total Magnesium (Mg)	2018/10/24					<0.40	mg/kg	1.4	40		
9196705	Total Manganese (Mn)	2018/10/24	91	75 - 125	105	75 - 125	<0.010	mg/kg	2.6	40		
9196705	Total Mercury (Hg)	2018/10/24	NC	75 - 125	103	75 - 125	<0.0020	mg/kg	0.36	40	93	75 - 125
9196705	Total Molybdenum (Mo)	2018/10/24	93	75 - 125	101	75 - 125	<0.0040	mg/kg	NC	40	95	75 - 125
9196705	Total Nickel (Ni)	2018/10/24	87	75 - 125	106	75 - 125	<0.010	mg/kg	9.5	40	90	75 - 125
9196705	Total Phosphorus (P)	2018/10/24					<2.0	mg/kg	0.51	40	95	75 - 125
9196705	Total Potassium (K)	2018/10/24					<2.0	mg/kg	3.7	40		
9196705	Total Rubidium (Rb)	2018/10/24					<0.010	mg/kg	1.5	40		
9196705	Total Selenium (Se)	2018/10/24	95	75 - 125	103	75 - 125	<0.010	mg/kg	5.3	40	98	75 - 125
9196705	Total Silver (Ag)	2018/10/24	81	75 - 125	97	75 - 125	<0.0010	mg/kg	NC	40		
9196705	Total Sodium (Na)	2018/10/24					<2.0	mg/kg	3.9	40	94	75 - 125
9196705	Total Strontium (Sr)	2018/10/24	84	75 - 125	102	75 - 125	<0.010	mg/kg	85 (3)	60		
9196705	Total Sulphur (S)	2018/10/24					<50	mg/kg	1.7	40		
9196705	Total Tellurium (Te)	2018/10/24					<0.0040	mg/kg	NC	40		
9196705	Total Thallium (Tl)	2018/10/24	84	75 - 125	102	75 - 125	<0.00040	mg/kg	1.4	40		

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Maxxam Job #: B890906
Report Date: 2018/10/31

QUALITY ASSURANCE REPORT(CONT'D)

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9196705	Total Tin (Sn)	2018/10/24	90	75 - 125	99	75 - 125	<0.020	mg/kg	NC	40	124	75 - 125
9196705	Total Titanium (Ti)	2018/10/24	92	75 - 125	100	75 - 125	<0.020	mg/kg	7.3	40		
9196705	Total Uranium (U)	2018/10/24	91	75 - 125	103	75 - 125	<0.00040	mg/kg	NC	40	101	75 - 125
9196705	Total Vanadium (V)	2018/10/24	91	75 - 125	105	75 - 125	<0.020	mg/kg	NC	40		
9196705	Total Zinc (Zn)	2018/10/24	NC	75 - 125	123	75 - 125	0.103, RDL=0.040 (2)	mg/kg	5.6	40	95	75 - 125
9196705	Total Zirconium (Zr)	2018/10/24					<0.040	mg/kg	NC	40		
9198028	Total Mercury (Hg)	2018/10/30	NC	75 - 125	102	75 - 125	<0.0010	mg/kg	4.0	20	77	75 - 125

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Reference outside acceptance criteria due to digestion limitation. (10% of analytes failure allowed).

(2) Method Blank exceeds acceptance limits for Zn. Sample values for Zn are >10x the concentration of the method blank and the contamination is considered irrelevant.

(3) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

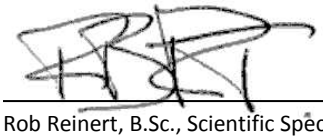
Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B890906
Report Date: 2018/10/31

DIAVIK DIAMOND MINES INC.
Your P.O. #: K73160

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Rob Reinert, B.Sc., Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam
A Bureau Veritas Group Company

Custody Tracking Form

878

W9417

Please use this form for custody tracking when submitting the work instructions via eTR (electronic Test Requisition).
Please ensure your form has a barcode or a Maxxam eTR confirmation number in the top right hand side. This number links your electronic submission to your samples.

First Sample: LKTR-9-4
Last Sample: OTOLITHS
Sample Count: 8

Relinquished By				Received By			
Atikin Hehn	Digitally signed by Atikin Hehn DN: cn=Atikin Hehn, o=Diavik Diamond Mines, ou, email=atikin.hehn@riotinto.com, c=CA Date: 2018.10.15 16:03:26 -06'00'	Date		RACHEL BERNARDI		Date	2018/10/16
		Time (24 HR)				Time (24 HR)	14:44
		Date		NIDA KAZMI	Didakazmi	Date	2018/10/17
		Time (24 HR)				Time (24 HR)	14:15
		Date				Date	
		Time (24 HR)				Time (24 HR)	

Submission Triage Information

Sampled By

# of Coolers/Pkgs: 2

Rush ☐ Immediate Test ☐ Food Residue ☐
Micro ☐ Food Chemistry ☐

*** LAB USE ONLY ***

Received At

Labeled By

Verified By

Comments:

B890906_COC

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)		1	2	3
Y	Y	Y	-4	-6	-3
Y	Y	Y	19	18	20
Y	Y	Y	-1	-1	1

1261

2018/2019

Company Name: Maxxam
Project Name: B883551
Client Contact: Veronica De Guzman
Email: vdeguzman@maxxam.ca
 # & Type of Structures: 9 OT
Work to be Completed:
Special Instructions: 2 OT for QAQC + 5 photos - marked
Invoice:

Location	Date	Structures (FR/OT/SC)	Species	Fish #	Age	Con. Index KA	QA/QC MB	Comments
UK3906		OT	LKTR	7	25	P		
UO2305		OT	LKTR	9	24	F		
UO2306		OT	LKTR	14	17	F		photo
UO2307		OT	LKTR	15	23	F	24	photo
UO2308		OT	LKTR	16	29	F		photo
		OT	LKTR	17	26	F	26	photo
UK3907		OT	LKTR	27	23	F		
UK3909		OT	LKTR	28	28	F		photo
UK3910		OT	LKTR	29	21	P		

Appendix 5 Camp Water Testing

- TK Water Quality Forms Completed (2018)
- TK Water Sampling Notes
- TK Water Tasting Notes
- Science Water Forms
- Scientific Water Testing Results - laboratory results

2018 AEMP at Diavik/Lac de Gras **TK of Water**

Date: 2018 – August - 4 Recorder: Zach

Location/Depth: Bay #2 Sample ID: 1 B 4 Metres Group/Person: YKDFN

Collection Features:		***(Circle what best describes the feature.)***		***Comments***
Temperature:	(Cold)	Average	Warm	
Depth:	Deep	Average	(Shallow)	
Clarity:	See bottom	Murky	Cannot see your hand in water	
Movement:	Still	~~Some~~	Running	
Colour:	Blue	(Green)	Yellow	Other

Other:

Taste Test:

Tea: (Good) Average Poor

Comments:

(Cold) Water: Good (Average) Poor Better taste than the first one

Comments: Clean almost taste like rain water

Boiled Water (Good) Average Poor Averagely - good.

Overall Description:

Why was this water testing location chosen? Okay location

How can you tell when water is healthy or unhealthy? averagily

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

Averagely happy

What can you teach us about water? The water would be a circle of life

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water. It will be okay

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running. both are related

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

Date: 2018 – August - 4 Recorder: Eric LKDFN 4m deep

Location/Depth: Bay#1 Sample ID: 1 - B Group/Person: #2

Collection Features: ***(Circle what best describes the feature.)*** ***Comments***

Temperature:	(Cold)	Average	Warm		chilly the ~~air~~
Depth:	Deep	Average	(Shallow)		6
Clarity:	See bottom	Murky	Cannot see your hand in water		Clear
Movement:	(Still)	(Some)	Running		still
Colour:	Blue	(Green)	Yellow	Other	Dark ~~[illegible]~~ green

Other: __________

Taste Test:

Tea: Good (Average) Both Poor ~~Its tastes better~~

Comments: Its to Plain but the water is healthy Both opinion

Cold Water: Good (Average) tommy ernest Poor Ernest: Its tastes better then

Comments: The fist sample, tommy: No different then ernest's

Warm water: Good (Average) tommy ernest Poor comments: still taste smoky

Overall Description: Nothing different.

Why was this water testing location chosen? __________

How can you tell when water is healthy or unhealthy? __________

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

Nothing different.

What can you teach us about water? when the small bug lands in your cup it's going to be calm

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

LKDFN

Date: 2018 – August - 4 Recorder: Eric

Location/Depth: Byth 1m deep Sample ID: 1-A Group/Person: Boat #2

9:15A.M 12W 0540956 7152335

Collection Features:	***(Circle what best describes the feature.)***			***Comments***
Temperature:	(Cold)	Average	Warm	
Depth:	Deep	Average	(Shallow)	
Clarity:	(See bottom)	Murky	Cannot see your hand in water	clear same see bottom
Movement:	Still	(Some)	Running	current from main lake
Colour:	Blue	(Green)	Yellow	Other
Other:				

Taste Test: Both

Tea: (Good) Average Poor Nice clean Tea

Comments: They both say the same about the tea its No20 (Good)

Both

Cold Water: (Good) Average Poor

Comments: Its clear, It taste good but a little swampy, Grassy.

Boiled water Both

warm water (Good) Average Poor

Overall Description: Comments: Its okay, but it tastes like smoke

Why was this water testing location chosen? At the bay because in the morning the water is fresh

How can you tell when water is healthy or unhealthy? Both say the water is healthy.

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

The water is happy if it could speak, because it's still fresh
happy happy, happy.

What can you teach us about water? Keep the water safe is good healthy

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

Date: 2018 – August - 4 Recorder: Natasha

Location/Depth: Bay - 4m Sample ID: #1 - B Group/Person: Richo

Collection Features:		***(Circle what best describes the feature.)***		***Comments***
Temperature:	Cold	Average	Warm	top of water is a bit warmer, bottom is cold
Depth:	Deep	Average	Shallow	4m.
Clarity:	See bottom	Murky	Cannot see your hand in water	clear
Movement:	Still	Some	Running	- more stable than 1m
Colour:	Blue	Green	Yellow Other	- dark green.
Other:				

Taste Test:

Tea: Good Average Poor Tea is tan, taste the same. No dings in the cup, the first one does, not this one.

Comments:

cold Water: Good Average Poor Similar to the last one (cold)

Comments: Clarity is like the cup.

boil water: good - Boil water taste good, same as last one.

Overall Description:

Why was this water testing location chosen?

How can you tell when water is healthy or unhealthy?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

The water would be happy, cause it looks healthy and clear.

What can you teach us about water? Clear clean water, you can live a healthy life.

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words? yes, gotta pay respect to the land/water.

Are you taking care of the Elders? yes

2018 AEMP at Diavik/Lac de Gras **TK of Water**

- current swirling
- wind churning water
- only BA as ...

Date: 2018 – August - 4

Recorder: Natasha

Location/Depth: #Bay - 1m

9:15 am 12w

Sample ID: #1 - A

0540956 7152335

Group/Person: #2 Tlicho

Collection Features: ***(Circle what best describes the feature.)*** ***Comments***

- fish are slow moving in bay
- fish move in cooler water

Temperature:	(Cold)	Average	Warm		- autumn weather, morning
Depth:	Deep	Average	(Shallow)		
Clarity:	See bottom	Murky	Cannot see your hand in water		clear.
Movement:	Still	(Some)	Running		ripple wind moving surface.
Colour:	Blue	(Green)	Yellow	Other	nice.

Other: little current at bottom coming from main water/ nice.

Taste Test:

Tea:	(Good)	Average	Poor	It's clear and taste good.

Comments: Similar to back home. Red Rose is good. Boil tea is the same.

Cold

Water:	(Good)	Average	Poor	It looks clear just

Comments: like the cup. Taste good.

Boil Water good - The cold/boil water tastes similar,

Overall Description:

Why was this water testing location chosen? ______

How can you tell when water is healthy or unhealthy? ______

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

_____

_____

_____

What can you teach us about water? _____

_____

_____

_____

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

Date: 2018 – August - 4 Recorder: Joanne

Location/Depth: #1 Sample ID: 1A Group/Person: Wayne

1RW 0540956 7152335

Collection Features:	***(Circle what best describes the feature.)***			***Comments***
Temperature:	(Cold)	Average	Warm	
Depth:	Deep	Average	(Shallow)	
Clarity:	(See bottom) clear	Murky	Cannot see your hand in water	clear
Movement:	(Still)	(Some)	Running	Nice
Colour:	Blue	(Green)	Yellow	Other ripple

Other: Currents swirling

Taste Test:

Tea: Good Average Poor Would not drink tea

Comments:

Cold Water: Good (Average) Poor clear, can't tell it from close to the land can taste vegetation

Comments: can tell it from close to the land can taste vegetation

Boiled water: Good Average Poor taste=metal, clear

Overall Description:

Why was this water testing location chosen?

How can you tell when water is healthy or unhealthy?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

_____

_____

_____

What can you teach us about water? _____

_____

_____

_____

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

Date: 2018 – August - 4 Recorder: Joanne

Location/Depth: 4 m Sample ID: 1B Group/Person: Joanne

12W 0540956 #7522835

Collection Features:	***(Circle what best describes the feature.)***			***Comments***
Temperature:	(Cold)	Average	Warm	surface is warmer
Depth:	Deep	Average	Shallow	
Clarity:	See bottom	Murky	Cannot see your hand in water	same - clear
Movement:	(Still)	Some	Running	
Colour:	Blue	(Green)	Yellow	Other

Other: _____

Taste Test:

Tea: (Good) Average Poor ~~better than it~~

Comments: _____

Cold Water: (Good) Average Poor Clear, bit better than it

Comments: _____

Boiled Water: Good Average Poor ~~better than it~~

Overall Description:

Why was this water testing location chosen? _____

How can you tell when water is healthy or unhealthy? _____

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

"If my uncle had tits he would be my Aunt"

What can you teach us about water? Still water is not healthy.
Running water is better

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

Date: 2018 – August - 4th

Recorder: Regan Adjun

Location/Depth: #1 – 1m

Sample ID: 1A

Group/Person: KIA

12W. 0540956 7152335

Collection Features:		***(Circle what best describes the feature.)***			***Comments***
Temperature:	(Colder)	Average	Warm		
Depth:	Deep	Average	(Shallow)		1m
Clarity:	See bottom	Murky	Cannot see your hand in water		clear
Movement:	Still	(Some)	Running		
Colour:	Blue	(Green)	Yellow	Other	

Other: See notes from Tlicho

Taste Test:

Tea: (Good) Average Poor

Comments: Nancy Good tea, Bobby very smooth. No scum good taste smoked tea Smoke taste, very No difference from the past sessions from here in Lac De Graw.

Cold Water: (Good) Average Poor

Comments: really good unfilterd water

Boiled Water: (Good) Average Poor tasted smoked water, taste smooth, No bitterness, good water

Overall Description:

Why was this water testing location chosen?

How can you tell when water is healthy or unhealthy?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

_____

_____

_____

What can you teach us about water? _____

_____

_____

_____

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

Date: 2018 – August - 4th

Recorder: Regan

Location/Depth: 4m
12w.0540956 .715235

Sample ID: 1B

Group/Person: KIA

Collection Features: ***(Circle what best describes the feature.)*** ***Comments***

Temperature:	Cold	Average	Warm		
Depth:	Deep	Average	Shallow		
Clarity:	See bottom	Murky	Cannot see your hand in water		
Movement:	Still	Some	Running		
Colour:	Blue	Green	Yellow	Other	

Other:

Taste Test:

Tea: (Good) Average Poor taste good.

Comments: very good, pure, Nancy very pure tea.

Cold Water: (Good) Average Poor

Comments: taste pure compared from 1m very good. Smoother water. No bitter taste.

Boiled Water: Good (Average) Poor ~~good~~ pure with smoke, ~~nancy~~ taste metal from pure, rot taste.

Overall Description:

Why was this water testing location chosen? Because it really didn't make a difference in the Bay or take current's intake

How can you tell when water is healthy or unhealthy? the colour of the lake, no difference from previous session's.

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why? no difference from three years ago. To much disturbance from the ~~[illegible]~~ human movement's, Help me a little keeping the quality of the water fresh and stay fresh.

What can you teach us about water? water is still good, no difference three years ago, because it's in a mine site emmision coming from the [illegible] mine, Put out alot of dust going into the air

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

UTMs 12W 0540956 7152335

2018 AEMP at Diavik/Lac de Gras **TK of Water**

Date: 2018 – August - 4 Recorder: Zach

Location/Depth: Bay #1 Sample ID: 1A Group/Person: YKDFN 09:15

Collection Features:	***(Circle what best describes the feature.)***			***Comments***
Temperature:	(Cold)	Average	Warm	
Depth:	Deep	Average	(Shallow)	
Clarity:	See bottom	Murky	Cannot see your hand in water	Clear-ish
Movement:	Still	(Some)	Running	
Colour:	Blue	(Green)	Yellow	Other
Other:				

Taste Test:

Tea: (Good) (Average) Poor Don't taste nothing but tea.

Comments: Tea tastes just right

Cold Water: Good (Average) Poor Swampy, grass taste

Comments:

Boiled Water: Good (Average) Poor taste like log, firewood water it's okay. make sure no smoke or it'll taste smokey

Overall Description:

Why was this water testing location chosen?

How can you tell when water is healthy or unhealthy?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

_____

_____

_____

What can you teach us about water? _____

_____

_____

_____

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

Date: 2018 – August - 4 Recorder: KATHY MAI

Location/Depth: NAUTOUS Sample ID: 2A - 2m Group/Person: Wayne NSMA

(Describes open water)

Collection Features:	***(Circle what best describes the feature.)***			***Comments***
Temperature:	(Cold)	Average	Warm	
Depth:	(Deep)	Average	Shallow	Deep at both ends
Clarity:	(See bottom)	Murky	Cannot see your hand in water	
Movement:	Still	(Some)	Running	
Colour:	Blue	Green	Yellow (Other)	BLACKISH / BLUE

Other: _____

Taste Test:

Tea: Good Average Poor Wayne did not participate

Comments: _____

Cold Water: (Good) Average Poor Clear

Comments: _____

Boiled water: Good Average Poor not as good as deeper sample - tastes like still water

Overall Description:

Why was this water testing location chosen? _____

How can you tell when water is healthy or unhealthy? _____

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

_____

_____

_____

What can you teach us about water? _____

_____

_____

_____

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

Will finish in camp.

Date: 2018 – August - 4 Recorder: KATHY MAT

Location/Depth: Narrows - Sample ID: 2B - 20m Group/Person: Wayne NSMA

Collection Features:		***(Circle what best describes the feature.)***		***Comments***
Temperature:	Cold	Average	Warm	
Depth:	Deep	Average	Shallow	
Clarity:	See bottom	Murky	Cannot see your hand in water	
Movement:	Still	Some	Running	
Colour:	Blue	Green	Yellow	Other

Other:

Taste Test:

Tea: Good Average Poor Wayne did not participate

Comments:

Cold Water: ~~Good~~ Average Poor clear same.

Comments:

Boiled Water: Good Average Poor clear

Overall Description:

Why was this water testing location chosen?

How can you tell when water is healthy or unhealthy?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

_____

_____

_____

What can you teach us about water? _____

_____

_____

_____

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

Date: 2018 – August - 4 Recorder: ____________

Location/Depth: #2 Sample ID: 2A Group/Person: KIA - Bobby Nancy

Collection Features: ***(Circle what best describes the feature.)*** ***Comments***

Temperature:	Cold	Average	Warm		
Depth:	Deep	Average	Shallow		
Clarity:	See bottom	Murky	Cannot see your hand in water		
Movement:	Still	Some	Running		
Colour:	Blue	Green	Yellow	Other	

Other: ____________

Boiled Water: (Good) Average Poor — good water, big difference, [illegible] / Smoky taste for Nancy, Not bitter, No scum at bottom [illegible]

Comments: really good, didn't taste as [illegible] (Nancy) / taste [illegible] / taste [illegible] from pot's stainless steel, Aluminum

Taste Test:

Tea: Good (Average) Poor

Comments: Nice gold colour. good tea. two bug's spotted. very good taste metal from the pot

Water: (Good) Average Poor — No Bitter taste. Bobby. very good / taste [illegible] good [illegible]

Comments: testing, very good, clear water, fresher taste than this a.m. Good water

Cold water: (Good) x2 Average Poor : No Bitter taste. it's very good water (Bobby) It's about the same taste from this morning (Nancy)

comment's: Good water for Bobby

Overall Description:

Why was this water testing location chosen? ____________

How can you tell when water is healthy or unhealthy? ____________

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

_____

_____

_____

What can you teach us about water? _____

_____

_____

_____

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

Date: 2018 – August - 4 Recorder: _____

Location/Depth: #2 Sample ID: 2B Group/Person: KIA - Bobby Nancy

Collection Features:		***(Circle what best describes the feature.)***		***Comments***
Temperature:	Cold	Average	Warm	
Depth:	Deep	Average	Shallow	
Clarity:	See bottom	Murky	Cannot see your hand in water	
Movement:	Still	Some	Running	
Colour:	Blue	Green	Yellow	Other

Other: _____

Boiled water Good Average Poor

Comment's: Nice golden colour, No scum, Very good

Taste Test:

Tea: Good Average Poor

Comments: _____

Water: Good Average Poor

Comments: _____

Cold water Good Average Poor

Comment's: _____

Overall Description:

Why was this water testing location chosen? _____

How can you tell when water is healthy or unhealthy? _____

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

_____

_____

_____

What can you teach us about water? _____

_____

_____

_____

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

Date: 2018 – August - 4 Recorder: Eric

Location/Depth: Narrows Sample ID: 2A - 2m Group/Person: LKDFN

Collection Features:		***(Circle what best describes the feature.)***		***Comments***
Temperature:	Cold	(Average)	Warm	When yavr hot your hot when your Nother No #
Depth:	(Deep)	Average	Shallow	
Clarity:	(See bottom)	Murky	Cannot see your hand in water	
Movement:	Still	Some	(Running)	
Colour:	Blue	(Green)	Yellow	Other
Other:				

Taste Test:

Tea: EB. Terry (Good) (Average) Poor EB Lazo duwe

Comments: Terry; very good also test so good

Water: Terry EB (Good) (Average) Poor Terry very Fresh

Comments: Tastes the same as 1A.

warm water: Good (Average) Both Poor Average Joe blow

Overall Description:

Why was this water testing location chosen?

How can you tell when water is healthy or unhealthy?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

_____

_____

_____

What can you teach us about water? _____

_____

_____

_____

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

Date: 2018 – August - 4 Recorder: Eric M

Location/Depth: Narrows Sample ID: 2B - 20m Group/Person: LKDFN

Collection Features:	***(Circle what best describes the feature.)***			***Comments***
Temperature:	Cold	(Average)	Warm	
Depth:	Deep	(Average)	Shallow	
(Clarity:)	(See bottom)	Murky	Cannot see your hand in water	
(Movement:)	Still	(Some)	Running	
Colour:	(Blue)	Green	Yellow	Other: Dark Blue

Other: Winded out on the lake

Taste Test: EB, Terry

Tea: (Good) Average Poor It's so good.

Comments: EB Nezodwe

Water: Terry, EB (Good) Average Poor Terry: About the same. Clear

Comments: EB very Good. Same as above

Cold Warm water (Good) EB Terry Average Poor - taste Like smoke

Overall Description: EB Flavor in there

Why was this water testing location chosen?

How can you tell when water is healthy or unhealthy?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

_____

_____

_____

What can you teach us about water? _____

_____

_____

_____

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

Date: 2018 – August - 4 Recorder: Zach

Location/Depth: _____ Sample ID: 2A 2M Group/Person: YKDFN

Collection Features:		***(Circle what best describes the feature.)***		***Comments***
Temperature:	Cold	(Average)	Warm	_____
Depth:	(Deep)	Average	Shallow	_____
Clarity:	(See bottom)	Murky	Cannot see your hand in water	_____
Movement:	Still	Some	Running	_____
Colour:	Blue	(Green)	Yellow Other	_____

Other: _____

Taste Test:

Tea: (Good) Average Poor _____

Comments: _____

Cold Water: (Good) Average Poor _____

Comments: _____

Boiled Good (Average) poor Taste like Smoke

Overall Description:

Why was this water testing location chosen? _____

How can you tell when water is healthy or unhealthy? _____

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

_____

_____

_____

What can you teach us about water? _____

_____

_____

_____

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

Date: 2018 – August - 04 Recorder: Zach

Location/Depth: _____ Sample ID: ZB 20 M Group/Person: YKDFN

Collection Features:		***(Circle what best describes the feature.)***		***Comments***
Temperature:	Cold	Average	Warm	_____
Depth:	Deep	Average	Shallow	_____
Clarity:	See bottom	Murky	Cannot see your hand in water	_____
Movement:	Still	Some	Running	_____
Colour:	Blue	Green	Yellow Other	_____

Other: _____

Taste Test:

Tea: (Good) Average Poor Taste like orange peacoke

Comments: _____

Cold Water: (Good) Average Poor _____

Comments: _____

boiled water: Good (Average) Poor _____

Overall Description:

Why was this water testing location chosen? _____

How can you tell when water is healthy or unhealthy? _____

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

_____

_____

_____

What can you teach us about water? _____

_____

_____

_____

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

Date: 2018 – August - 4 Recorder: Mason

Location/Depth: 2m Sample ID: 2A Group/Person: Tlicho

Collection Features:		***(Circle what best describes the feature.)***		***Comments***
Temperature:	Cold	Average	Warm	
Depth:	Deep	Average	Shallow	
Clarity:	See bottom	Murky	Cannot see your hand in water	
Movement:	Still	Some	Running	
Colour:	Blue	Green	Yellow	Other

Other:

Taste Test:

Tea: (Good) Average Poor No difference to the ones before.

Comments:

Cold Water: (Good) Average Poor The water taste good, and looks clear. Taste like back home water.

Comments:

boil water: Good - Similar, but you can taste a little smoke

Overall Description:

Why was this water testing location chosen?

How can you tell when water is healthy or unhealthy?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

_____

_____

_____

What can you teach us about water? _____

_____

_____

_____

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

2018 AEMP at Diavik/Lac de Gras **TK of Water**

Date: 2018 – August - 4 Recorder: Mason

Location/Depth: 20 m Sample ID: 23 Group/Person: Tlicho

Collection Features:		***(Circle what best describes the feature.)***			***Comments***
Temperature:	Cold	Average	Warm		
Depth:	Deep	Average	Shallow		
Clarity:	See bottom	Murky	Cannot see your hand in water		
Movement:	Still	Some	Running		
Colour:	Blue	Green	Yellow	Other	

Other: _____

Taste Test:

Tea: (Good) Average Poor Tea taste good, whoever collected the water must be lucky

Comments: _____

Cold Water: (Good) Average Poor Similar to the first cup.

Comments: _____

boil water: Good: Taste similar to the cold water.

Overall Description:

Why was this water testing location chosen? _____

How can you tell when water is healthy or unhealthy? _____

2018 AEMP at Diavik/Lac de Gras **TK of Water**

If water had words, what would it say about how it is doing? It is happy? Hurting? Why?

_____

_____

_____

What can you teach us about water? _____

_____

_____

_____

Notes:

Guiding principle: Water is alive. It can hear what we are saying about it. We need to be respectful of the water. We should avoid talking too much about water.

Water Movement: Movement of the water may be related to the weather, so we need to check beneath the surface to determine if the water is really running.

Remember Camp Protocols:

When going out in the boat, did you give tobacco, pay the water, feed the land or say some words?

Are you taking care of the Elders?

Water Testing (BA, JS, NK, JW)
August 4, 2018 at TK2, 4:30 pm – 5 pm

Why did you choose this location?

NK: Because it is closer to the mines.

BA: We are also closer to the Narrows and the river and where we can't to be collecting the samples for the last few sessions. We're finally here getting a sample close to the Narrows.

What is it you are thinking about in this area?

BA: We are down river from the next lake at Lac du Sauvage. We are trying to be as close to the river coming from Lac du Sauvage.

JS: People need to know if the water is healthy. If it is not, they need to know what is causing it.

This first sample is at 2 m.

JS: That's where the birds would be feeding, the loons, all that underwater. They dive underwater in that are with little fish in their mouths. Looning! Seagulls too.

BA: The seagulls dive bomb too. In the rivers. They can go 2–4 feet deep.

JW: Not too sure about why. Happy to let others decide.

Temperature?

BA: The top is always a little warmer than the bottom. If you want to test the top it is a little warmer. Sun warms the water, chemicals react in the heat.

JS: Average. In August it will be cold, in July it would be warm.

BA: Average

Depth: Average depth (23 m) for most big lakes. This sample is shallow.

Clarity?

NK: It looks clear. I tested the water using the science equipment last time. I filled the bottles for testing. We were out for nine hours.

BA: Clear

JS: Clear

Movement?

JS: Depends on the wind. Right now it is windy. Some movement at 2 m.

BA/NK: Some waves can be very large and large movement up to about 2 m depth. Right now I don't think it is too windy. Some movement.

JW: Maybe a depth of 6 m, the water won't be moving as much as top. It might be good. We'll check and see.

Colour?

BA: Blueish green.

NK: I just saw the water come out pure and white. Green. Clear.

JS: Blueish green. Looks green and blue. Nice colour.

EB: Eric recording Ernest and Terri

How do you know it is healthy?

JS: When it is blue. This colour. Blue and dark.

BA: It is not murky, clear. Always been really clear and it not murky, no sediments floating around in the water. Whereas some lakes you could see lots of sediment, mud and sediments.

JW: The water from here looks clear. She doesn't know the depth of 2 m, how they would collect water. Wait and see. [Peter shows her the hydrolab and how it collects water] I am amazed at how they do the water collection.

The second sample is at 20 m where the fish are feeding.

JS: The fish feed from the bottom, this is feeding area, close to the bottom. The deeper it is, the fish are darker. It is lighter up at the surface so the fish are lighter. Deeper areas there are darker fish. Inland lake, more like yellow. You see that, that's what the elders say. Inland lake, fish is more soft than the big lake. They are nice. Cold water lakes, good fish. Up near the surface they are lighter and softer fish.

BA: Very cold. Colder than the top where fish can go during the day. Sun's rays are not less intense. When you catch a fish, it dives deeper underwater because it has more strength. Just like us, when we are too hot, we tend to be weaker than when we are just the right temperature.

Clarity?

BA: All still, clear.

NK: Expect it to be clear. Three years ago when we went to the deep area, we tried from the bottom, you can still taste the sand. It was too near the bottom.

JS: Depends on the wind. Could be a bit murky down there when water not moving.

Movement?

BA: Some movement due to currents in a large lake.

NK: I don't think too much movement because the water is so heavy. It is going to be still. The only time there is movement on the top because of the wind because the water is so heavy.

END

AEMP Water Tasting Notes

Water Tasting
Dec 4, 2018

NT – We had Bobby on the boat sharing his knowledge on the boat and we had the youth asking bobby questions – why he chose that place to sample the water and trying to capture his TK of water. What we'll do now is try 3 different samples. One from 1 m below the surface and then 3 samples from 4 m below. Where we tested was 6 m deep. First site is tea, boiled water and cold water (1A) and then as soon as we finish those 3, we'll do 1B. We'll do 6 samples total for tasting this time. And youth will ask the elders what they think of the water. And if Elders can take a minute to talk about what they're tasting the youth will record their knowledge. Feel free to ask questions that you're curious about and encourage the elders to share what they're noticing and tasting in the water. Any questions or comments? (no)

CE- Water comes straight out of Lac de Gras. It is not filtered. The mine puts its treated water back in the lake so not everybody might be comfortable with tasting it.

Samples from TK1

1A - Cold

WL: Fishy taste because we dumped all the fish guts in there.

DE: It's swampy.

EB: Too close to the shore. That's why it is swampy.

JS: Too close to the land. You could taste it. Grass tasting.

JW: Looks clear, good. Taste is good.

1A – Boiled

JS: Tastes like smoke.

WL: Tastes like aluminum pot. The warm one.

DE: The boiled one is smoother than the cold one. Tastes easier to drink.

EB: Cold water is not as good as Great Slave Water but after you boiled it, it tastes like the smoke. The weather, right across there is the dyke close to us. We'll find out by tea because a few years back we had boiled tea, we could tell the mark on it. It means the air that goes up has to go down. We don't see that anymore. That dust from the tracks. Yesterday was blown, so I went west still going the other way. North now.

JS: The cold one you taste is a little grassy. Inland lake water. When you take Great Slave water, it tastes different. When you go on the big lake, it is good water. Inland lakes taste too grassy. My uncle tells about big lakes, drinks good tea. Otherwise, smell that grassy.

1A – Tea

Little flies, flying around means it is going to calm down. One of them went into the tea. In Chip, it is called da- daa.

DE: No ring around it. The tea taste good. We could tell because it is red (like red rose tea). Clear, clean.

EB: Nice and clean tea. Nason due! Means very good.

JS: This is the best tea! Wayne should try some! Not too strong, just right tea. Perfect!

JW: What are you looking for in good tea? It is clear, taste is good. Is it similar to the tea she would have back home? It is similar. Red rose tastes good.

1B Tasting

1B – Cold

EB: Average taste. Tastes the same as the one from 1 m. For me, this tastes a little better because I have a bad cold. Right now, blowing so hard. Cold out here. To me, the water is really cold out here. When I go home, it will be lots of rain and the water will be different again.

JW: Tastes similar. Looks good. Similar to the last one.

JS: It's good. Average. You don't taste anything in it. Taste like rain water a bit. Lots of rain this summer. Clean. Smooth-like. You could tell the difference form the last one at 1 m.

BA: Tastes really good. Tastes about the same from the 1 m. Since it is cold water, straight from the water, it has not been put in a kettle you don't taste the metal from the kettle.

NA: First old water, I could taste the smell of air. The down below, I can taste pure water.

From my tea, the first boiled tea you can taste the fire, same with the boiled water.

Boiled tea from inside the cabin, you could taste the metal. It is so pure you can taste the metal from the pot. The water from 4 m, you can taste pure water. The difference is what you use to boil it. The water is so pure, you can taste the pot. We don't see any ring or scum in the kettle.

1B – Boiled

BA: Tastes somehow like metal in the teapot. Just like Nancy says. Very good water. No bitter taste. Didn't put a ring around a cup.

JS: Cold water average, but this one is good boiled. When you boil it, you take the taste out of it. Doesn't matter what you are cooking.

1B – Tea

NA: Nice gold colour, nicely steeped. This is pure tea. No rings.

BA: Very smooth. Very good taste. Pure. Healthy. This one, I didn't taste the pot in this one.

JS: No smoke taste. This one was cooked inside that is why. You can really tell the difference.

DE: Too plain for me because when it takes smoky tastes way better for us. For me, the water is healthy, no marks when you see the water in your cup. Clear, clean.

EB: Perfect. Clear.

JW: No ring inside this cup. No soot, looks clean.

Is there any difference from 2012 or 2015?

BA: I don't notice anything.

I don't notice a difference from 2012. FS saw that the tea marked the cup when he drank it. This year there is nothing.

If the water had words, what would it say?

DE: For me, I think the water is happy because it is still fresh. The water is still fresh. It has not been destroyed by anything, even though the mine is here. I feel like the water is fresh. If I was coming every year, it might be a different answer maybe.

EB: I think it is pretty happy. Even tea on the fire, then they taste like smoke. Average. The water from the cabin inside, tastes different again. No smoke. Still the same, just taste different.

JW: The water is fresh and healthy. It would say.

What can you teach about the water?

DE: Keep our water healthy! Have respect for your water. If you travel to difference areas, make sure you pay your water so it will have respect for you.

EB: I been drinking water all my life. It is healthy. We live on water. The main part. It's important to have clean water. An important thing.

WL: Still water is not great, running water is better. Running out in the open. Not safe to go out in the water with 8 ft waves!

JW: Strong will to live, healthy water.

Samples from TK2

2A- Cold

JW – Good water. The taste of the water is good and clear. Clear as glass. Similar to what she drinks at home, at Behchokǫ̀.

BA – No bitter taste. Good water. Very good.

NK - This is even taste greater than this morning. Very good water. Its colder and it tastes more like yummy from the deeper water. Very good. Clearer water than this morning.

DE – Water is clear. Good. Very fresh. This morning was rough. This evening is very good. Deeper water. I think it was because it was form deeper water.

EB – Average. Good. Same.

JS – Very nice water. Very fresh. This morning was grassy, this was nice cold and smooth. Just like fresh water.

2B – Cold

JW – Tastes similar to what I just drank. Good water. Good and clear.

EB – Deepest is really good. Very good. The upper one tastes like heat.

DE – It is about the same for me as the one I tasted from 2 m. Clearer.

NK – Same as the one we had before.

BA – Same. Very good water.

Average. You couldn't tell the difference. Didn't taste any grass. Clear.

2B – boiled

NK – You can taste the carbon when it is boiled. Hot water. Really good.

BA – Very good. Difference from this morning. Came from stainless steel versus aluminum, you can taste the aluminum this morning. Didn't taste the pot so much.

JW – Similar to the cold one. Good.

JS – It is good.

EB – Good.

DE – Tastes way better than this morning. Tasted too swampy this morning. At home, water tastes the same for me. As long as it is from out deep. From the river, drinking water.

2A – boiled on fire

BA – Tasted the fire right away. Tasted different form the stainless steel. Very good.

NK – Average because of the smoke

JW – Similar. Makes no difference.

JS – Good but smoky. Average.

DE – Good but tastes like smoke.

2B – Tea on stove

EB – Very good. I need sugar. Going to boil it and put it in my thermos tomorrow.

DE – Nice and clear. Good.

JS – Very good. Little bit of sugar and it will taste good.

JW – The tea tastes very good. Whoever fetched the water must be lucky because it tastes very good.

NK – None.

BA – Still very good.

2A – Tea on Fire

BA – Found a bug floating. Lots of little flies.

JS – Good good good.

EB – Tastes better than deep tea.

DE – Me too. Tastes better than the first tea.

JW – No difference to the ones before.

JK – Happy it tastes the same as three years ago.

BA - No difference.

END

RioTinto

AQUATIC EFFECTS FIELD SHEET

		No:	ENVI-133-0112
Area:	8000	**Revision:**	05
Effective Date:	2 August 2018	**By:**	Colleen English
Task:	AQUATIC EFFECTS MONITORING – TK Camp		
		Page:	1 of 3

Page 3 Revision Tracking Only not for Print

GENERAL

LOCATION NAME: 1 **DATE (yyyy-mm-dd):** 18/08/04 **TIME (24:00):** 10:07

SAMPLED BY: KG **TYPE OF SAMPLE:** (water) biota sediment

GPS COORDINATES (UTM 12W): 0540963 E 7152329 N

DESCRIPTION: TK Camp

CLIMATE CONDITIONS

Air Temp: 9 °C **Wind Direction:** NE **Wind Speed (knots):** 8

Precipitation: rain / mist / snow / (n/a)

Cloud Cover: 0%, 10%, 25%, 50%, (75%), 100% **Wave Height:** ripples cm (required for lakes)

FIELD EQUIPMENT & RESULTS

~~QA/QC:~~ —

DSSPro Handheld #: 16F102053 **DSSPro Probe #:** 16F101417

Calibrated: (YES) NO **Date of Last Calibration:** ~~July~~ Aug-2-2018

Sample ID	Depth (m)	pH (pH units)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	Conductivity (µs/cm)	Sample ID	Depth (m)	pH (pH units)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	Conductivity (µs/cm)
1	3.2	6.70	11.1	0.9	11.06	34.3	11						
2	3.0	7.12	11.1	0.8	11.07	34.3	12						
3	2.0	7.19	11.1	0.8	11.08	34.3	13						
4	1.0	7.22	11.1	0.8	11.08	34.3	14						
5	0.5	7.24	11.1	0.9	11.09	34.3	15						
6							16						
7							17						
8							18						
9							19						
10							20						

File name on DSSPro: TK-1 **Total Depth of Water:** 3.4 m

Secchi Depth: **Depth Disappear** _____ m **Depth Reappear:** _____ m **Average:** _____ m

Additional Information (e.g. equipment issues, safety concerns, weather problems, changes during sampling event, follow-up actions required, etc.)

Dropped totally mercury cap, tripled rinse cap.
dropped lid for Diss. ammonia 3x rinsed.

RioTinto

AQUATIC EFFECTS FIELD SHEET

		No:	ENVI-133-0112
Area:	8000	**Revision:**	05
Effective Date:	2 August 2018	**By:**	Colleen English
Task:	AQUATIC EFFECTS MONITORING – TK Camp		
		Page:	2 of 3

Page 3 Revision Tracking Only not for Print

BETA BOTTLE – WATER QUALITY

Sample ID	T	M	B	QAQC
Sample Type	GW			
Sample Depth (m)	2			
T.Metals (Unpreserved)	✓			
D.Metals (Unpreserved)	✓			
T.Mercury (Pre-preserved)	✓			
D.Mercury (Unpreserved)	✓			
T.Nutrients (Pre-preserved)	✓			
D.Nutrients[2] (Unpreserved)	✓			
T.Ammonia (Pre-preserved/Parafilmed)	✓			
D.Ammonia[3] (Unfiltered)	✓			
Routine (Unpreserved)	✓			
TSS, Turb, pH (Unpreserved)	✓			

– no depth –

DEPTH INTEGRATED – EUTROPHICATION INDICATORS

Sample ID	-4	-5	QAQC
Sample Type			
Sample Depth (m)	10	10	10
Number of Tows in Composite	12	12	12
T.Nutrients (Pre-preserved)	✓	✓	✓
D.Nutrients[2] (Unpreserved)	✓	✓	✓
T.Ammonia (Pre-preserved/Parafilmed)	✓	✓	✓
D.Ammonia[3] (Unfiltered)	✓	✓	✓

EKMAN

BENTHIC INVERTIBRATES		SEDIMENT PROPERTIES min 800 mL		
Sample ID	N/A	Sample ID	-4	-5
Sample Depth (m)		Sample Depth (m)		
Number of Grabs in Bucket Composite	6	Number of Grabs in Bucket Composite	3	3
Benthic Invertebrates (Sieved; 10% Buff Formalin 1:1)	✓	Sediment Bag x2 (Composite split into 2 bags)	✓	✓
Sediment Description (i.e. colour, odour, texture, debris)				

KB CORER – SEDIMENT QUALITY

min 100 mL

Sample ID	-4	-5
Sample Depth (m)		
Number of Cores in Composite	Min 3	Min 3
Length of Cores (cm)	1 2 3	1 2 3
All Cores Photographed	✓ ✓ ✓	✓ ✓ ✓
Sediment Core Bag	✓	✓

Notes:
1. No water samples are filtered in the field
2. D.Nutrients are filtered in the lab and pre-preserved
3. D.Ammonia are filtered in the lab, pre-preserved, and parafilmed

RioTinto

AQUATIC EFFECTS FIELD SHEET

		No:	ENVI-133-0112
Area:	8000	**Revision:**	05
Effective Date:	2 August 2018	**By:**	Colleen English
Task:	AQUATIC EFFECTS MONITORING – TK Camp		
		Page:	1 of 3

Page 3 Revision Tracking Only not for Print

GENERAL

LOCATION NAME: 2 **DATE (yyyy-mm-dd):** 2018/08/04 **TIME (24:00):** 10:50

SAMPLED BY: RA, KG, **TYPE OF SAMPLE:** (water) biota sediment

GPS COORDINATES (UTM 12W): 054087 E 7152307 N

DESCRIPTION: TK camp

CLIMATE CONDITIONS

Air Temp: 11 °C **Wind Direction:** West **Wind Speed (knots):** ~~3~~ 8

Precipitation: rain / mist / snow (n/a)

Cloud Cover: 0%, (10%), 25%, 50%, 75%, 100% **Wave Height:** 01 cm (required for lakes)

FIELD EQUIPMENT & RESULTS

~~QA/QC:~~

DSSPro Handheld #: 16F102053 **DSSPro Probe #:** 16F101417

Calibrated: (YES) NO **Date of Last Calibration:** Aug 2 2018

Sample ID	Depth (m)	pH (pH units)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	Conductivity (µs/cm)	Sample ID	Depth (m)	pH (pH units)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	Conductivity (µs/cm)
1	22	8.63	6.8	-0.3	12.31	34	11	2	7.46	10.7	-0.5	11.64	335
2	20	7.82	6.8	-0.2	12.29	34	12						
3	18	7.58	6.8	-0.2	12.31	34	13						
4	16	7.46	7.0	-0.3	12.34	34	14						
5	14	7.34	7.5	-0.2	12.26	33.8	15						
6	12	7.25	8.6	-0.2	12.03	33.7	16						
7	10	7.27	9.7	-0.4	11.79	33.4	17						
8	8	7.35	10	-0.4	11.73	33.4	18						
9	6	7.42	10.1	-0.4	11.71	33.3	19						
10	4	7.46	10.3	-0.4	11.74	33.5	20						

File name on DSSPro: TK two **Total Depth of Water:** 24 m

~~**Secchi Depth:** **Depth Disappear** ____ m **Depth Reappear:** ____ m **Average:** ____ m~~

Additional Information (e.g. equipment issues, safety concerns, weather problems, changes during sampling event, follow-up actions required, etc.)

Turb meter reading negative numbers

RioTinto

AQUATIC EFFECTS FIELD SHEET

		No:	ENVI-133-0112
Area:	8000	**Revision:**	05
Effective Date:	2 August 2018	**By:**	Colleen English
Task:	AQUATIC EFFECTS MONITORING – TK Camp		
		Page:	2 of 3

Page 3 Revision Tracking Only not for Print

BETA BOTTLE – WATER QUALITY

Sample ID	T	M	B	QAQC
Sample Type			GW	
Sample Depth (m)			20	
T.Metals (Unpreserved)			✓	
D.Metals (Unpreserved)			✓	
T.Mercury (Pre-preserved)			✓	
D.Mercury (Unpreserved)			✓	
T.Nutrients (Pre-preserved)			✓	
D.Nutrients[2] (Unpreserved)			✓	
T.Ammonia (Pre-preserved/Parafilmed)			✓	
D.Ammonia[3] (Unfiltered)			✓	
Routine (Unpreserved)			✓	
TSS, Turb, pH (Unpreserved)			✓	

DEPTH INTEGRATED – EUTROPHICATION INDICATORS

Sample ID	-4	-5	QAQC
Sample Type			
Sample Depth (m)	10	10	10
Number of Tows in Composite	12	12	12
T.Nutrients (Pre-preserved)	✓	✓	✓
D.Nutrients[2] (Unpreserved)	✓	✓	✓
T.Ammonia (Pre-preserved/Parafilmed)	✓	✓	✓
D.Ammonia[3] (Unfiltered)	✓	✓	✓

EKMAN

BENTHIC INVERTIBRATES		SEDIMENT PROPERTIES min 800 mL		
Sample ID	N/A	Sample ID		
Sample Depth (m)		Sample Depth (m)		
Number of Grabs in Bucket Composite	6	Number of Grabs in Bucket Composite	3	
Benthic Invertebrates (Sieved; 10% Buff Formalin 1:1)		Sediment Bag x2 (Composite split into 2 bags)		
Sediment Description (i.e. colour, odour, texture, debris)				

KB CORER – SEDIMENT QUALITY

min 100 mL

Sample ID		
Sample Depth (m)		
Number of Cores in Composite	Min 3	Min 3
Length of Cores (cm)		
All Cores Photographed		
Sediment Core Bag		

Notes:
1. No water samples are filtered in the field
2. D.Nutrients are filtered in the lab and pre-preserved
3. D.Ammonia are filtered in the lab, pre-preserved, and parafilmed

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your P.O. #: K73160
Your Project #: AEMP
Site Location: Open Water AEMP
Your C.O.C. #: 7762

Attention: DDMI Environment

DIAVIK DIAMOND MINES INC.
P.O. BOX 2498
300-5201 - 50th AVE.
YELLOWKNIFE, NT
CANADA X1A 2P8

Report Date: 2018/08/17
Report #: R2605752
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B866189
Received: 2018/08/08, 09:39

Sample Matrix: Grab Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Acidity pH 4.5 & pH 8.3 (as CaCO3)	2	N/A	2018/08/10	BBY6SOP-00037	SM 22 2310 B m
Alkalinity - Low Level	2	N/A	2018/08/10	BBY6SOP-00026	SM 22 2320 B m
Chloride - Low Level	2	N/A	2018/08/09	BBY6SOP-00011	SM 22 4500-Cl- E m
Conductance - Low Level	2	N/A	2018/08/10	BBY6SOP-00026	SM 22 2510 B m
Fluoride - Low Level	2	N/A	2018/08/11	BBY6SOP-00048	SM 22 4500-F C m
Hardness Total (calculated as CaCO3) (2)	2	N/A	2018/08/13	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3)	2	N/A	2018/08/13	BBY WI-00033	Auto Calc
Mercury (Dissolved) by CVAF	2	N/A	2018/08/09	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Total) by CVAF	2	2018/08/09	2018/08/09	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	2	N/A	2018/08/13	BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (dissolved)	2	N/A	2018/08/10	BBY7SOP-00002	EPA 6020b R2 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	2	N/A	2018/08/13	BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (total)	2	N/A	2018/08/10	BBY7SOP-00002	EPA 6020b R2 m
Nitrogen (Tot. Diss) - FF/FP	2	N/A	2018/08/16	BBY6SOP-00016	SM 22 4500-N C m
Nitrogen (Total)	2	N/A	2018/08/10	BBY6SOP-00016	SM 22 4500-N C m
Ammonia-N Dissolved, Low Level (UF/UP)	2	2018/08/13	2018/08/13	BBY6SOP-00009	EPA 350.1 m
Ammonia-N Low Level (Preserved)	2	N/A	2018/08/13	BBY6SOP-00009	EPA 350.1 m
Nitrate+Nitrite (N) (low level)	2	N/A	2018/08/09	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) (low level)	2	N/A	2018/08/09	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N) Low Level Calc	2	N/A	2018/08/09	BBY WI-00033	Auto Calc
Filter and HNO3 Preserve for Metals	2	N/A	2018/08/09	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (3)	2	N/A	2018/08/14	BBY6SOP-00026	SM 22 4500-H+ B m
Orthophosphate by Konelab (low level)	2	N/A	2018/08/09	BBY6SOP-00013	SM 22 4500-P E m
Sulphate - Low Level	2	N/A	2018/08/09	BBY6SOP-00017	SM 22 4500-SO42- E m
Total Dissolved Solids (Calculated)	2	N/A	2018/08/14	BBY WI-00033	Calculated Parameter
Total Dissolved Solids (Filt. Residue)	1	2018/08/09	2018/08/10	BBY6SOP-00033	SM 22 2540 C m
Total Dissolved Solids (Filt. Residue)	1	2018/08/10	2018/08/11	BBY6SOP-00033	SM 22 2540 C m
TKN (Calc. TN, N/N) dissolved	2	N/A	2018/08/10	BBY WI-00033	Auto Calc
TKN (Calc. TN, N/N) total	2	N/A	2018/08/10	BBY WI-00033	Auto Calc

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your P.O. #: K73160
Your Project #: AEMP
Site Location: Open Water AEMP
Your C.O.C. #: 7762

Attention: DDMI Environment

DIAVIK DIAMOND MINES INC.
P.O. BOX 2498
300-5201 - 50th AVE.
YELLOWKNIFE, NT
CANADA X1A 2P8

Report Date: 2018/08/17
Report #: R2605752
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B866189
Received: 2018/08/08, 09:39

Sample Matrix: Grab Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Phosphorus-P (LL Tot, dissolved) - FF/FP	2	2018/08/10	2018/08/10	BBY6SOP-00013	SM 22 4500-P E m
Total Phosphorus - Low Level	2	2018/08/10	2018/08/10	BBY6SOP-00013	SM 22 4500-P E m
Total Suspended Solids	2	2018/08/09	2018/08/10	BBY6SOP-00034	SM 22 2540 D
Turbidity	2	N/A	2018/08/08	BBY6SOP-00027	SM 22 2130 B m
TOC Subcontract - LowLevel (1)	2	N/A	2018/08/17		

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Maxxam Ontario (From Burnaby)
(2) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).
(3) The BC-MOE and APHA Standard Method require pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the BC-MOE/APHA Standard Method holding time.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your P.O. #: K73160
Your Project #: AEMP
Site Location: Open Water AEMP
Your C.O.C. #: 7762

Attention: DDMI Environment

DIAVIK DIAMOND MINES INC.
P.O. BOX 2498
300-5201 - 50th AVE.
YELLOWKNIFE, NT
CANADA X1A 2P8

Report Date: 2018/08/17
Report #: R2605752
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B866189
Received: 2018/08/08, 09:39

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Veronica De Guzman, B.Sc., Project Manager
Email: VDeGuzman@maxxam.ca
Phone# (604) 734 7276

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B866189
Report Date: 2018/08/17

DIAVIK DIAMOND MINES INC.
Client Project #: AEMP
Site Location: Open Water AEMP
Your P.O. #: K73160
Sampler Initials: KG

RESULTS OF CHEMICAL ANALYSES OF GRAB WATER

Maxxam ID		UA5558		UA5559		
Sampling Date		2018/08/04 10:07		2018/08/04 16:50		
COC Number		7762		7762		
	UNITS	TK-1	QC Batch	TK-2	RDL	QC Batch
Parameter						
Subcontract Parameter	N/A	ATTACHED	9107491	ATTACHED	N/A	9107491
Calculated Parameters						
Filter and HNO3 Preservation	N/A	LAB	9095406	LAB		9095406
Dissolved Hardness (CaCO3)	mg/L	8.96	9094420	8.83	0.50	9094420
Total Hardness (CaCO3)	mg/L	8.94	9094232	8.92	0.50	9094232
Nitrate (N)	mg/L	<0.0020	9094650	0.0088	0.0020	9094650
Calculated Total Dissolved Solids	mg/L	18.0	9095172	16.0	0.50	9095172
Dissolved Total Kjeldahl Nitrogen (Calc)	mg/L	0.179	9095174	0.220	0.020	9095174
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.156	9094920	0.155	0.020	9094920
Misc. Inorganics						
Fluoride (F)	mg/L	0.030	9098528	0.030	0.010	9098528
Acidity (pH 4.5)	mg/L	<1.0	9097002	<1.0	1.0	9097002
Alkalinity (Total as CaCO3)	mg/L	7.42	9098844	5.77	0.50	9098844
Acidity (pH 8.3)	mg/L	<1.0	9097002	<1.0	1.0	9097002
Alkalinity (PP as CaCO3)	mg/L	<0.50	9098844	<0.50	0.50	9098844
Bicarbonate (HCO3)	mg/L	9.05	9098844	7.04	0.50	9098844
Carbonate (CO3)	mg/L	<0.50	9098844	<0.50	0.50	9098844
Hydroxide (OH)	mg/L	<0.50	9098844	<0.50	0.50	9098844
Anions						
Orthophosphate (P)	mg/L	<0.0010	9096618	<0.0010	0.0010	9096618
Dissolved Sulphate (SO4)	mg/L	4.49	9096426	3.93	0.50	9096733
Dissolved Chloride (Cl)	mg/L	3.1	9096424	3.0	0.50	9096424
Nutrients						
Dissolved Phosphorus (P)	mg/L	<0.0020	9098506	0.0027	0.0020	9098506
Dissolved Ammonia (N)	mg/L	<0.0050	9100861	<0.0050	0.0050	9100861
Total Ammonia (N)	mg/L	0.012	9100851	0.016	0.0050	9100851
Nitrate plus Nitrite (N)	mg/L	<0.0020	9096418	0.0132	0.0020	9096418
Nitrite (N)	mg/L	<0.0010	9096421	0.0044	0.0010	9096421
Dissolved Nitrogen (N)	mg/L	0.179	9104763	0.233	0.020	9104763
Total Nitrogen (N)	mg/L	0.202	9096670	0.208	0.020	9096670

RDL = Reportable Detection Limit
N/A = Not Applicable

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Maxxam Job #: B866189
Report Date: 2018/08/17

DIAVIK DIAMOND MINES INC.
Client Project #: AEMP
Site Location: Open Water AEMP
Your P.O. #: K73160
Sampler Initials: KG

RESULTS OF CHEMICAL ANALYSES OF GRAB WATER

Maxxam ID		UA5558		UA5559		
Sampling Date		2018/08/04 10:07		2018/08/04 16:50		
COC Number		7762		7762		
	UNITS	**TK-1**	**QC Batch**	**TK-2**	**RDL**	**QC Batch**
Total Phosphorus (P)	mg/L	0.0042	9098511	0.0033	0.0020	9098511
Physical Properties						
Conductivity	uS/cm	35.2	9098845	33.3	1.0	9098845
pH	pH	6.95	9098839	6.67		9098839
Physical Properties						
Total Suspended Solids	mg/L	<4.0	9095849	<4.0	4.0	9095849
Total Dissolved Solids	mg/L	20	9095982	30	10	9097622
Turbidity	NTU	0.38	9094690	0.27	0.10	9094690
RDL = Reportable Detection Limit						

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Maxxam Job #: B866189
Report Date: 2018/08/17

DIAVIK DIAMOND MINES INC.
Client Project #: AEMP
Site Location: Open Water AEMP
Your P.O. #: K73160
Sampler Initials: KG

MERCURY BY COLD VAPOR (GRAB WATER)

Maxxam ID		UA5558	UA5559		
Sampling Date		2018/08/04 10:07	2018/08/04 16:50		
COC Number		7762	7762		
	UNITS	TK-1	TK-2	RDL	QC Batch
Elements					
Dissolved Mercury (Hg)	ug/L	<0.0020	<0.0020	0.0020	9093319
Total Mercury (Hg)	ug/L	<0.0020	<0.0020	0.0020	9095893
RDL = Reportable Detection Limit					

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Maxxam Job #: B866189
Report Date: 2018/08/17

DIAVIK DIAMOND MINES INC.
Client Project #: AEMP
Site Location: Open Water AEMP
Your P.O. #: K73160
Sampler Initials: KG

ELEMENTS BY ATOMIC SPECTROSCOPY (GRAB WATER)

Maxxam ID		UA5558	UA5559		
Sampling Date		2018/08/04 10:07	2018/08/04 16:50		
COC Number		7762	7762		
	UNITS	TK-1	TK-2	RDL	QC Batch
Dissolved Metals by ICPMS					
Dissolved Aluminum (Al)	ug/L	2.37	1.59	0.20	9097467
Dissolved Antimony (Sb)	ug/L	<0.020	<0.020	0.020	9097467
Dissolved Arsenic (As)	ug/L	0.318	0.286	0.020	9097467
Dissolved Barium (Ba)	ug/L	2.29	2.32	0.020	9097467
Dissolved Beryllium (Be)	ug/L	<0.010	<0.010	0.010	9097467
Dissolved Bismuth (Bi)	ug/L	<0.0050	<0.0050	0.0050	9097467
Dissolved Boron (B)	ug/L	<5.0	<5.0	5.0	9097467
Dissolved Cadmium (Cd)	ug/L	<0.0050	<0.0050	0.0050	9097467
Dissolved Chromium (Cr)	ug/L	<0.050	<0.050	0.050	9097467
Dissolved Cobalt (Co)	ug/L	<0.0050	<0.0050	0.0050	9097467
Dissolved Copper (Cu)	ug/L	0.524	0.481	0.050	9097467
Dissolved Iron (Fe)	ug/L	1.5	<1.0	1.0	9097467
Dissolved Lead (Pb)	ug/L	<0.0050	<0.0050	0.0050	9097467
Dissolved Lithium (Li)	ug/L	1.75	1.66	0.50	9097467
Dissolved Manganese (Mn)	ug/L	0.211	0.230	0.050	9097467
Dissolved Molybdenum (Mo)	ug/L	0.466	0.458	0.050	9097467
Dissolved Nickel (Ni)	ug/L	0.575	0.540	0.020	9097467
Dissolved Selenium (Se)	ug/L	<0.040	<0.040	0.040	9097467
Dissolved Silicon (Si)	ug/L	<50	<50	50	9097467
Dissolved Silver (Ag)	ug/L	<0.0050	<0.0050	0.0050	9097467
Dissolved Strontium (Sr)	ug/L	22.6	22.1	0.050	9097467
Dissolved Thallium (Tl)	ug/L	<0.0020	<0.0020	0.0020	9097467
Dissolved Tin (Sn)	ug/L	<0.010	<0.010	0.010	9097467
Dissolved Titanium (Ti)	ug/L	<0.50	<0.50	0.50	9097467
Dissolved Uranium (U)	ug/L	0.0420	0.0483	0.0020	9097467
Dissolved Vanadium (V)	ug/L	<0.050	<0.050	0.050	9097467
Dissolved Zinc (Zn)	ug/L	<0.10	0.40	0.10	9097467
Dissolved Zirconium (Zr)	ug/L	<0.050	<0.050	0.050	9097467
Dissolved Calcium (Ca)	mg/L	1.83	1.84	0.010	9094640
Dissolved Magnesium (Mg)	mg/L	1.06	1.03	0.0050	9094640
RDL = Reportable Detection Limit					

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B866189
Report Date: 2018/08/17

DIAVIK DIAMOND MINES INC.
Client Project #: AEMP
Site Location: Open Water AEMP
Your P.O. #: K73160
Sampler Initials: KG

ELEMENTS BY ATOMIC SPECTROSCOPY (GRAB WATER)

Maxxam ID		UA5558	UA5559		
Sampling Date		2018/08/04 10:07	2018/08/04 16:50		
COC Number		7762	7762		
	UNITS	TK-1	TK-2	RDL	QC Batch
Dissolved Potassium (K)	mg/L	1.00	0.971	0.010	9094640
Dissolved Sodium (Na)	mg/L	2.22	2.11	0.010	9094640
Dissolved Sulphur (S)	mg/L	1.29	1.13	0.50	9094640
Total Metals by ICPMS					
Total Aluminum (Al)	ug/L	7.19	7.21	0.20	9097469
Total Antimony (Sb)	ug/L	0.021	<0.020	0.020	9097469
Total Arsenic (As)	ug/L	0.337	0.305	0.020	9097469
Total Barium (Ba)	ug/L	2.36	2.40	0.020	9097469
Total Beryllium (Be)	ug/L	<0.010	<0.010	0.010	9097469
Total Bismuth (Bi)	ug/L	<0.0050	<0.0050	0.0050	9097469
Total Boron (B)	ug/L	<5.0	<5.0	5.0	9097469
Total Cadmium (Cd)	ug/L	<0.0050	<0.0050	0.0050	9097469
Total Chromium (Cr)	ug/L	0.054	0.069	0.050	9097469
Total Cobalt (Co)	ug/L	0.0329	0.0251	0.0050	9097469
Total Copper (Cu)	ug/L	0.582	0.584	0.050	9097469
Total Iron (Fe)	ug/L	21.8	24.3	1.0	9097469
Total Lead (Pb)	ug/L	<0.0050	<0.0050	0.0050	9097469
Total Lithium (Li)	ug/L	1.71	1.68	0.50	9097469
Total Manganese (Mn)	ug/L	7.23	11.6	0.050	9097469
Total Molybdenum (Mo)	ug/L	0.477	0.451	0.050	9097469
Total Nickel (Ni)	ug/L	0.639	0.654	0.020	9097469
Total Selenium (Se)	ug/L	<0.040	<0.040	0.040	9097469
Total Silicon (Si)	ug/L	54	55	50	9097469
Total Silver (Ag)	ug/L	<0.0050	<0.0050	0.0050	9097469
Total Strontium (Sr)	ug/L	22.4	22.3	0.050	9097469
Total Thallium (Tl)	ug/L	<0.0020	<0.0020	0.0020	9097469
Total Tin (Sn)	ug/L	<0.010	<0.010	0.010	9097469
Total Titanium (Ti)	ug/L	<0.50	<0.50	0.50	9097469
Total Uranium (U)	ug/L	0.0752	0.0757	0.0020	9097469
Total Vanadium (V)	ug/L	<0.050	0.064	0.050	9097469
Total Zinc (Zn)	ug/L	0.19	0.64	0.10	9097469
RDL = Reportable Detection Limit					

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Maxxam Job #: B866189
Report Date: 2018/08/17

DIAVIK DIAMOND MINES INC.
Client Project #: AEMP
Site Location: Open Water AEMP
Your P.O. #: K73160
Sampler Initials: KG

ELEMENTS BY ATOMIC SPECTROSCOPY (GRAB WATER)

Maxxam ID		UA5558	UA5559		
Sampling Date		2018/08/04 10:07	2018/08/04 16:50		
COC Number		7762	7762		
	UNITS	**TK-1**	**TK-2**	**RDL**	**QC Batch**
Total Zirconium (Zr)	ug/L	<0.050	<0.050	0.050	9097469
Total Calcium (Ca)	mg/L	1.83	1.82	0.010	9094644
Total Magnesium (Mg)	mg/L	1.06	1.06	0.0050	9094644
Total Potassium (K)	mg/L	0.979	1.01	0.010	9094644
Total Sodium (Na)	mg/L	2.17	2.20	0.010	9094644
Total Sulphur (S)	mg/L	1.36	1.53	0.50	9094644
RDL = Reportable Detection Limit					

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DIAVIK DIAMOND MINES INC.
Client Project #: AEMP
Site Location: Open Water AEMP
Your P.O. #: K73160
Sampler Initials: KG

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	9.0°C

Sample UA5558 [TK-1] : Sample received past method specified hold time for Nitrate+Nitrite (N) (low level). Sample received past method specified hold time for Nitrite (N) (low level). Sample received past method specified hold time for Orthophosphate by Konelab (low level). Sample received past method specified hold time for Turbidity. Sample analyzed past method specified hold time for Ammonia-N Dissolved, Low Level (UF/UP) . Sample received past method specified hold time for Ammonia-N Dissolved, Low Level (UF/UP). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample UA5559 [TK-2] : Sample received past method specified hold time for Nitrate+Nitrite (N) (low level). Sample received past method specified hold time for Nitrite (N) (low level). Sample received past method specified hold time for Orthophosphate by Konelab (low level). Sample received past method specified hold time for Turbidity. Sample analyzed past method specified hold time for Ammonia-N Dissolved, Low Level (UF/UP) . Sample received past method specified hold time for Ammonia-N Dissolved, Low Level (UF/UP). Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Results relate only to the items tested.

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Maxxam Job #: B866189
Report Date: 2018/08/17

QUALITY ASSURANCE REPORT

DIAVIK DIAMOND MINES INC.
Client Project #: AEMP
Site Location: Open Water AEMP
Your P.O. #: K73160
Sampler Initials: KG

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9093319	Dissolved Mercury (Hg)	2018/08/09	99	80 - 120	98	80 - 120	<0.0020	ug/L	NC	20
9094690	Turbidity	2018/08/08			101	80 - 120	<0.10	NTU	3.3	20
9095849	Total Suspended Solids	2018/08/10	104	80 - 120	99	80 - 120	<4.0	mg/L	20	20
9095893	Total Mercury (Hg)	2018/08/09	91	80 - 120	93	80 - 120	<0.0020	ug/L	NC	20
9095982	Total Dissolved Solids	2018/08/10	104	N/A	96	80 - 120	<10	mg/L	4.3	20
9096418	Nitrate plus Nitrite (N)	2018/08/09	103	80 - 120	107	80 - 120	<0.0020	mg/L	2.7	25
9096421	Nitrite (N)	2018/08/09	102	80 - 120	105	80 - 120	<0.0020	mg/L	0.87	25
9096424	Dissolved Chloride (Cl)	2018/08/09	101	80 - 120	98	80 - 120	<0.50	mg/L	4.0	20
9096426	Dissolved Sulphate (SO4)	2018/08/09	NC	80 - 120	99	80 - 120	<0.50	mg/L	0.86	20
9096618	Orthophosphate (P)	2018/08/09	106	80 - 120	90	80 - 120	<0.0010	mg/L	NC	20
9096670	Total Nitrogen (N)	2018/08/10			102	80 - 120	<0.020	mg/L		
9096733	Dissolved Sulphate (SO4)	2018/08/09	91	80 - 120	99	80 - 120	<0.50	mg/L	11	20
9097002	Acidity (pH 4.5)	2018/08/10					<1.0	mg/L	NC	20
9097002	Acidity (pH 8.3)	2018/08/10			106	80 - 120	<1.0	mg/L	10	20
9097467	Dissolved Aluminum (Al)	2018/08/10	101	80 - 120	100	80 - 120	<0.20	ug/L	9.2	20
9097467	Dissolved Antimony (Sb)	2018/08/10	102	80 - 120	101	80 - 120	<0.020	ug/L	NC	20
9097467	Dissolved Arsenic (As)	2018/08/10	103	80 - 120	101	80 - 120	<0.020	ug/L	8.1	20
9097467	Dissolved Barium (Ba)	2018/08/10	101	80 - 120	98	80 - 120	<0.020	ug/L	0.53	20
9097467	Dissolved Beryllium (Be)	2018/08/10	101	80 - 120	99	80 - 120	<0.010	ug/L	NC	20
9097467	Dissolved Bismuth (Bi)	2018/08/10	99	80 - 120	98	80 - 120	<0.0050	ug/L	NC	20
9097467	Dissolved Boron (B)	2018/08/10	100	80 - 120	99	80 - 120	<5.0	ug/L	NC	20
9097467	Dissolved Cadmium (Cd)	2018/08/10	101	80 - 120	99	80 - 120	<0.0050	ug/L	NC	20
9097467	Dissolved Chromium (Cr)	2018/08/10	99	80 - 120	100	80 - 120	<0.050	ug/L	NC	20
9097467	Dissolved Cobalt (Co)	2018/08/10	98	80 - 120	99	80 - 120	<0.0050	ug/L	7.7	20
9097467	Dissolved Copper (Cu)	2018/08/10	97	80 - 120	98	80 - 120	<0.050	ug/L	2.6	20
9097467	Dissolved Iron (Fe)	2018/08/10	101	80 - 120	101	80 - 120	<1.0	ug/L	2.5	20
9097467	Dissolved Lead (Pb)	2018/08/10	100	80 - 120	99	80 - 120	<0.0050	ug/L	NC	20
9097467	Dissolved Lithium (Li)	2018/08/10	100	80 - 120	98	80 - 120	<0.50	ug/L	3.5	20
9097467	Dissolved Manganese (Mn)	2018/08/10	98	80 - 120	99	80 - 120	<0.050	ug/L	10	20
9097467	Dissolved Molybdenum (Mo)	2018/08/10	104	80 - 120	101	80 - 120	<0.050	ug/L	0.73	20

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Maxxam Job #: B866189
Report Date: 2018/08/17

QUALITY ASSURANCE REPORT(CONT'D)

DIAVIK DIAMOND MINES INC.
Client Project #: AEMP
Site Location: Open Water AEMP
Your P.O. #: K73160
Sampler Initials: KG

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9097467	Dissolved Nickel (Ni)	2018/08/10	98	80 - 120	99	80 - 120	<0.020	ug/L	2.9	20
9097467	Dissolved Selenium (Se)	2018/08/10	103	80 - 120	102	80 - 120	<0.040	ug/L	NC	20
9097467	Dissolved Silicon (Si)	2018/08/10	104	80 - 120	102	80 - 120	<50	ug/L	NC	20
9097467	Dissolved Silver (Ag)	2018/08/10	99	80 - 120	99	80 - 120	<0.0050	ug/L	NC	20
9097467	Dissolved Strontium (Sr)	2018/08/10	97	80 - 120	98	80 - 120	<0.050	ug/L	0.21	20
9097467	Dissolved Thallium (Tl)	2018/08/10	100	80 - 120	98	80 - 120	<0.0020	ug/L	NC	20
9097467	Dissolved Tin (Sn)	2018/08/10	101	80 - 120	100	80 - 120	<0.010	ug/L	NC	20
9097467	Dissolved Titanium (Ti)	2018/08/10	97	80 - 120	98	80 - 120	<0.50	ug/L	NC	20
9097467	Dissolved Uranium (U)	2018/08/10	107	80 - 120	104	80 - 120	<0.0020	ug/L	1.9	20
9097467	Dissolved Vanadium (V)	2018/08/10	100	80 - 120	100	80 - 120	<0.050	ug/L	NC	20
9097467	Dissolved Zinc (Zn)	2018/08/10	102	80 - 120	102	80 - 120	<0.10	ug/L	NC	20
9097467	Dissolved Zirconium (Zr)	2018/08/10	99	80 - 120	99	80 - 120	<0.050	ug/L	NC	20
9097469	Total Aluminum (Al)	2018/08/10	101	80 - 120	98	80 - 120	<0.20	ug/L	11	20
9097469	Total Antimony (Sb)	2018/08/10	102	80 - 120	101	80 - 120	<0.020	ug/L	3.9	20
9097469	Total Arsenic (As)	2018/08/10	103	80 - 120	101	80 - 120	<0.020	ug/L	5.3	20
9097469	Total Barium (Ba)	2018/08/10	99	80 - 120	98	80 - 120	<0.020	ug/L	0.76	20
9097469	Total Beryllium (Be)	2018/08/10	101	80 - 120	100	80 - 120	<0.010	ug/L	NC	20
9097469	Total Bismuth (Bi)	2018/08/10	98	80 - 120	100	80 - 120	<0.0050	ug/L	NC	20
9097469	Total Boron (B)	2018/08/10	102	80 - 120	100	80 - 120	<5.0	ug/L	NC	20
9097469	Total Cadmium (Cd)	2018/08/10	102	80 - 120	100	80 - 120	<0.0050	ug/L	NC	20
9097469	Total Chromium (Cr)	2018/08/10	99	80 - 120	99	80 - 120	<0.050	ug/L	13	20
9097469	Total Cobalt (Co)	2018/08/10	98	80 - 120	99	80 - 120	<0.0050	ug/L	16	20
9097469	Total Copper (Cu)	2018/08/10	98	80 - 120	97	80 - 120	<0.050	ug/L	0.71	20
9097469	Total Iron (Fe)	2018/08/10	98	80 - 120	102	80 - 120	<1.0	ug/L	18	20
9097469	Total Lead (Pb)	2018/08/10	99	80 - 120	100	80 - 120	<0.0050	ug/L	NC	20
9097469	Total Lithium (Li)	2018/08/10	101	80 - 120	98	80 - 120	<0.50	ug/L	2.1	20
9097469	Total Manganese (Mn)	2018/08/10	90	80 - 120	99	80 - 120	<0.050	ug/L	16	20
9097469	Total Molybdenum (Mo)	2018/08/10	101	80 - 120	101	80 - 120	<0.050	ug/L	2.7	20
9097469	Total Nickel (Ni)	2018/08/10	99	80 - 120	98	80 - 120	<0.020	ug/L	1.1	20
9097469	Total Selenium (Se)	2018/08/10	103	80 - 120	103	80 - 120	<0.040	ug/L	NC	20

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Maxxam Job #: B866189
Report Date: 2018/08/17

QUALITY ASSURANCE REPORT(CONT'D)

DIAVIK DIAMOND MINES INC.
Client Project #: AEMP
Site Location: Open Water AEMP
Your P.O. #: K73160
Sampler Initials: KG

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9097469	Total Silicon (Si)	2018/08/10	103	80 - 120	99	80 - 120	<50	ug/L	1.1	20
9097469	Total Silver (Ag)	2018/08/10	100	80 - 120	99	80 - 120	<0.0050	ug/L	NC	20
9097469	Total Strontium (Sr)	2018/08/10	98	80 - 120	98	80 - 120	<0.050	ug/L	0.10	20
9097469	Total Thallium (Tl)	2018/08/10	98	80 - 120	99	80 - 120	<0.0020	ug/L	NC	20
9097469	Total Tin (Sn)	2018/08/10	100	80 - 120	101	80 - 120	<0.010	ug/L	NC	20
9097469	Total Titanium (Ti)	2018/08/10	98	80 - 120	98	80 - 120	<0.50	ug/L	NC	20
9097469	Total Uranium (U)	2018/08/10	104	80 - 120	103	80 - 120	<0.0020	ug/L	6.3	20
9097469	Total Vanadium (V)	2018/08/10	100	80 - 120	99	80 - 120	<0.050	ug/L	13	20
9097469	Total Zinc (Zn)	2018/08/10	102	80 - 120	100	80 - 120	<0.10	ug/L	NC	20
9097469	Total Zirconium (Zr)	2018/08/10	98	80 - 120	97	80 - 120	<0.050	ug/L	NC	20
9097622	Total Dissolved Solids	2018/08/11	NC	80 - 120	107	80 - 120	<10	mg/L	3.9	20
9098506	Dissolved Phosphorus (P)	2018/08/10	95	80 - 120	99	80 - 120	<0.0020	mg/L	NC	20
9098511	Total Phosphorus (P)	2018/08/10			99	80 - 120	<0.0020	mg/L		
9098528	Fluoride (F)	2018/08/11	98	80 - 120	102	80 - 120	<0.010	mg/L	0	20
9098839	pH	2018/08/14			101	97 - 103				
9098844	Alkalinity (PP as CaCO3)	2018/08/10					<0.50	mg/L		
9098844	Alkalinity (Total as CaCO3)	2018/08/10			96	80 - 120	<0.50	mg/L		
9098844	Bicarbonate (HCO3)	2018/08/10					<0.50	mg/L		
9098844	Carbonate (CO3)	2018/08/10					<0.50	mg/L		
9098844	Hydroxide (OH)	2018/08/10					<0.50	mg/L		
9098845	Conductivity	2018/08/10			98	80 - 120	<1.0	uS/cm		
9100851	Total Ammonia (N)	2018/08/13	105	80 - 120	100	80 - 120	<0.0050	mg/L	13	20
9100861	Dissolved Ammonia (N)	2018/08/13			95	80 - 120	<0.0050	mg/L		

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Maxxam Job #: B866189
Report Date: 2018/08/17

QUALITY ASSURANCE REPORT(CONT'D)

DIAVIK DIAMOND MINES INC.
Client Project #: AEMP
Site Location: Open Water AEMP
Your P.O. #: K73160
Sampler Initials: KG

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9104763	Dissolved Nitrogen (N)	2018/08/16			90	80 - 120	<0.020	mg/L		

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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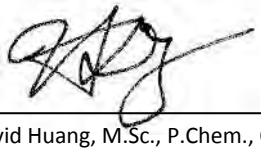
Maxxam Job #: B866189
Report Date: 2018/08/17

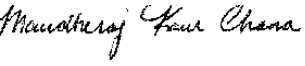
DIAVIK DIAMOND MINES INC.
Client Project #: AEMP
Site Location: Open Water AEMP
Your P.O. #: K73160
Sampler Initials: KG

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



David Huang, M.Sc., P.Chem., QP, Scientific Services Manager



Mandheraj Chana, Junior Project Manager

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Maxxam
A Bureau Veritas Group Company

Custody Tracking Form

W7762

Please use this form for custody tracking when submitting the work instructions via eTR (electronic Test Requisition).
Please ensure your form has a barcode or a Maxxam eTR confirmation number in the top right hand side. This number links your electronic submission to your samples.

First Sample: TK-1
Last Sample: TK-2
Sample Count: 2

Relinquished By				Received By			
Shelby Skinner	Digitally signed by Shelby Skinner DN: cn=Shelby Skinner, o=Diavik Diamond Mines Inc., ou, email=shelby.skinner@riotinto.com, c=CA Date: 2018.08.06 06:07:31 -06'00'	Date		ANDREA WANG		Date	2018/08/08
		Time (24 HR)				Time (24 HR)	09:39
		Date				Date	
		Time (24 HR)				Time (24 HR)	
		Date				Date	
		Time (24 HR)				Time (24 HR)	

Submission Triage Information

Sampled By: KG

# of Coolers/Pkgs: 1

Rush ☐ Immediate Test ☐ Food Residue ☐
Micro ☐ Food Chemistry ☐

*** LAB USE ONLY ***

Received At:

Comments:

Labeled By:

Verified By:

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)		1	2	3
N/A	N/A	✓	7	10	10

841

3866189_COC

Your Project #: B866189
Your C.O.C. #: B866189-ONTV-01-01

Attention: Veronica De Guzman

Maxxam Analytics
4606 Canada Way
Burnaby, BC
CANADA V5G 1K5

Report Date: 2018/08/17
Report #: R5361433
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8K3723
Received: 2018/08/10, 10:50

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Total Organic Carbon (TOC) (1)	2	N/A	2018/08/13	CAM SOP-00446	SM 23 5310B m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Total Organic Carbon (TOC) present in the sample should be considered as non-purgeable TOC.

Your Project #: B866189
Your C.O.C. #: B866189-ONTV-01-01

Attention: Veronica De Guzman

Maxxam Analytics
4606 Canada Way
Burnaby, BC
CANADA V5G 1K5

Report Date: 2018/08/17
Report #: R5361433
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8K3723
Received: 2018/08/10, 10:50

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Nazeema Rahaman, English, Project Manager
Email: NRahaman@maxxam.ca
Phone# (905)817-5700 Ext:5806
==========

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Maxxam Job #: B8K3723
Report Date: 2018/08/17

Maxxam Analytics
Client Project #: B866189

RESULTS OF ANALYSES OF WATER

Maxxam ID		HLD026	HLD027			
Sampling Date		2018/08/04 10:07	2018/08/04 16:50			
COC Number		B866189-ONTV-01-01	B866189-ONTV-01-01			
	UNITS	**UA5558-TK-1**	**UA5559-TK-2**	**RDL**	**MDL**	**QC Batch**
Total Organic Carbon (TOC)	mg/L	2.5	2.4	0.50	0.27	5676789

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8K3723
Report Date: 2018/08/17

Maxxam Analytics
Client Project #: B866189

TEST SUMMARY

Maxxam ID: HLD026
Sample ID: UA5558-TK-1
Matrix: Water

Collected: 2018/08/04
Shipped:
Received: 2018/08/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon (TOC)	TOCV/NDIR	5676789	N/A	2018/08/13	Nimarta Singh

Maxxam ID: HLD027
Sample ID: UA5559-TK-2
Matrix: Water

Collected: 2018/08/04
Shipped:
Received: 2018/08/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Organic Carbon (TOC)	TOCV/NDIR	5676789	N/A	2018/08/13	Nimarta Singh

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	5.7°C

Results relate only to the items tested.

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Maxxam Job #: B8K3723
Report Date: 2018/08/17

QUALITY ASSURANCE REPORT

Maxxam Analytics
Client Project #: B866189

			Matrix Spike		SPIKED BLANK		Method Blank	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**UNITS**
5676789	Total Organic Carbon (TOC)	2018/08/13	97	80 - 120	98	80 - 120	<0.50	mg/L

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

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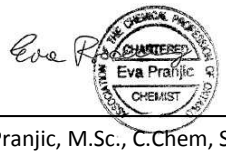
Maxxam Job #: B8K3723
Report Date: 2018/08/17

Maxxam Analytics
Client Project #: B866189

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

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Appendix 6 Camp Notes and Transcripts

- TK Interview Questions
- TK Interview Notes
- TK Trip / Excursion Notes
- Camp Daily Notes
    - Day 1—August 6, 2015
    - Day 2—August 7, 2015
    - Day 3—August 8, 2015
    - Day 4—August 9, 2015
    - Day 5—August 10, 2015

Fish and Water Semi-structured Questionnaire

Introduction and Local Context

1. For our records, please share your name, when you were born, and community.
2. Have you or someone you know spent time around Lac de Gras in your lifetime? If so:
   - During which years?
   - Do you remember fishing in the Lac de Gras area in your lifetime?
   - What types of fish were found in Lac de Gras?
   - In your lifetime, have you seen changes in the fish in Lac de Gras?
   - Can you tell me about the water in the Lac de Gras area?
   - In your lifetime, have you seen changes in water in Lac de Gras?

Fish

1. Can you tell us about the relationship between fish and your people?
2. Can you tell us about traditional protocols, stories, and/or laws around fish?
3. How do people tell when a fish is healthy? What about unhealthy? What do they look for?
4. Based on your observations of Lac de Gras and the fish you have seen and eaten at the AEMP Camp, what are your thoughts about the state of the fish?
5. Are there times when people avoid fishing or eating fish? If so, why? Are there certain times of year or certain areas around Lac de Gras that people avoid for fishing?
6. If fish in Lac de Gras could talk, what would they tell you about how they are doing and what they need to stay healthy? What would they say about changes to Lac de Gras from the past to now?

Water

1. Can you tell us about your relationship with water?
2. Can you tell us about cultural protocols, stories, and/or laws around water?
3. Is there water that you avoid drinking? Where? Why?
4. Based on your observations of Lac de Gras and the water you have sampled and tasted at the AEMP Camp, what are your thoughts about the state of the water?
5. What do you look for nowadays before you drink water from an area? What traditional tests did your ancestors use to tell good drinking water (e.g., watching if the birds are drinking the water)?
6. What else affects water quality (e.g., caribou migration may affect water by stirring up mud or through their defecation; wetlands may filter water making it good for tea)?
7. If the water could talk, what would it tell you it needs to stay healthy?
8. If water could talk, what would it say about the environment now versus the past?

Watching into the Future

1. After the mining company leaves, how would you suggest the area be watched (monitored)?
2. Do you have specific recommendations around fish and/or water?
3. What can community members do to make sure this happens?

Closing

1. Is there more you would like to say or questions that we didn't ask?
2. Is there anything about this interview that you would change?

Thank you so much for your time and important contributions. Confirm consent form is signed.

Bobby Algona

DDMI 2018 AEMP TK Camp

August 4, 2018

Bobby Algona, Kitikmeot Inuit Association

Interview by Natasha Thorpe
Filmed by Jay Bulckaert and Craig Kovatch

You have been here in 2012 and 2015. If there has been changes and he can talk to the fact that he has been here three times.

Bobby – Inukshuk story. How humanity got started. That is his theme.

From the last interviews his family has changed a little bit. This session here he is going to name 'Inukshuk'. The story everything in the world got started. From the elders and his grandmother and father. He has gained TK from his elders. The majority from his father and grandmother when he was growing up. They were always asking questions about lots of things. How we have clothes and everything around us. Water and everything.

His is going to name the theme 'Inukshuk'. His Inuit elders have told him that everything that we have in the world comes from the rock we have here on earth. Everything comes from rock. How two rocks made our son. The meaning of male and female. Also learning from school knowledge and scientific education gained through school. Everything comes from rock. The rock is alive. Every rock represents the meaning of life. Universes and galaxies, as he learned in school. We have many galaxies and universes that are all rock. The rocks mating together making life. The meaning of the stars out in the universe – they are alive. The sexes are made males and female. All living things even the microbes are male and female. The rock is also male and female. Without those two elements there would be nothing growing. The two rocks mating is how the sun was made. We respect the sun because that is how everything was started from the two rocks mating.

The moon, when it was blown just far enough, and the earth stopped, just in time to go around the sun. The earth represents a child of the sun. As do the other planets of the universe. The universe became as one. The heart of the universe is the sun. Other galaxies that float around . . . there are other planets in other universes and also other galaxies.

Through his own thinking he has come to know that there are other worlds just like ours. Each galaxy in his traditional knowledge represent families. Our own galaxy is one family. Other galaxies are other families. All the rocks floating around in other galaxies represents one living thing. As in one God. God represented in many different languages is in every galaxy.

Going back to our own sun and our own planets. We stopped just in time to enable the development of humanity in our own living world today. The earth stopped just between too cold and too hot. When the earth started its course around the sun it started to have daylight and night which represents winter and summer.

In Bobby's own observations from schooling and from elder stories he has come to this knowledge because if the earth were further away it would be too cold. Mars and Venus are too close to the sun to have life like ours. All the planets have life in them. Because they came from the sun as we all did.

It went night and day, night and day, going around the sun. Once this happened it started to make moisture and water. A rock in the fire left overnight will have a coat of water around it. From that, he has learned that water is from the very rock that we are on.

When the earth cooled down it started to make a crust over many trillions or billions of years. This created water. This cooled down everything. This is meaning of water that we have on earth comes from rock getting cold and hot. Other people and scientists say that water comes from other places but that is not what he sees. A fire ball started to cool down – the core of the earth- and made it into an ember.

Each crust represents billions of years. Through those ages, earth started to have more crust with flowers, sediments in the water making plants. Moisture in the plants. How still that water was in lakes form millions of years. The moisture in the rock all around us. The rock content represents each and every being that we are. The rocks would ferment in those years and create plant life, through wood and roots. Things started to grow. The ponds that we see today have been sitting there for thousands of years. Each and every lake has a different taste to it. This represents to him how everything got started. Rocks made wood and thus we have animals. Just right amount of heat in the air that we have started the development of plants, people and metals and all the things we have on earth.

From the stories that he has understood from the elders he understands that the rocks and the changes in the rocks are 'Inukshuk'. It is how we got started. It doesn't mean that we are getting lost as we live.

Other rocks represent other things. All types of rocks represent different things. But the piles we see represents man. The other ones represent other living being on earth. Inukshuk we want to find things under the snow. We put a rock, Inukshuk, under the snow to show us where our food cache. Animals find our food too. Buried in the snow. The foxes and wolves and wolverines will dig down and show us exactly where that meat cache was buried and how we can find it in the winter.

It started to get cold and we got snow. Water started to get cold and we got ice. Knowing from our elders and from other meetings he knows that James Bay and those areas there is where the meteorite touched down and killed off many people. Before this happened there were many thousands of people and trees and mammoths. Many of our people lost many families from the meteorite. Our descendants are the children who lost their mums and dads by the meteorite. That is why there are few people in the Arctic. We are slowly gaining more people. Our population is now increasing. But we are from those children who had lost their mums and dads. These children were living as one with their mums and dads. Now they had to survive alone and find other people. They started their culture. From these little groups came groups with different dialects. Originally, they were all from one clan. But then we were all one.

That is a story that my grandmothers passed on to me many years before I went to school. These stories were very interesting to us. We always wanted more and more storied. My grandmother got tired, but she said there will always be another story tomorrow.

The very meaning of the Inukshuk's, fish and humanity got started was from this rock that came from the sun. It is all life on earth that came from this rock that we have 'life on earth'. We have dinosaurs and trees and what we have today. I have told this story to my children and grandchildren. They ask the meaning Inushuk as I asked my grandmother years ago.

The bone story I have told in the past about the fish bones is much later after life got started. I would like to jump back to this story. How that man started to use his tools. For that man, that fish, the bones represent that one man being entombed in a caribou hide. This is the skin of the fish and the man was put in the water because in the ice-age, or one of the many ice-ages, he started floating around in the caribou sack. It started to float away when there was more water on this earth. It stayed in that water for many years and became a fish. All the bone that the fish has represent the tools that we have been using. It is the tools that the man used before he became a fish. It represents all the tools that we used. That is the beginning of all the stories.

The very meaning of all the metals, the mining companies, they know how to make metals to make stoves etc. components in cameras and Ipods. It has many mines in the components in a camera. There are many metals and plastic and components in a camera. There is aluminum and other metals to make these things, used in many types of ways. He really appreciates the tools that we have. How folks made tools that help us. Like when we are sick, his hernia scars. He appreciates many things that white folks have developed.

He has nothing against mining but he wishes that they knew more about discarding their emissions and the things they use. He is happy that they are making an effort to have less impact on the earth. But throughout the years he has come to appreciate the good things, but he wishes the mines have better ways of discarding what they don't use in the mine. He is glad that they are using their TK in other parts of the world too. He just wishes they had better solutions to things like climate change in the context of the mining industry.

But people say that volcanoes are dangerous too. The volcanoes as he understands they start life as well. That is the living fire, the living rock in our core. It represents life on earth. Volcanoes are natural phenomena. When you walk around you see growth on the rock all the time. To him that is the starting of life on earth. Most rocks start plant life. The very rock itself . . . There is always growth on that one rock. That is how a rock is alive. Rock tripe . . . what the white folks call it . . . nautiak . . . flower from the rock . . . nautiak (living things). The very meaning of different rocks mating that represent every living being on earth. Throughout his viewing on Discovery Channels or on National Geographic he looks at the rocks where they are doing their research and he sees growth on the rocks there. It is the moisture from the air. This is life on earth as well. Each region, because the earth rotates in a certain way all the time, there are two poles. They are cold on both sides. Night and day at both ends. The Equator has constant sun. Tropical places with not much cold air. No ice. From those two cold areas come night and day. North and South pole are always having night and day. Some communities don't get sun for many months. That is how the ice stayed there for years and years. For some reason, Earth got a little further from that line. The Earth's rotation changed over the ages. Meteorites hit the earth and changed the rotation. A meteorite would change the rotation of the earth if it is strong

enough. Like when you hit a ball. The magnetic pole will change. The magnetic pole is like a string on a ball. The magnetic pole creates different climates. The core pulls up and wants to disperse.

Natasha – Has Bobby noticed any changes at the camp at Lac de Gras?

Bobby – All along they have known that the emissions from the mines will cause changes. As the mines are blown up it causes changes to the water. The lighter rock goes into the air and the very fine powder goes into the air all around the world. When you see a pit being blown up you see all the heavy rock with a cloud of smoke above which is a very fine powder in the air that disperses all around and into the lake and changes the content of the lakes from what they have been for thousands of years. The fine powder sticks on plant life as well. The rain washes down this sediment and washes it into the roots as well. It takes many years before the changes are visible. To him, when you start up a mine.

There used to be many hundreds of caribou around the area. The dust affects the plant life. When we have different time periods- when we blow up the rock in the winter it is frozen. It has a different content in summer and winter.

Natasha – How does it affect the fish here?

Bobby – These last few days we have come across more cysts and worms in the fish we are catching. He is starting to get a little suspicious now. Every mine has different chemical contents and using emulsions underground. This will change the water quality contents in Lac du Gras or any lake around these areas.

They dispersed a lot of powder rock in the area. They use chemical mixtures underground and emulsions. It is going to be changing more often. The fish are moving away from the blasting area all the time. The fish will swim quickly from an explosion and this movement in fish is accompanied by a chemical reaction in the fish.

Fish will move away all the time because of the emulsions and explosions.

Natasha – She wants to make sure that he has anything else to share?

Bobby – He knows that the mines are trying to do a good job controlling emissions into the air and water. He wants them to find better solutions and better ways of doing things. He has never been against mining. He has knives, teapots, clothing that are very useful to him. But he would like all of industry to find better solutions so that humanity stays healthy. Use a lot of TK. He knows that a lot of mining companies want to go into different places in the world and disrupt different cultures. But he wants the mines to find different ways to deal with emulsions and emissions. The only wants the mines to find better solutions.

END

Ernest Boucher

2018 DDMI AEMP TK Camp
August 5, 2018

Ernest James Boucher – Łutsel K'e Dene First Nation
Interviewed by Joanne Barnaby and Natasha Thorpe
Filmed by Jay Bulckaert and Craig Kovatch

I have been involved with the environment for quite awhile. Fisheries and Oceans from Saskatoon, with Marlene Evans. I've been here in this area maybe four times now. I was help while doing environmental work with the chopper, then with a Calgary company called Metric (Camsell Lake) in 2008. I used to work at Ekati, Misery in 2002. I spent Christmas and New Years there. I got out January 4, but it was good to be out. The oldest trailers are there again. Memories when I look at that. When they closed down, I flew over with a chopper and there was nothing. It was all gone. Now everything is back.

Last five years, even in the east Arm, Great Slave Lake, there are no caribou. They don't go inland anymore, they go right to the south border of Saskatchewan. Everything is burned anyway. The muskox are moving in, there are lots of them.

Q. Did you travel out here as a young person? Hunting?

My late dad used to go down to Snap Lake, Mackay Lake and then quite awhile back, years before I was born, they would hunt there. Trapping all the way from Łutsel K'e to Alymer Lake. A lot of people used to go over there. They used to meet somewhere, I don't know where. Even Kugluktuk too. I hear that from some people too. That is why Kugluktuk and Dene people would come here and talk about what is going on around here, every once in awhile.

On account of the mine, we can't get any more caribou. When they first had the exploration camp, there was nothing across, where the dyke was, there were islands. There were caribou. We used to have tent frames there years back. Then the mine started and people from YK and LK would come here and tell them that this is the main part for caribou where they swim across. Not anymore. It is blocked. Maybe that is why the caribou don't come around anymore. They go right through to Francois Lake, Great Slave Lake, but there is nothing over there anymore. Three summers ago from Fort Reliance down to Fort Reliance it was all burned. Even the north shore of Macleod Bay was all burned, this time of year it was still burning. I was going to the Reliance camp. I was a camp boss, every summer for 23 years. We went through, it was smoky, but it didn't matter. All this years it has been burning. There is nothing else to burn, on the south side of Great Slave Lake. Same thing in Nonacho Lake. Same thing, we were out traveling my brother and I. Now everything has grown back. When we went over there about four years ago, but it has grown back. We had to make a road for 5 days to get there. The snow was so thick. We finally got a caribou.

Nowadays is not like old days. Old days you don't hear a chopper or skidoo. No disturbance. Now it is different. I used to stake claims here, in 1968, for Smoky Hill. Quite a few years back, I was stepping on diamonds staking claims. Now I just look at it, those mines. What did I get out of it?

I think about that every time I come here. Those mines. I guess from the west side of Coppermine, Hope Lake, that is where there is a base camp. Go out there with a plane and drop us off, drop us off. We stayed there for 3 wks. It was so cold that one skidoo broke down and we had to walk back along our picket lines. Every time you light a match it shuts off. Too cold. We made it back to the camp, walking. Wintertime. February. This guy who was with me is still alive. I think about it every once in awhile.

Q. Have you noticed changes since you started coming to the camp here? In the fish?

The first time we got here, when it was open. Back then there was only one dyke. Now there is another one since I left here. Seems like, to me, the fish we used to get were smaller. The trout we got just now are amazing. There are so many fish right now, they are all really big. Used to have a five inch net and we got so many. That is why they put a smaller net. We still get a lot of trout. You see that. I think the population of fish is growing. Before people set nets before I was born and they did trapping, people from Yellowknife.

Q. Why do you think there are more and bigger fish?

Because nobody is fishing anymore. There used to be a game hunting lodge, I don't know if it is open. Maybe it is open. They used to hunt caribou, go fishing. Alymer Lake, same thing. They shut down that big game hunting, killing all the bulls in the summertime. They don't know how much they are killing just for the horns. You have to look into that kind of stuff.

Q. In terms of the health of the fish, what have you seen?

I've done a lot of fishing all my life for DFO. Where I come from, Stark Lake, they are so skinny and all the worms are coming out. I was talking with George Low and he said it was overpopulation. No dog teams anymore, straight skidoos. Used to be a mine there, closed in 1954. Something to do with that too. This or next summer, they are supposed to clean up Stark Lake. I was involved in that too.

Q. Can you tell us about your life as a ranger?

It is pretty good to be a ranger. If anybody get lost, we are there for them. No matter how far they are. Probably in October, I had another meeting in Łutsel K'e. Sometimes we have planning meetings in September, early fall time. Sometimes we go to Alymer Lake, Francois Bay, once we met those guys from Francois Bay. We do a lot of traveling in Łutsel K'e. There is going to be a sergeant now. He went to Resolute Bay one year. This instructor used to in the army, a Frenchman. I met him. One time I got hurt, I didn't drive the skidoo. I still went, they paid me. It took me five months to get better.

Q. How many years have you been with the rangers?

It has been 21 years. I am getting tired of it. You have to have a good machine. That is the main thing.

Q. What would you like to hear if fish could talk from around here?

We had bad weather this year. Last time we had just beautiful, calm weather. Now we are stuck for two days, I have a really bad cold but I set that net today, to show those people. I have been around. I know how it is like.

Q. What are you looking for when you catch a fish?

The main part of it, you open your fish. If it is not healthy, I could tell. If they are skinny, small tail, big head. I see some fish who have worms just sticking out (of the flesh). Lots in Great Slave Lake. Because of what they eat. Even us, it can happen to us. They told us that Stark Lake is over-population. The smaller ones are okay, that is what they told us. I went through them most of the time. Everything was sampled and tested. There was somebody who came over this summer, I sent a satellite back. There is only one about 1.5 mi from LK. I hear there were lots of armies came in. Divers, everybody.

Q. Is the food changing that the fish are eating [in Lac de Gras]?

You see the mine here, we are pretty close to it. What goes up must come down. One year we flew a chopper from Lac de Gras looking for caribou. I could see that snow just yellow. Where does that come from? That Pierre Marlowe told me that what comes up must comes down. We look at the snow and it is yellow. That comes from the air. All that air sits up there. I've been counting a lot of caribou. Some we see at broken legs, get stuck in the boulders. Gets scared and tugs back and forth. They get scared when the big trucks come. I saw one with a broken front leg, running on three legs. It got away. Lots of animals come to Ekati. Foxes, wolverines.

One time we were at the airport, called to go help chase them away. They got tangled up in the wires and a grizzly bear was eating it. Somehow they broke the fence. They choked. I cleaned them up and sent them back to Yellowknife. That was in the fall. That was 14–15 years ago.

We had one woman from Vancouver we were flying around with her. All up to the Coppermine.

Q. Would you like to see people working together in monitoring, in the future?

People used to work together and they are still working together. One time I went to Cambridge Bay, the mine was starting there. It was a JV Treaty 11 and Baker Lake, Treaty 8. Florence was the Chief and I was a counsellor at the time. It has worked for a long time, to have people work together. Mine not going to be here all the time, not forever. The elders talk. I do a lot of listening in Yellowknife, N'Dilo, all over the place. The land claim is still not settled so I don't know what will happen.

Q. Do you see the possibility that people will continue to work together?

I'd like to be here in the future and work together. If we don't work together, the land and everything will be gone forever. We have a big, rich country. We are not hungry. We can fish any time we want. People starving on the other side of the world. Better for people here.

Q. What do you think about the water in Lac de Gras these days?

Yesterday when we sampled, it was shallow. It is normal to have a swampy taste. The one was really swampy, in the bay. All the wind pushing in to the bay, just like a river. We got lots of trout yesterday, but it was swampy off the dock. The water is good, for me anyway.

Q. Do you have any concerns about the water in Lac de Gras right now?

No, not at all.

My wife died in 2009 and I put her away in Inuvik, she was from down there. My son, Damian, is working at Ekati. My boy has been all over. Greenland, Alaska. He was down at Nahanni for the last two years. He is going to school for a parks warden kind of job.

My throat is sore. That is all I have to say.

END

Terri Doris Enzoe

DDMI 2018 AEMP TK Camp

Interview August 3, 2018

Terri Doris Enzoe – Łutsel K'e Dene First Nation
Interviewed by Natasha Thorpe and Joanne Barnaby
Filmed by Jay Bulckaert and Craig Kovatch

My name is Doris Enzoe from Łutsel K'e on Great Slave Lake. I was born on the barrenlands close to Artillery Lake, I was told by my mom. I'm not new, I'm reincarnated. I've been here before and I'm back. Most of my life I was born and raised in the bush until I was 14 years old. Only then we moved to Snowdrift (Łutsel K'e). My parents, they made their living by trapping in the wintertime. In the summertime he would go guiding. My mom would sell her arts and crafts. I lost my mom about 15 years ago and dad 10 years ago. I'm the oldest one in the family.

I teach my children and grandchildren how to live off the land, speak in Chip so we don't lose our language. I don't speak English when they come, even though they don't understand. If one doesn't understand, the other will say it so they catch on. I teach my third son how to do sewing. We do lots of sewing together and live off the land, out into the barrens, fishing and trapping, moose hunting. When there was caribou, we would go out all the time, all my life. I'm not an indoors person. Always traveling on the land.

I think the land is a beautiful peaceful place to go to when you are stressed out. I just go out on the land and heal myself. Land is really important to me. You don't need anything when you are out there. You can speak to the land water, plants. They won't talk back but you'll hear the whistling in the wind like somebody is talking to you. Most of the time, I'm on the land. The water is important. If we don't have water, we aren't going to survive here. I don't buy store bought food. I eat wild food off the land, caribou, muskox, moose. We are planning on having parks in our community so for the past 10 years my son and I take the youth out and teach them out to live off the land, how many visitors we have in our area, how many fish they are allowed to catch. We do lots of water testing, as the mines are close to our area. Downstream and upstream. We do lots of water and fish sampling and send them out. We send them out to Marlene Evans but we never get the results. I never see anything. We see fish that are unhealthy, like in Stark Lake.

Long time ago when we had dog teams, people used to fish there but the dogs are no longer taking us out. People have skidoos. So it is overpopulating in Stark Lake, like fish are deformed. You see that now. For me, when I travel with my son in the barrens, he will tell me stories like here is where our grandfather used to pass. We both have different stories to tell one another. One day when we were on the barrens, he said – how do you feel out here. I feel light headed, good about myself. So peaceful. I can walk on the lake, it is frozen. So peaceful. In the summer we have to bring a boat for a long way to go hunting. If we wanted to go somewhere

we usually go to Lake Antoine's camp where there were boats to rent. Sometimes I think, how did our ancestors move around a long time ago. They make canoes and do lots of walking. My auntie Madelaine Drybones said they make a back on the dogs so that they pack it for them. Now we pack our own stuff on the skidoo it is faster to where you want to go. That is all about me.

I do lots of sewing at home, lots of traditional sewing. Learned how to fix moose hide. The last 3 yrs we've had a hide camp to learn how to fix moose, beaver, wolverine and we are teaching our young people how to do this. Before we lose it, we might as well teach the young people Even the ones that are here for us, it seems like they are happy to be out here. For me, we should have more youth coming out. There is too much electronics, into their ipods stuff like that. They are too much into stuff like that. When I grew up it was not like that. We were kept busy. The generations have changed.

Even the climate has changes. We have snow now, rain. The weather is changing. I see all those things as I'm growing up. When I was working for Hunters on the Land, it used to be really nice but about 3 years later it is more strong, the wind. Sometimes it is kind of scary, out there trying to survive. Watch the youth that are with you. Then we pay tobacco every 10 minutes if it is windy. I tell them to have lots of respect for the land, pay the land and water. Especially where it is spiritual place, you have to be quiet and pay the water. The hardest part is the language. You tell them and then they forget. All the kids speak only English now so that is why we are losing our language. For me, I talk in my language to my grandchildren. In my language . How are you Granny? I'm okay I'll say in my language. If I am working around my house, they would help me out, speak in my language to me. I feel really proud of them speaking to me in my language. Some people don't believe it. They say, Doris, your grandchildren are talking to you in Chip. Ya, because I teach them.

I'm hardly every home this summer, working on the land, working for the First Nations. For me, the land is my pillow. Every time there are meetings, they are talking about land or wildlife, I always make sure the water, the land the animals that are there, I talk about it. It is not for me, it is for the future of my grandchildren. I tell them to have respect for anything that you do. Have respect for the water when you are out on the boat, because the water is alive.

Q. Do you want to say anything in your language?

These young people who are growing up, they should teach them good, to teach our language, where our ancestors used to live. It is nice if you talk to your kids in a good way and having respect for them so they can understand. When you scream at your kids, then they have a hard time. If you speak in a low voice, they can understand it. A long time ago the way we used to live is not the same as it is today. We have to tell them all to have respect for the land and how we live because life is not going to be the same as before, today. (Translated)

Q. As a child you travelled here, what kinds of changes have you witnessed?

When I was youth, we used to see lots of caribou. Now we have to go a long ways to feed our family. Not only my family, but my brothers and sisters and aunties and uncles who cannot go out any more. And single mothers. That's why we need to give back.

Q. Do you feel that the caribou might come back?

I don't think so. If there is, it won't be as much as when I was growing up. My son went out to Fox Lake and there was no caribou, it was already gone. They had to charter a twin otter to come home. We bought 3 G drums plus the charter and it cost us lots of money. I didn't get any caribou, but I have muskox. I've been living off muskox for the last 8 years. There are not caribou. You are lucky if you can go out and shoot caribou. A few weeks ago we shot a muskox so I would have meat in the freezer. I share my food with the elders and community members so I have to go out.

Q. How do you feel about these mines out here?

It shouldn't be here in the first place. Since we live off here, it makes a big change for me. All the caribou are migrating on the Nunavut size because they were close to Rankin, just around here before. My friend and I would talk on the phone in Rankin and they say there are caribou everywhere.

Q. Is that the Bathurst?

I think so. This is where they migrate. Their footprints are everywhere. Through Ekati and Dominion. All their time the diamonds were here, just raising their calving and not knowing. They had to move now and it destroyed their food. No foot around here so have to go elsewhere.

Q. Have you noticed changes in the fish?

When my mother was alive when the mining company comes, they'll say, one day there will be changing in the fish.

My mother talked about this. I knew it was going to happen. Sores, cancer. Lots of worms and cysts around their heart. We put nets in the water and go fishing. Where we go, we head out so we can get it for the night. That is a big change too.

Q. So those cysts and worms and sores never used to be there?

No. They weren't there. I don't know how we're going to protect that because of climate change. We don't know what I happened at the other end of the world. It goes into the water, land, anywhere.

Some people think the wind is only here, around their area. Not sure. The wind is all ever. My grandfather used to tell me that I would see lots of changes. Even the blackbears are in the community. Every other day there are 3–4 bears in the community. I don't know what they're looking for, making food. Every day somebody is out there looting at night so we can protect our kids. Those are the changes we see today. How do we know about other animals? How do we know how they would feel? Not only bears, all animals. Used to be just bears. Bears more aggressive now, slapping the dog around.

Q. If fish could talk…

Don't put too much garbage in the water. There is lots of plastic in the air, goes to bottom of the lake. That is where the fish eat. Sometimes I wish there were no airplanes, mines. So we can eat healthy. Now there are planes all over. That is what my grandfather said. I have to bring it up and it has to stay with me.

Q. What would you like to see in the future?

Talking to your young people, tell them how to protect things for the future: the water, land and animals. If you don't talk about it and let your voice go out, there isn't a story for us. When we were asked about a national park, we don't want any development and roads.

When I work for "watchers of the land" I always ask people to take back their garbage. I'm always the one speaking out. I tell them I think it is time for you to speak up because I'm not going to be there forever. I got off and now my son. That's how life goes on. Makes me happy. That is how life goes on.

Q. Do you see the potential for expanding monitoring with other communities?

We started off with Dettah and Fort Resolution and Fort Smith. We're supposed to be working all together. We go from McKay to Simpson Lakes. Our whole family.

Q. Would you like to see ongoing monitoring w other communities here?

I see fish that . . . I don't know how long the mine is open for but it would be nice to start earlier to protect our land, fish, water, caribou.

Q. In the past, how did people know if there was something wrong on the land?

If we don't hear anything about caribou being around, the Elders would know. A few years ago, the Elder asked me, Did you use lots of caribou around? And I would say, no. The caribou have moved because there is not food or forest fire and now that the mines are all around us. This is a big change to us.

Q. Are there other things people watch for to tell if land is healthy?

A. Elders all know about climate change. Used to be ponds, but now it is just water. Since the mine opened, the caribou moved away. Too dry, not enough rain. More forest fire. The watch high/low is that and tell us.

Good water has no ring around the cup in the tea. If there is something like mercury in you water, it will make the ring on a cup and water testing should take place

Q. Are there traditional laws that are not going well understand that she come back.

I see some laws coming back like feed the fire, pay water. That is how I was taught, but today some people can't teach their kids and I cannot answer that. I'm glad that I am here at this camp.

Before the mine came up here, the water was fresh. Today I'm not sure because I didn't drink any yet. When the camp first opened, I tasted it. When we tasted the water, I can tell you.

Q. How do you feel about the fish are these days?

Julie knows her fish, she is only taking the healthy ones. When my mother was still alive, my girl, you will be seeing sick fish around the mining company and it is. We won't be sure from what but maybe we take our fish out to see what is wrong with them. Otherwise I don't know. When I go to the next meeting when I go home, they will ask me about the fish. I have to tell them there are some sick fish.

END

Nancy Nanoak Kadlun

DDMI 2018 AEMP TK Camp

August 5, 2018

Nancy Nanoak Kadlun, Kitikmeot Inuit Association

Interviewed by Joanne Barnaby and Natasha Thorpe
Filmed by Jay Bulckaert and Craig Kovach

Originally from Bay Chimo and I moved to Kugluktuk 22 years ago. This is my second time coming to the camp. Hardly anything has changed from 3 years ago. And I'm happy about that. In the future, we would like our grandchildren and other young people to know that we do these interviews so they can learn from them. Without doing this, who would know our water and land would be healthy?

Q. Have you noticed any changes since last time?

No changes, but I think it is too early. The ground is too dry. In the fish, there were cysts or worms in almost the 20 fish that I worked with. The worms in their skin, I don't know what is causing that. Maybe just these by the shore. There is lots of healthy fish still.

Q. It may have to do with where we were fishing?

I have no idea. The first fish I filleted, they had worms on the body. I don't know what causes that. I'm curious.

Q. Are you concerned?

When I think about it, I'm not concerned, but if there is so many, I wonder what is causing it. If I'm starving I would just take the cyst off and eat it if I really have to.

Q. Are there other things that help you to tell if the fish is healthy?

We've been doing fish for so long, we can notice whether it is healthy or not. I look for cysts, pesticides, stomach not healthy, whatever is in there. From the colour. Colour of the gills too. From those fish I was cutting, the gills were not bad. I was seeing all these worms on their body though. I would like to know what is causing that. Why are there more and what is causing that?

Q. What about the water?

It is still the same from three years ago. We had boiling clear water and it is still good for now.

Q. Did you notice much difference from the sample locations?

When we first got some from near where the boat was because it was windy, we noticed the fish down below and by the shore, you could taste the grass.

Q. Are you satisfied with the taste of the water?

Yes. It still tastes great. It is pure water. This is a huge lake. It has really good water so I hope it stays the same forever. It also goes to Kugluktuk, our only water source. Not only, but lots of little rivers that go down from this same lake. We will try to preserve it as long as we can. We have a town that is getting bigger each year in Kugluktuk.

Q. What about the future? What do you think about?

When I think about it, I think about our river. The permafrost is melting and our river is going higher. This lake might still be there, but I don't know about the future. Our land is getting higher. I don't know how it will be in the future for our water in Kugluktuk.

Q. What about the future of this camp?

This camp should continue as long as it is here. We constantly want to camp here as long as this lake is here. Even if these mines close, they will always be more coming. It will never stop. They know there are diamonds here. There is big water. This will never be the last mine. It will go on for life as people still work.

Q. What do you like about the camp?

We are trying to preserve our country. We need the water. If we just say yes, how is our community look like? Right away we will have no more. This will be all claimed. So many mines coming all the time. People want to work. This won't be the last mine. Let's try to have our water and air as good as long as we could. You never know what it is going to be like in the future.

Q. How do you feel about the youth participating?

I'm so happy about them coming as they learn lots from hearing. When I was a little girl, my mom would talk to me about the future. After I had my kids, her words came back to me strongly. I would really like the youth to come because if they learn and see what is happening, that will never go away.

Q. What about learning science here?

I'm so proud of them, who else is going to teach them? They have to do both sides. They need to be strong. They both understand by going to camps like this LISTEN>>..

Q. What would the fish say if I they could talk?

Please do not disturb where I live. It is important that we have air as well. It cannot be polluted. Please do not disturb our water.

Q. What would the water say?

Please do not disturb me. I am here. Same thing. I cannot go anywhere.

Q. When the mine closes, how would everybody work together to watch?

We need to keep coming. If they would help us do the same thing as Diavik does. Here. They should learn from what Diavik is doing. We are so thankful for Diavik doing this. Maybe they can learn from this. We'll keep asking for more, because we want to preserve our land and water.

Q. Should people from different cultural communities keep working together? If the mines close, should we find a way to keep monitoring?

That makes it stronger for people to get stronger. We all need to work together to keep our land clean. Even if this mine closes, we would like to know how this mine settles. It might get worse from not always being watched. We would like to keep coming here to see how it is going to be, because the dust is not going to just stop. There will still be so much floating around and draining. If the ground is settling down it is going to have movements itself.

I would like to say thank you for doing stuff like this. Us people without our equipment, we cannot do it. I am thankful for people monitoring the water a, fish and air every year. It is going to be hard and heartbreaking if everything just stops. I am thankful for people everyday for monitoring the water and the air.

END

Wayne Langenhan

DDMI 2018 AEMP TK Camp

Wayne Langenhan – North Slave Métis Alliance

5 August 2018

Interviewed by Natasha Thorpe
Notes by Colleen English

My name is Wayne Langenhan. I'm from Yellowknife, or not *from* Yellowknife. I live on Hwy 3 and have been for 19 yrs. Today is August 5, 2018 and I'm here at the TK camp in Lac de Gras.

W – Yes, I would like to say something about the trout tasting. Most people don't live in communities that eat a lot of trout. Except for Łutsel K'e area in the east arm, they're in waters with abundant fishing for trout, they eat trout. As you come out of that area, it's a different bottom and there is not as many trout. They are coming back to the Yk area but its slow. The point I'm trying to make is that sense we don't eat a lot of trout in N'dilo, Dettah, Yk area, since we don't eat a lot of it, we don't know a lot about taste and texture and what it should be. We can tell if they're diseased or if there are cysts or whatnot in the meat or intestines. But we can't narrow down this tasting thing on trout. I think a better idea is to taste whitefish because 90% eat whitefish on steady basis. I just thought I'd bring that up. Its like tea, what do I know about tea. I don't drink it, I drink coffee. And I can't tell you about trout either, because I eat more whitefish.

NT – Good point, something we can talk about. Maybe good for the fall session in Yk. We can bring that up. You've been in 2012 and 2015 – see any changes?

W – the trout that we pulled in in various other sessions were more healthy fish. The ones we pulled in now there were a lot of cysts and worms and stuff like that. Some were just unhealthy fish that had to be dumped. There were two in the last session. One had to be let go and looked sickly in a past session, it had a great big head and a long narrow body and looked more like a snake. The other two were just cysts and worms. Here there were more this time. I think there is something happening in this lake with the fish. Maybe they're blasting more or. It seems like they're testing the water alo.t but I don't know about what they're doing with blasting down in those pits. It could not only be just Diavik, it could be across the area like straight across from the other side, like Ekati. Or I don't know if they have the new pit Jay as well. Look into the frequency of the blasts and what depth they're blasting at. I noticed, as well as a few other people, that the fish were not as healthy as the last time we were out there.

NT – We had this w Bobby yesterday as well. He wondered about climate change.

W – there is a possibility of that. Its changed a lot of things already like the parasites in caribou on Ellesmere island. It could very well be that for the parasites and cysts here. I don't really notice this more in the big lake where I fish back home. But here it's a small lake and more frequent blasting. But in Yk it's a big lake and the trout are only just starting to come back north in that lake now that mining is done. Maybe the intensity or depth of blasts are different or affecting them here.

NT – Monitor that possible change maybe we could find out how much and how deep blasting is. Interested to hear more about what programs in place to continue to watch fish now, into future at Diavik.

W – I think there should be more monitoring done instead of these TK camps where we come out to fish every three years. Its only 5 days. I'm pretty sure the mine could spring for doing this every year. Or they could be supporting communities to do this more regularly in all seasons. If they do this, they could do a catch and release system.

W – Talking about monitoring blasts, levels, rock movement, water movement, some sort of instrument that measures vibration in water. Also closer monitoring of fish themselves. Take 1 or 2 fish every once in a while. Set a short net, like 50 ft, in winter time. You won't catch many. It could be in different places. Take one big net and cut it up into smaller pieces to test different places. You could catch the fish to see what is going on with them. I think there is definitely got to be a program that comes up to keep a closer eye on this lake.

NT – What about water? Notice any change?

W – I can't remember how a glass of water tastes like 2 hrs ago from my kitchen sink so how can I remember from year to year. The water tastes alright to me. When it was taken out deep especially. When its really hot out, shallow water can taste really different because it heats up and changes. The deep water is really cold down there. If you taste something cold, it can taste great. But if you taste something warm, I don't care what it is, it can taste different. Take a beer for instance – warm is bad, cold is good. Maybe there are more microbes closer to the surface than way deep down.

Water to me tasted fine. You have to compensate for the depth. If it tastes dirty or different from the top, it could just be dust floating. But down at 20 m the water stays pretty clear. It could look clear but small tiny things could be inside it. I think you compensate for the depth and coldness of water you can figure out if its good or bad. But if it was really that bad, probably half the fish would be floating.

NT – Any other indicators you'd look at for health of water or fish?

W – I think maybe they're doing enough on the water testing. Maybe they can do a bit more frequently. Like the samples they do yesterday, they only do them once a year. Or was it more?

CE – Twice a year for that.

W - knowing what they discharge at that point, even a small amount of contaminants, you can only put in so much because this is not a major, major lake. At the narrows the current is moving from that other lake in to LDG. It would seem the other lake is quite clear because its moving in that direction. Its not just the amount you put in daily or hourly or whatever, its what you put in over months and years that make up the whole thing. The other thing, is have they ever tested the plants on the bottom of the lake. Maybe they're getting contaminated. The fish eat these and the bugs and stuff on the bottom.

NT – Are you uncomfortable drinking water straight from lake?

W – Not really. If everyone else would do it, I would too. No real harsh smell or taste to it, just a difference in taste between the warm and cool.

I don't come up here that often. Just for the TK Panel or other meetings at the mine itself. I think basically that diamond mining is 90% cleaner than mineral mining. Metal mining has dirty tailings and stuff. But there is some little thing affecting this lake as its only been a 3 yr period since we were last here and there has been a change in the amount of parasites in the trout. Maybe we should process the whitefish when we pull the net. The trout are usually a flesh eater, eh. They go after smaller fish. Whitefish aren't like that. They are little bug eaters, small things, because they got small mouths on them. I don't know what else they could do.

NT – Yesterday seemed frustrated with questions asked in boat about water. If anything to ask instead, can talk about that.

W – I can tell ya something right now. The way the card was laid out, it should have said 'for use in boat' vs 'for use in camp' and there was no break in them.

NT – We went through it with the youth and part of the camp is to teach them and familiarize them with the form. Make it more clear.

W – Format should be laid out better as to where you ask the questions.

I've hunted and fished in a lot of different places in the territories but this was not one of them. I went more towards the west and east and Great Bear Lake and towards Gordon Lake and Lac la Martre area. This is not my hunting ground. But if they drop you in the middle of tundra, you really can't tell one area from another. It looks a lot the same.

END

Jonas Sangris

DDMI 2018 AEMP TK Study

Jonas Sangris, Yellowknives Dene First Nation

3 August 2018

Interviewed by Joanne Barnaby and Natasha Thorpe
Filmed by Craig Kovatch and Jay Bulckaert
Notes by Natasha Thorpe and Colleen English

Years ago, when they discovered diamonds around 92y before that people were trapping up here. I always remember my dad telling me about how the white fox pelt was $1000 bucks at one time. So people came here to get white fox. They'd drive their dog teams here, and on the hill near here they see a white rock and if you hit it with a sleigh, you'd wreck your sled. In those days they were driving over diamonds. They didn't know that. That's what a lot of elders said. That's what they remember.

Tells the story in his language…

I'd like to say that the economy is the best thing that has ever happened. When I was chief, Giant closed and the government was downsizing. I asked the elders 'what can we do'. I said I don't know. They said creator will look after us. A few years later, they found diamonds. We see it that the creator was looking after us. All the wildlife, the animals – we don't feed them, we look after them but they are still there for us. So we need to make sure that the mines are responsible – look after the water, the animals. And employ First Nations people. There are rules in these areas now. Its important to sit down and talk about things. I always think, what's going to happen when its over, what are they going to do. I remember coming here in the winter once and we were flying back home to Yellowknife and I could see all this tundra… (pause for sound issue)

I'm Jonas Sangris. I'm with the YKDFN and I just turned 70 about 3 mos ago. It makes me think about the old people when they used to come up here and they didn't have a camp like this. I wonder how they survive. Its 40 below and they didn't freeze to death. I wonder how they did it? It's amazing. It was a hard life back then.

Speaking in his language…

Dene law. Traditional law. I means that the FN has their own laws about what to do and what not to do. Naou is what they call it. People say that's whats our law. We have our own. Those are the things we still follow today. Recently I noticed in the last couple of years the elders work to keep using traditional law. For example, you should never lie to people. Be healthy. There are 10 or 12 of them. You have to do, you have to know. If you go on the land, you have to take matches, guns and bullet. You need ammo. That's what you live off. Trad law been in place for many years. People follow those words. If you say Trad Law right away you think of the elders that put those together and that's very important to us.

Eka – is caribou fat. Ti is lake. Ekati is caribou fat lake.

I've come up here twice. As far as Mackay Lake. The last guy who came up here was Joe Charlo. Him and his son Narcisse were the last ones to come up here and trap. I came to Mackay Lake twice before the mine started.

Q. Have you noticed change since those days?

Lots of changes because of the mine. Mostly people started to work. Nowadays you have to pay for everything. Back in the day you needed water and firewood. Now you need more. Elders would say non-native make us pay for everything. We were talking about houses and one of elders said can I talk? He said why you say government? Before, If I want to build a house I grab my axe and build my home. Elders were healthy before. But look at me now. I'm 300 lbs and all I exercise is my wrist – I turn a tap for water, I plug things in for electricity. And you need work to pay for all this. I watch TV and look at the old life. I did that for a year in Gordon Lake. I went in fall and came back in March and that was the best year of my life, oh man. But now we have to look after things.

The mines need to keep their agreements. Look after the water, land and animals. We made an agreement on this. They need to check it out and make sure its ok. They need to do that. Its good. If you look at the old mine sites from the 40s and 30s there is stuff still around, they never cleaned up. Here they do a good job, you can see it. One of the things I noticed at the mine here, yesterday there was a west wind and the dust was flying out onto the lake. The elders say oil the road to keep the dust down, they aren't happy with that. The fish we caught last night looked really good. The water looks good. But they should keep the dust down.

JB – so you haven't noticed much change. In water/fish

Jonas – fish look good. I haven't tasted the water yet. Since the mines came there are hardly any caribou. I would go in November to the end of the Tibbitt road and was guaranteed see a caribou years ago. Now we have to come up the winter road and we may not even see a caribou. That's the only thing I notice. It may be just a cycle, I don't know. But I've noticed. If you put something in their path, they have to do around.

What watch?

Reclamation is going to be important. The way it is in the barrenlands. I remember an elder saying what are you going to do with the rocks out of the mine. They said – you see that hill there, it will look like that. But now you see the big hill, its like a mountain. Here and at Misery. I worry about caribou being able to go over that. I hope the FN and other people will get jobs with reclamation and try to keep it clean. But I think its not going to be the only mine, there will be others coming.

Fish talk – what say?

I don't know. Its something that maybe they want to go to another lake. It would be hard to take all the fish out of here. It's a big lake with lots and lots of fish. The fish are probably saying that it's a mess. Pollution of water maybe. If you wash yourself, you notice right away. Fish are like that, too. They keep themselves clean. Seagulls feed then land on the lake and wash themselves. They've done that for years and years. One other

thing elders say, I always remember three old guys hunting at Mackay and there were whiskey jack. Said no matter where you go on the barrens, it can be 30 below and they still show up. He said 'I wish I could be like whiskey jack' 'why' 'they fly around and are happy and don't have a care' 'why' 'they don't have bills to pay' (laughs)

NT – importance of monitoring/watching, reclaiming – FN work together – what does that look like? Continue a camp like this, form an advisory board? What look like?

J – those dikes have to be filled. They have to look after that very good. So that caribou can use the area again. You don't want to leave a big whole. If they fill it, the caribou may come back. Try to keep it the way it was in the past. It would be hard but there is a lot of technology these days.

If the land is healed, you'll know if there is good fish, good animal, good water. If I come back in 10 years and see caribou walking over that hill, I'll be happy. If the fish look good, that's good. When mines close, the elders always talk about people moving offices and laying off FN people.

Work together with other FN orgs?

J – Yes. Look around and see what is happening and pull together elders to make recommendations and let politicians know. I don't know about the Wek'èezhìi Board and all that. It's not our people. They don't know. I think our elders need to look at this stuff.

On the FN side, if anyone goes camping or hunting, they clean up after themselves. They take everything, they clean up after themselves. We need to see that. Especially with the diamond mines. Around town, there are lots of old mines with garbage or old dynamite like they talked about yesterday. But I'd like to see all those pits be closed down.

Elders use moss to wash their hands, it's very clean.

JB – in past, things people would watch for to tell if land or water or fish is good, or warning signs that it wasn't good? Animals or birds staying away from an area

J – One of the things the elders always talk about is that you watch the birds. The geese. They do north and then later, yeah, they go back. There is always 2 lines, one this side, one other. To north is long line, there will be lots of caribou on the north side. They watch for this to know where caribou will be. When you're coming like this at night, they watch the northern lights. When you see the lights, they like to go towards the sound. They know which way to hunt from the lights, where to find caribou. When caribou move, their feet make sounds and the lights follow. And people know this. Animals are really sensitive. One of the reasons they are not around this year is lots of burn areas. North arm, around Mackay Lake. They won't go to burn areas, they go where their food is. There are no trees in burn area, no food. They won't go back there, they know that. There is lots of smoke on the lake or water, fish will move away from those areas. If you see a caribou walking, they'll go a different way. That's why caribou are going further east. There is lots of traffic. If you fly back and watch the lake, you'll see the ice road the whole way. Fumes, that's bad. They know that. They move away.

The fumes go into the water, too, after it melts. Fish don't like, they'll go somewhere else. Also climate change – its get warmer and the water changes. Not only here but up north too. The world is changing, something I s happening. One old man said the world is round. The top part is big and its getting warmer. In his language he said…**… meaning that its harder to breathe now there is too much pollution and it goes up and warms the world.

NT- If fish could talk, what say. If water could talk, what would it say?

J – If fish could talk, they'd say give me a sunglass or goggle so I can see where I'm going. Underwater there is all kinds of species and they can sense. If you cut fish on the side, whitefish anyway, on both sides you see a little white thing. That's their sensor. They have senses that go from neck to tail. Inside there is a white line. Its their sense. Its like they can hear, they know whats ahead. Same thing with some animals. Wolverine. If they hit a lake after walking on a trail, you'll notice that they'll lay down for 10-20 mins before they move so they can look ahead and sense what they're going to run into, what is ahead. Talking about wolverine, there is a guy named wolverine – Ernest from LK. Because he likes to grab stuff. He helps himself (laughs).

Speaks in his own language…Masi.

END

Julie Wedzin

DDMI 2018 AEMP TK Camp

3 August 2018, 10:30 am

Interviewed by Joanne Barnaby and Natasha Thorpe
Notes by Colleen English
Interpreted by Peter Huskey
Filmed by Jay Bulckaert and Craig Kovatch

All in Tłįchǫ – *translate later*

She's very thankful that the mine is testing the water. They do the same in Behchokǫ̀, which is where she gets her water, and she thinks that is good.

She talked about the importance of fish for the people, that was their livelihood in the past. And the caribou too. Also it was important for the people and she wanted to see if it was ok to talk about the late Chief Jimmy Bruneau because he was the one who travelled in this area. The story is kind of long but it's important to this area. She wants to share it in the meetings or now.

That's the story of when Chief JB speaks, his words are strong. It shows how this one guy . . . Cops arrested someone going hunting in Behchokǫ̀. The story began with her and her husband going back to Wekweetì and in the rapids in one of the big lakes the kicker broke down and while her husband was fixing the kicker, Chief JB was coming from the other side and he set up a camp and let them stay for the night. Her husband asked the chief to tell a story about how it would be like in the future. And the chief was right about how everything changed and kids were out of control and stuff like that. She's telling the truth. This is a summary of what she said.

She seen them taking samples but from her observations, she can touch a fish and feel the texture to see if it's healthy. If it's too soft you can't work it up. If it's healthy, you clean and cook it. If it's not healthy you just put it away. I think it's good what they're doing here but I haven't seen the whole process yet so I'll have to let you know more later.

You see by the gills. If it's red it's healthy. If they're white-ish it's no good. If the texture of the fish is soft it's no good, if it's healthy it's kind of hard.

She said that a long time ago before the 30s the water used to be very pristine. When the industry started, near Behchokǫ̀, the mining used chemicals that changed the water and it is now murky and dirty. They keep checking the water. At the same time, the older people, the elders, eat country food like caribou, rabbits, ducks, fish. A lot of young people nowadays are diabetic because of the processed food they eat. She's not diabetic because she eats country food. When people come to visit her she gives them 5 fish to eat and if they ask for caribou she'll give them a small piece if she has some. She is the boss of her place, but who is now the queen while I'm here? The queen is gone! (laughs)

JB – You're queen here for us for 5 days

J – I can be the queen anywhere! (laughs)

JB – Working together with other groups

J – She's very happy to be among the group here. We make jokes together and laugh together. And we see the youth fishing and I'm very happy and they're happy catching fish. They should dance when they catch fish!

JB – Same approach as this in future?

J – She's very happy she sees the group working together with Chief Jimmy Bruneau and sharing stories. She is aware that they're taking fish samples and water, but they also do this with caribou and moose. If harvesters find unhealthy animals they take the liver to ENR. She's happy that they're taking the fish and water. She would like to walk on the barrenlands but to do this they should be in a group of 3. For safety and to talk about wildlife.

JB – Something more she wants to see?

J – She said that in the past they used to check fish upstream from Behchokǫ̀ and they probably still do that and checking water. These people they don't contact her to see if she can help doing research on fish. She lives alone on Frank Channel, she doesn't have power on the one side where she lives. They do on the other side. She lives self-sustaining and she's almost 80. She starts her own generator. She still lives this way.

JB – Anything else to share?

J – She made reference to the Chief again. It took them 5 days to arrive in Wekweetì and the people living there, they were staying on the island and were running low on food. While they were traveling in that area he (the Chief) said to go hunting over the hill. The island they were living on, nobody could go to the washroom! Everyone would see you. So everyone went to the mainland. Then the next day her husband said lets go hunting for caribou. They found 21 caribou that they shot. That's how she remembers her husband. They were at Winter Lake.

She doesn't really remember what year this was – her children were just infants then. Her husband passed away in 78. While living in Wekweetì her husband said lets go to Behchokǫ̀ because there was no school, no health center or anything in Wekweetì. He wanted his children to be educated and not reliant on social assistance payments so they moved back to Behchokǫ̀. And now she's happy that they did that because some of her children graduated and some went on to get masters degree in different fields and now they've moved on to live on their own.

One time the Chief JB asked her husband to find a ride to check out the area in Edzo where they were going to build a school. Where he sat on a big rock, that's where they built the school. There is a big rock sitting there beside the school today. She is telling stories from her heart and sharing her experience today.

NT – Tlicho protocols on healthy land, fish, water?

J – A pretty long time ago before the mines or industry came the water was pristine and wildlife healthy. Now have to monitor. And now because there is less and less caribou we have to rely on buffalo. And now because there is no caribou we may have to rely on horse to do our sewing. I think she is done for now.

She said she didn't know she was doing videos but she is happy now she has the chance to share this way. She said young and old people watch these things now. Masi.

END

Storytelling at the Narrows

August 4, 2018

Interview with Julie Wedzin and Jonas Sangris (small section by Ernest Boucher)

By Natasha Thorpe

EB: Was here in 2012 and saw 3 grizzly bears, lots of fish. Used to come here 40 years ago and we could drive the boat right up through the narrows. I'd lead 3–4 boats. Water level used to be a lot higher. I don't know why it is too low. Even in Kugluktuk, the water level is lower.

Picking Labrador tea here, much better than anywhere else.

****

JS: I was here 3 years ago looking at where they want to put the Jay Pipe. Three islands, inside right around they want to make a dike. Take out the water and pile it over there. Put a cap there. Last few months they maybe scrapped or delayed the project. The esker that starts there goes straight through almost to Ekati they were checking for place to put the road to it wouldn't go through the esker. They were looking for wolf dens, foxes and figure out the best place to cross. A few elders went. After we were done, we landed on that side and walked around. That time we saw some bears. As a kid I went as far as Mackay Lake, not this far. My dad was born at the end of Mackay Lake. Born on the tundra. They made a lay down area and he was born there. His name is Joseph Sangris. They call him Natawia. Born on those kinds of willows.

We boat all over Mackay Lake, all over to the end. Couple days to go home. That time we had a tent. Not a pup tent. A sleeping tent. Fred was there too. Almost 11 am, Joseph says on Sunday. He sat there doing a prayer, somebody said Hey! the tent is on fire! We ran and threw stuff on it but the whole tent burned down. Don't say anything until we get back. It was bad. So we headed back. Some of the stuff we lost, our bedding, but it was okay. Back in the day, the cloudberries and blueberries were the only treat we had. The cranberries were too small right now.

Beautiful country. Lots of seagulls here when we arrived. They are fishing. The youth have some fish already I think.

Q. Was this known as a fishing site?

When they come out here in the old days, because of the current, the ice is not too thick so they set nets. Go out there and cannot break ice, 6-7 feet so they set nets here. Fish for dogs when they had a dog team. Lots of ekwo, caribou.

JW: I've only been in the Wekweetì area, I don't know stories from around here. She has always been in the Wekweetì area, but not here. When they migrate, we see lots of caribou in the Winter Lake area, but I think people have been in this area because there are lots of caribou here at the Narrows. The population is not down. There are lots of caribou still, they are probably hiding. Sometimes if you go boating along the shore awe may see caribou. When we walk on the caribou, if we are lucky, we might see caribou.

Q. Is there anything you need to do to keep your caribou luck?

JW: The only way we are lucky is when we go somewhere new part of the world and we offer gifts to the land. That is the way we are lucky, giving gifts to the land. There are legends from our ancestors that if we go boating and see growth like this, take a little piece and offer it to the water, we may see caribou. That is how our ancestors did it and how we do it to this day.

Q: I am wondering how Julie feels to be at this place. This beautiful land and the mines in the background.

JW: I am very thankful and it keeps me strong to be on the land again. My wellness is here now. She says that probably Jonas is feeling very happy to be here because he is the one to go hunting here in this area. It would be good to see caribou. Happy there are berries here and no chemicals and it tastes good.

Q. Why did you change your mind to come here today?

JW: I am happy I joined the trip. It makes me feel strong and well to have a strong heart to be here. The land looks beautiful. It is good to be here. We are happy to be here amongst these people around this group. Us elders they feel young now, out here. She is going to telling stories when she goes home. She'll say she was running on the tundra like a young girl. One day. [laughter]

I am teasing Wayne, sitting around without any woman.

When I first travelled to Wekweetì and there were no houses of buildings and Wekweetì didn't exist at that time. When I first came, they started building houses. Just before they made a settlement, I was married at that time. The men were the head of the house and made the decision. My husband made the decision to go back to Behchokǫ̀. When the couple get marries, they life a long time and raise kids together. Men would hunt caribou, ducks fishing, all the wildlife. If you live w a good man that harvests, it is a good life that they life, a healthy life. Now today, when people get married, they often split up, divorce, it is not healthy. At the same time, if we find an old man able to do the work for us, what's the use of having an old man around not able to do anything? [Laughter] I am thankful to come on this trip because I can see the tundra, the barrenlands and it looks beautiful. I am happy I made the trip to the Narrows. I'm glad I was brave and strong to come. Now I've sat I may not get up again.

JS: When I look out at the Narrows and see the mines, I feel happy and sad in a way. I wonder how an elder would feel in the past. They don't have a change to go back here. Sit around, nice and quiet. This morning, I sit around and I here ale machine running. All those big hills now, come from underground. In one way, happy and sad feeling. When you think of the elders in the past. In the past, the elders look around for caribou, white

fox, that was there way of life. Now it is hard. I never thought there would be a mine here. It is good for the economy, for people, but FN are still hesitating. It is hard for them, especially the second generation, because the first generation all they did was trap and hunt. Now we are caught in two worlds. We like to come out here, but you need cash to travel up here,

Before never like that. We had a dog team. As kids we would go get caribou and fish for your dogs, food. If I put 5 dollars won and meat down, which ones I am going to take. I'll take the meat, I know I'll survive. Money, what I'm going to do? That's what the elders will say.

Nowadays you need something to survive. It is one other thing. I'd like to see them pour money into education, post-secondary education so that way they are going to survive. They are not going to survive out here on the land nowadays. Some probably could but not all of them. We always remember when I was about 15 I came home for Christmas holidays and my dad said, understand English, but speak our language. You are not going back to school. I set a trap before Christmas, I want you to come w me and visit all the traps. Holy man, I was happy, because I don't have to go to school. He said I didn't have to go to school.

Nowadays you cannot do that. He taught me a lot of things, how to survive in the bush. It was cold in those days. If you going to sleep like that, you going to freeze. He told me to get up and make a fire. Make some tea. I was thinking how to get water. Go outside, he said, Take the top snow and use the bottom snow, that is the best, give you lots of water. That time, in the fall, freezing rain. That is the best. Out here there is nothing, no store. If you are cold, you need to get wood that is the only way you are going to survive. If you are thirsty you have to make water. If you hungry, you have to hunt. If you don't kill anything, you'll starve to death. That is how they taught me.

Nowadays, I could go both ways. Go to work or go to the bush. I can survive anywhere. But my kids wouldn't. My kids learned the white ways now. It is too bad those things happen. Not only the mining, the government, killing the First Nations people off. You have to have a gun license, permits, you look at the gun law, they cannot even buy shells, need a permit. Those are some of the things. Trapping issues. Humane trapping, they shut all that down. We never heard of those things before. One of the elders said, they took all those things away from you, put you close together in town so you have to work, pay taxes, for power, that's is how they want your money all the time. If you really think of it, it is true. Sort of a balance of both ways. Mainly now, today, the economy will be stronger. I made sure that all my four kids graduated. I told them, go out in the world, find your way to survive for your kids. I'm not going to tell stories all the time. Good, but in a way, it is sad. Sad they are spoiling the land. The other way, it is good, IBAs, but how long that going to last.

Mine done in 10–15 years, then what do we do? I guess the government is going to build a bigger jail. If they got nothing to do and no work, they'll get in trouble. That's what is happening now. I feel sad for the younger people today. Put them out here, they will survive. Put them downtown, they break windows, go to jail so they can get 3 meals a day. In the fall, you see the routine the kids go to jail for the weekend. They are not bad. I remember one of my cousins, working at the mine. What do you do? I drive trucks. You have a licence? No, he said, but they are desperate to work. Now, last year, one guy has no school, cannot read. No academics. I can't read so they let him go. Now it is starting to happen. He was at the mine. Happened to a friend of mine. The let him go. For safety, I could see that, but it is hard. Damned if you do, damned if you don't.

END

Storytelling at the Narrows: Berries and Plants

Daily Notes
2018 AEMP TK Camp
Diavik, Lac de Gras
August 4, 2018
Day 3 – berries and plants at the Narrows with Terri Enzoe and Nancy Kadlun

What are your favourite berries?

T- blueberries. The taste and you can make jam, you can have pancakes. Or you can make blueberry muffins anything. Right from scratch you can make blueberry cake. You can try them with anything.

N – blueberries. Cloudberries are my favourite because when I was a little girl me and my mom would pick lots of berries and they were my only fruit in the summertime. You can even make akpik jam. Akpik are cloudberries. As a child I ate them plain, and as I got older I started making jam when I make bannock.

What about medicinal plants? Are berries considered medicinal?

T – Yes, good for cleaning your system.

Other plants? Ernest took Labrador tea for his cold. Do you use that for colds a lot?

T – We use that for regular tea or for colds. A regular tea when you're out in the bush. If you run out of other tea, it's your second option. You can make Labrador tea.

N – Never had it. I've never had tea from the ground before. Other people have it from leaves but I haven't tried it myself. I will try it one day somewhere.

Are there other plants that you use medicinally?

N – You know those powdered mushrooms. I've heard of people using them by spreading them on sores and it helps you heal.

T – I use them. I don't know around here, I'm not sure. If you go to where there are little trees around on the barrens. We use spruce gum for cold sores. At the end of it, when spring comes there are little fresh leaves popping out, we pick those. Purple ones that come out, when babies have sores in their mouth, we boil this and then use a cloth to wipe it in their mouth and heal their sores.

Grow up picking?

T – Picking with elderly women that go out all the time. They tell me which are plants I can take for medicine. It's not just any kind you can take. Before taking anything from the plant you have to give tobacco to take something from the plant.

N – I picked with my family. Me and my sister and brother were the only ones in Arctic Sound by Hood River. We were in cabins. Every fall we'd try to get as many berries as possible because there was no store.
Preserving?

N – Eaten right away. Or don't completely seal them and keep them where there is no sun. Then they last awhile.

Do you ever dry berries?

T – Cranberries only.

What can you make with cranberries?

N – Muffins.

T – Save for Easter and Christmas for cranberry jam

Did you learn stories about plants and how they came to be, or more learning about what it does for you?

T – When growing up, elders would talk about how plants would heal you. And that's where I learned it from.

Are people still teaching that today?

T – Yes, they teach their kids.

Are women always the experts for plants?

T – The men too.

N – Both are in my area. Everyone tells stories and teaches.

Caribou food – what do they eat?

N – Little lichens, I don't know what else. I've never really watched what they eat. I know they eat lichens though.

T – Lichen I guess. That's the only thing I know they eat.

END

Day 1 – 2 Aug 2018

Daily Notes
2018 AEMP TK Camp
Diavik, Lac de Gras
August 2, 2018: Day 1

Participants:
Julie Wedzin, Peter Huskey, Mason Beaverho; Wayne Langenhan (NSMA); Jonas Sangris, Zachary Sangris (YKDFN); Ernest Boucher, Doris (Terri) Enzoe, Eric Marlowe (LKDFN); Bobby Algona, Nancy Kadlun, Regan Adjun (Kitikmeot); Natasha Thorpe, Joanne Barnaby, Kathy Mai (Thorpe Consulting); Jay Bulckaert, Craig Kovatch (Artless Collective); Kyla Gray, Sean Sinclair, Shelby Skinner (DDMI); Colleen English (C&E Consulting)

Travel/fly to site, transfer to camp by boat; select tents

Feeding the fire and opening prayer – Jonas Sangris and Julie Wedzin

Opening Circle

Julie: . . . at one time RCMP came up to me. I was smoking fish and cops came up to me and thought the tent was on fire. Also a firetruck came along. The RCMP told the fire chief that the old lady was smoking caribou hide. I'm very thankful we arrived here safely and we'll be sharing many more beautiful stories like this. My husband passed away years ago and I have 13 children and raised 3 grandchildren. When my husband was alive, we took a trip to Wekweetì. Other people traveled with airplane at that time. It's a long distance. I had 5 children with me and it was hard work. We would often wait for one another crossing lakes and that's how we arrived in Wekweetì. That was the hardships we went through. You get tired when you do this kind of work. I have lots of stories but will keep more for tomorrow.

Doris – I am known as Terri at home, but Doris when I travel. I'm from Łutsel K'e and I like the outdoors. Right now back home people are going to the spiritual gathering at Ft Reliance and I'm missing it. I will go if I get home in time. And I will go moose hunting, maybe muskox this year. That's about it.

Nancy - I'm from Umingmaktok originally, and I've lived in Kugluktuk for 22 yrs. I drum dance and sing and I am going home after this then going immediately back to Yellowknife to do a drum dance and sing in a performance.

Kathy – I'm a visitor. I'm really happy to be here and meet everyone. I've never been to the barren-lands. And I have never worked 100 fish in one day and I'm a bit worried! Natasha invited me to come. My job is a fisheries biologist and I deal with salmon and sturgeon a lot so I have a lot to learn from you on trout and whitefish.

Wayne – I live on Hwy 3, most of you know where that is, 15 mi west of Yellowknife. I've been there about 18 years. Its more peaceful out there than in Yellowknife. I want to stay a couple more years but my wife is putting the bug on me to move. We're snooping around, maybe Yukon, there's gold up there. I'm always watching TV programs on the Gold rush, and gold. I want to give it one kick at the can before I get old. We have 2-3 years to think about it and then we'll have something straightened out. It takes time, especially this day and age. Not sure with weather patterns in different parts of the world – rain, flash floods, you never know. So you have to give a move some thought. Happy to be here and see familiar faces and I hope everything goes well out here as it has in previous camps. I must mention that I really appreciate getting the same cook back.

Shelby: I am with the Enviro department at Diavik. I met a few of you at the TK Panel and I'm happy to meet more of you.

Rod – I'm live in Thunder Bay, and work with Discovery. I am your go-to guy if you need anything or need anything fixed here. We'll look after it.

Uyarrai– I was born in Gjoa Haven originally, but I was raised in Yellowknife. I am working with Discovery as well. I'm excited to be here and looking forward to the fishing and camp.

Craig – With Jay for video. I'm from Hay River. This is my first time this far north and I'm super excited to be here.

Kyla – I was born and raised in Hay River. I work in the Environment department at Diavik. I'm very excited to be here, and I will be here all weekend to help with the camp.

Zach – I am from N'dilo, just outside Yellowknife, and I was born and raised there. My great grandpa took me out on the land once and he took 3 things: string, matches and a knife. I was about 7–8 yrs old and he left me on the land for a few days and told me to survive. I survived and am still here today. I love being here and helping, ask me for anything. I like to move around, not sit still so ask me to help. I'm really excited to be here.

Sean – I've been here at Diavik since 2011, this is my second TK camp that I've been helping with. I will be in and out and I'm looking forward to see what you catch.

Mason – I am from Whatì. Before I came here I was at Whitebeach Point on Great Slave Lake where we were discussing protecting the area from oil being dug up. We were fishing and collecting water from the lake, basically what we'll be doing here. I'm really looking forward to this weekend and it's great to see some old faces.

Eric – This is my first time at Diavik, but not my first time in the barren-lands. I really enjoy being in the barren-lands.

Regan – This is my first time at fish camp, and my second time at Diavik. I look forward to learning from you guys.

Bobby – I'm from around these parts. Specifically, Pellatt and Contwoyto Lake areas all my life I grew up there. My cousins, parents, aunts and uncles. On Pellatt Lake we had our own hunting community of people from all over – Baker Lake, Gjoa Haven. People used to be scattered all over these areas in the old days making hunting camps and living off the land long before white folks came to this area. From there I have been raising my family as well just to give them a chance to see the land and feel the land as I have as a child. These days we have a hard time with that. Raising children in communities is different from on the land and we're having a harder time raising them now. The way I was taught was to live and be as one as a family and sharing stories and keep the stories going along. I hope my kids do. They have that in them. To this day I tell them you should go back out to where I raised you. Maybe do that with your family and become one as a family. I raised my family to have two choices in life – education with white folks schooling and I taught them out on the land. They were with me all these years. I keep telling them I showed them all the trails and everything and it's up to you now. I'm older now and I can't get around as much because of my health, back problems and surgery. I was raised on the land to be at one as a family. In the communities now there are elders and youth having a lot of squabbles in the community. It's become harder to keep their mind straight in life in the communities. That's part of my story. I tell this for new people who came to this camp.

Ernest – most of you guys know me. I come from Great Slave Lake. First Nation Treaty 8. I've been around here since before some of you were born. 1968 staking claims. I've been here about 4 times this year. I know where all the fish are. I work for DFO (Department of Fisheries and Oceans) on Great Slave Lake and in Saskatoon with Marlene Evans. I see some new faces this year. I knew one guy from Kugluktuk sitting beside me here. He's been around, I can tell. If you tell a person who you are, you remember. I've been around - Mackenzie River, Tuk(toyaktuk), Beaufort Sea. The way I look at it, we don't have enough translators. Ours for Łutsel K'e is working for CBC in town right now. I'm 77 years old on Dec 2. I don't give up. I'm a hunter, I'm an elder. I lost my voice because I had a bad cold. I have lots to say. She knows me, and she knows me. Its good to know a person – who they are and what they're talking about. I want to see how this weekend goes. I went to a meeting in Cambridge years ago as a councilor. I've been to Whatì, Behchokǫ̀. Its late, I'm starving.

Colleen – I've been fortunate enough to have worked with many of you in the field on programs at Diavik and there are some new faces to add to the mix. I'm excited to meet those of you that are new and to be here. We have great youth from what I've heard around the circle. Please have patience with us as we work through all of the fish and the water to record your knowledge and words.

Jonas - I am Yellowknives Dene First Nation. I like being out here, I was here once already in 2012 and I noticed one thing so far - the water went down a bit. It's good to be out here. Lets do some work with the youth. It will be very interesting. Masi cho.

Joanne- I'm from Hay River. I've been involved with Diavik for almost 20 years as a contractor. Started with doing cross-cultural training and had about 100 people go through my course. Started working with Natasha in this program and the TK Panel that some of you belong to. We've been doing that together for some time. Great to hear from the youth especially the openness and desire to learn and to help the elders. My heart is warmed every time I see you elders and I'm grateful you are well enough to come back and be a part of this.

NT – It is a tremendous honour for me to work with these amazing elders and I'm excited about the youth we have here. To have Kathy here to help with TK, documenting, and fisheries knowledge. Please don't be shy to ask for anything you need. Tell us to speak up, shut up, whatever you need. We're here for you. This is your camp. It's in response to your wishes that you can keep making sure that the water is good and the fish are safe to eat. Before I hand it to Peter, I just want to say that we're lucky Hilda is back again. 12:15 is lunch today. Once we finish, we'll go through some of the Health & Safety stuff and talk about our plan today and loosely for the next few days. So we'll meet back here about an hour after lunch.

Peter – I'm from Behchokǫ̀. I've been interpreting since 2005. This is my second camp and I've been working with the TK Panel for I don't know how many years. It's a very good camp and I appreciate you inviting me back again. Please keep your headset for the duration of your time here and keep good care of it. It is rental equipment and we have to respect it to make sure it keeps working.

LUNCH

Kyla – One of the biggest concerns is the bear fence. It is on and activated at night. Walking on the tundra outside the camp requires checking in, two people and an air horn. Let me know when you go and return. Boating requires PFDs. Minimum 2 people on the boat, there are lots of shoals and shallow areas on LdG. We have shoal maps for each boat, and depth finders. Smoking is only at the fire pit, not in tents and not during meetings. Mattresses are very flammable. There is a rifle on site, Kyla and Rod are allowed to use it. Kyla is the bear monitor but it is a group effort. Do bear scans when you are walking. Every sleeper has a fire extinguisher,

smoke alarm, CO alarm and air horn. Emergency is one long air blast. CO and smoke detectors in every tent and they are effective.

Colleen - Safety is very important at Diavik, a priority. We need to be comfortable with driving boats, who is driving, etc. Winds above 15 knots means that you can't go out on the lake. We will monitor weather regularly. Uneven ground here means it is easy to twist an ankle or fall down. Going on or to the boat dock, getting to your cabins, etc. Don't hesitate to ask anybody for help with anything. Rod can teach you how to turn on/off the stove in your tent. Please wash your hands for meals. Use mugs to reduce environmental waste please. Tidy the campsite as we go.

Rod – Showers are available. Water can be very hot. Turn on cold water first. No paper towel on top of hot water tank please. Please don't touch the bear fence. 13,400 DC volts is a good bite if you touch it. Hilda and Rod have first aid.

Colleen – Fish waste has gone in garbage bags before and taken to site for incineration. Is there a better traditional way? Is there a way that you want to do this? People last time mentioned putting the guts back in the water so that nothing goes to waste. We can do this, if you would like. Please let us know.

Nancy – leave it by the water for the seagulls or shrimp. They will stink on the land. Bears still eat them in water. They will make the land really stinky.

Colleen – We would put it in a bin to take to another part of the lake.

Nancy – Freshwater bugs will get them.

Colleen – We have someone with a deet allergy. So they have Deet-free insect repellent. If you want to use repellent with deet, please only spray it in areas away from other people. Also sun screen. Outhouses have Hand sanitizer, as does the kitchen.

Natasha – How many feet from the water before we wear a life jacket? Where do we smoke?

Nancy and Regan got correct answers and a prize.

NT – let us know if we ought to go inside or if it gets too rainy. There are 4 main activities. Interviews, spending time with Elders in a bug free tent or out on the tundra, a place of their choice, where we spend time to ask you about fish, water, some of your stories. As you know, we have cameras going most of the day, but it's a time to honour you and share your stories and expertise.

The other two elements are fish and water. Elders said since 2002 they wanted to see and taste with their own eyes what was happening with the water.

A lot of time and planning goes into the little things to make sure that there is sharing between youth and elders. A draft report is put together in the fall and brought back for people to look at and see if it is right. There are two things at the end of the day – some people like a report and some people want to watch a video. So we have a team here to make a video to share with youth and elders that aren't here so they can see what happened.

The youth wanted to work the fish and work the camera in the past. If one of the youth would like to learn about video and documentary making they are available.

When we met in June we handed out a 'Consent Form'. We will hand that out. Please read it carefully. We are asking your permission to record what you say. You have the choice to remain anonymous. Your participation is voluntary here.

I think that it is important to let people check out the drafts. We don't want to assume that we have got it right. In the fall you will have the chance to view a draft video and report.

4 Areas – Fish tasting and water tasting. Spend time to understand who should be driving the boat and where we should be fishing. Set the nets in the evening and in the morning process the fish at the table. Kathy will lead what a fish biologist would do. Weighing, measuring, taking tissue samples for testing. Also, at least four fish to cook and taste. We will have an elder talk about it from a traditional knowledge perspective. Nancy showed up the men with her ulu last year. She was talking about the color of the gills, whether the tissue was mushy. Whether it had sat in the net too long. The youth will help write down and record the lessons that your elders will teach you what a healthy fish looks like.

The form is not a science form. It comes from meetings in 2012. You told us what to look for – like whether the fish is fat, has parasites etc. We will come back and bake, boil, fry and grill fish. Then we taste them and put the youth to work working out how people answer the questions about how this fish tastes to you. Depending on how many fish we get we usually have to set the nets twice. Last time we had to set the nets three times.

Colleen – We do 20 trout for heavy metals. In the past people have wanted to do whitefish. That is a possibility. We can incorporate a whitefish sample if people want to do that.

Natasha – Any questions from the youth? (Explains that we will walk through the forms with the youth this afternoon.)

Natasha – The third part is water. Is the water healthy? Diavik has water sampling stations all over the lake. For this camp we will take your direction on where we will collect water samples. We will make tea. We will taste it, see how clear it is. The youth will make comments on what the elders are saying. We are going to test the water without making tea. Do people want to just drink water? Does anyone have thoughts on boiling?

Ernest – We boiled the water last time. Fred said it can show oil sometimes. So boil it this time.

Bobby– Maybe we should boil and taste it cold.

Natasha – So we do three – tea, straight from lake, and cold boiled?

Bobby – Some lakes taste differently straight from lake to lake. On our walks in life we drink the cold water straight. Just knowing that each lake has different taste in water. Because of the rock content. We have been tasting it for years.

Colleen – I just want to be clear for everyone that the mine uses the water, treats it and puts it back in the lake. Some people might not be comfortable drinking the water straight from the lake because of this, so I want everyone to be aware and have a chance to think about this. The water is sampled a lot and is good quality, drinking water quality. Diavik also takes water from the lake for use on site.

Julie - We fully understand about the water. The water I drink is from Behchokǫ̀. When we drink water from Frank Channel we boil the water because it is murky, it seems like there it is yellowish on the top. But during the winter months, the water is very clear when we fetch water form under the ice. But when we check the nets, we keep an eye out on the fish, the texture, the health of the fish. So sometimes we ship the unhealthy fish to get it tested and they do samples. When we catch fish, we take a look at the fish and make dry-fish if it is healthy or cook it. If it is unhealthy, you can see by the gills. If it is white, it is no good. If it is red, it is healthy. We catch all the fish and clean it and take all the guts and what is leftover we put on the river, on the island and the seagulls come eat the leftovers. Sometimes we see bears in that area when we do that so we have to keep an eye out for the bear. Sometimes it goes to the island to eat but doesn't go to the camp. You have to really clean the fish very well and do a good job and make sure the bear doesn't come to the camp. One time I was cleaning fish in the tipi with canvas cover. There was a noise outside and I walked out and there was a bear standing there. That one time the bear came along and was standing there and I didn't know what do to I was all by myself. There was a door on the tipi and there was a log so I took the log and started banging on the door. I talked to the bear and said go away and mind your business. So it went on its paws and gently walked away. Today I have two dogs with me. One time there was a bear coming near and the dogs started to chase the bear away. The water in Behchokǫ̀ is very murky and in Wekweetì it is clear like this you can taste the water by boiling it, straight from the cup on the lake. You can do that. When you set nets and back at home my

children would tell me the health of the fish, the texture, we can explain things here. Same thing. I can tell them and I teach them there, and can here too. As youth, we have to teach our youth our experience. This is the only way the youth can learn. That is how we have to continue to do that.

During the winter months I teach the youth how to check nets and how to tie and untie the rope and put the fishnets out. I continue to teach those things. It will be good for the youth that are involved today to learn as much as they can for these elders. That is what we are here for, to learn from one another. It would be good for the youth to learn how to make dry fish. I better keep some stories for tomorrow. You'll be laughing.

Natasha – We should have you tell that story as part of the interview.

Julie – Later.

Natasha – The last part of the four components is 'trips'. We have been hearing that you want to go to the Narrows. And also to boat closer to the mine to look at it with your own eyes.

So, with all these things we want to do we have to plan carefully. Three days, all day. Monday we leave to go back. *It starts raining. Everyone goes inside.*

Natasha – So where do we want to put the nets? The weather forecast is that it is going to rain tonight.

Wayne – We should call it off and come back next week.

Ernest – Set the nets close to the dyke by the island. A second one right out from the dyke.

Jonas – No comment. (Joke) By the island.

Natasha – Shows maps of the lake. A regular one and the map for the water sampling program. A map of the mine site. And then a map of different shoals. Ernest wants to mark on the map of the water quality sampling.

Natasha hands out maps for water sampling and for where fish sampling was last time. Last time they didn't get as many fish. Natasha shows Ernest where they put them last time. In 2012 they put a net close to the mine site. Ernest is suggesting they put in a net again. Ernest points out where - for everyone to see. He shows where fish go through and where they spawn at the Narrows in September.

Colleen – Where Ernest is showing is where we were driving to get here. One net in between the gap between the islands and one out in the open water.

Natasha – What do we think of this suggestion?

Jonas – Right in the gap where the water comes into this lake from Lac Sauvage. It will be hard because it is deep water.

Colleen – The only challenge is because the Narrows is far and if we set one and the weather changed and we could maybe not get back. If we went to the Narrows, we could set a net for two hours or fish with rods from the shore.

Wayne – August and I, we set a net right here and if it gets rough we could set a net just to the left of the dock. So his suggestion is the same place as 2015. If the weather gets really dirty we can set a net and pull it without problems.

Jonas – Like the site by the airport at the intake. Just little islands out there.

Colleen – At the diffuser, you had an anchor on the island and set up a net right there.

Julie - Set nets in the channel. If we set nets right away the fish would be caught right away. How many times do we check the nets?

Colleen – We left them overnight in the past.

Natasha – Think about the weather tonight. When and where do the people want to set the nets?

Jonas – On the agenda it says set the nets after supper.

Colleen – We can check with the airport and see whether there is a storm coming in.

Natasha – Hopefully we can get to the Narrows. Then we have three choices. 2012 in that channel. 2015 – a little closer out there.

Jonas – Where does the end of the lake go to?

Bobby – Coppermine River

Jonas – How are the fish on the Coppermine River?

Bobby – People are having to bring their char to Renewable Resources more than in the past. In the last couple of years they have been observing the fish and the fish seemed sick. That's what we have been doing in the last couple of years. We aren't blaming anyone right now. It's that micro-plastic in the ocean that's all over the world. It's the same with seals and whales. Whales are coming to Cambridge Bay they are coming right into the bay. More belugas than narwhals coming into the bay. And from those observations they are looking for better feed and better area. Animals are just the same as us. They stay away from what they don't like.

Natasha – We generally set the nets tonight and retrieve them in the morning. Then we do the same thing the following day. While one group is out in front setting the nets and the other group is interviewing the elders. Ideally we want a fisheries TK expert and youth. Two boats with four people in each boat.

Bobby – Ernest knows where all the fish are.

Natasha – Two boats with two people. We need volunteers to go retrieve the nets.

The forecast for this evening. Thunderstorms around 8 o'clock. Winds gusting at 30 mph. Currently it is from the WSW now.

Joanne – Should we set the nets now?

Natasha – If we set the nets now it is not good for tomorrow? If the weather is decent tomorrow morning then we know we can get the nets.

Kyla - No precipitation tomorrow. 10C temperature. Winds 20 knots.

Natasha – I don't want to suggest, but with that first set we might want to set it closer, not by the diffuser.

Bobby – I have a suggestion. In the past, we set the nets in the evening and we left them overnight. That is a difference too. In this camp we want them alive. Catch a few fish while they are still alive and check them. We processed dead fish. The texture changes because they have been dead overnight.

Colleen – If we try to get out early tonight and set the nets at 5 or 6 tonight then that is a long time. If you are leaning towards doing it tomorrow morning, we could also angle off the dock. We made some jiggers. If people are more interested in putting nets out tomorrow morning.

Bobby – If we set them during the day. Last year we had more dead fish than live fish.

Natasha – We could set them earlier and process...

Bobby – Set them 25' some areas. But still, during the daytime the fish are not moving around. Fish are moving more during the day. If you want to catch more fish then fish in the evening.

Colleen – one year in the past we were setting in the morning for 4-5 hours and retrieving in the afternoon.

Wayne - Why don't we set at midnight and retrieve at 6?

Kyla – Another thing is a lightening warning. We have to keep that in mind. We can't be in boats if there is lightening.

Wayne – Set them now and pull them at 10 tonight.

Joanne – If we are going to set one close then we can take it out this evening?

Natasha – It is 3.20 now. It sounds like we don't want to be on the water past 6.

Wayne – I set my nets at 4 in the evening and pull at night and only have a couple of dead ones.

Bobby – do you set in the ocean or on a river?

Natasha – I worry about not getting to the Narrows. We get organized and do a round of water sampling. We could switch up water and fish. Do tea test tonight and set nets early tomorrow. What do people think about this suggestion?

Jonas – What do you think elder? (To Wayne)

Doris – Lets just get on with it and do it. It's all about getting to the Narrows.

Natasha – Who volunteers to go and get water samples. Two boats with 5 people in each boat. Before we head out there we can get an explanation of the gear.

Joanne - Do we want to choose the sites then? We have maps of sampling in 2012 and 2015. Also Diavik does ongoing sampling. Do we want to get a rough example and choose sites out there? Sheltered and closer is better because the wind is at 12 knots and 15 is the limit.

Colleen – Sample in 2012 is where Diavik puts water back in Lac de Gras. It is sampled to death from a science perspective. Lower site is where water gets pulled in for drinking. 2015 is where a net was set. People were interested in seeing water quality where they were catching the fish. Last year the other sample was near this camp – a convenience sample because of weather.

Bobby – We caught fish there too.

Colleen – There is an exposed area near A21 that was a no go area in the past and people might be interested in sampling there now.

Kyla – Testing of currents.

Colleen – They have tested how the effluent moves in the lake. A diffusion study. It comes out over here. They use a barium tracer to get an understanding of how that effluent moves.

Wayne – No study with dyes.

Colleen – There was a suggestion using dyes for when the mine closes to see how the water moves when it gets back into the lake from different points on east island.

Natasha – We have two boats and one set of sampling gear. Who is going in the boats.

Wayne – Why do you need 5 in a boat?

Request for volunteers.

Show of hands for who wants to go.

Kyla – They will be here in 45 minutes.

Colleen – That makes it 4.30. We need two recorders. Two film people. Two youth. Two elders.

Natasha – Location for sampling? Roughly? Does Mason want to go?

Mason – He will watch Julie.

Doris – Says go right out off the beach from here.

Bobby – that would be one.

Discussion of gear and use of Beta Bottles for collection samples for making tea.

Everyone takes a 15 minute break.

Youth training on water testing forms

Bobby caught a fish off the dock at 5:15. Tells story of caribou bones inside the fish head. Caribou skin becomes fish skin.

SEE VIDEO RECORDING

The lichen before it became dried out. Soapstone represents all the joints on the back.

Four fish were caught by angling off the dock.

LKTR-1: some health concerns; otolith not obtained; liver sample obtained; tissue samples obtained; Inuit TK field form completed with Bobby's analysis of the fish

LKTR-2: otolith and tissue samples obtained but tissue samples likely contaminated so will be discarded; healthy fish

LKTR-3: no science samples, just processed

LKTR-4: no science samples, just processed

Water samples not obtained after fish caught.

Day 2 – 3 Aug 2018

Daily Notes
2018 AEMP TK Camp
Diavik, Lac de Gras
August 3, 2018: Day 2

JB – As you know, it's windy out. They expect it to continue until at least noon. We'll get an update again at noon. So it's not safe to go out on the boats to set nets at the moment so we need to figure out how we want to spend our time. There's a couple of options. One is to do water collection really close by, in the bay at the camp. The other is we can organize knife sharpening and Wayne has agreed to show youth who don't have experience how to do that. The other idea is to do some elder interviews and we could have youth sit in and help learn from that. And we would do that on camera in Jay's tent. The other option is individuals could use rods to catch fish at the dock. But we need the knives sharpened first. If you do catch more fish, we can ask Kathy to do the science-based sampling. So maybe we should go around the room and see who wants to do what.

Bobby – Interviews. Start off with interviews.

JB – So far we have Jonas and Julie lined up for interviews. And now Bobby. That's likely enough for this morning so thank you.

Nancy – I'm going to make bannock at 2 pm but if anyone wants anything done I can help you.

Regan – I'll participate in knife sharpening.

Wayne – Do you want to learn how to sharpen a knife? Yes, I'll take the guys over to a tent and teach them. Maybe I'll learn something myself.

Eric – I want to fish off the dock.

Zach – I'll be right behind him with a net.

JB – Do you want to help with knife sharpening first?

Eric – Yes.

Zach – I'll join whatever. I'll go to knife sharpening and then help with fishing.

Jonas – Interview. I'd rather see a sharp knife from that guy over there (Ernest). He (Wayne) uses electric (knife) so I don't know!

JB – Not sure if Ernest is up to it but maybe he and Wayne could do it together?

Julie – It would be good to have nice sharp knives to work with the fish and make dry fish. When would the interview be? There are lots of stories we can share, I'd rather see the tasks done first.

Jonas – I'd like to see Terri do an interview too. She's been on the barren-lands by herself and with her son.

JB – We'll interview Terri too. Maybe people could indicate their willingness to do an interview?

Terri – That's why we came here right? I'm willing to do whatever.

Mason – I'll stick with the other youth for knife sharpening.

JB – After sharpening, youth are welcome to join and listen in on interviews. Knife sharpening is Wayne's tent, interviews is Jay's tent. Stove is going.

Ernest – I can help with knife sharpening.

Terri – Interview, I don't mind, but I want to go fishing. After the knife sharpening.

NT – When we met in June we talked about some lessons. Knife sharpening. We also brought rope to help with knot typing. Construction guys at Diavik made some jiggers for everyone. Are there any other lessons you'd like to teach? With this weather. Making Bannock? Anything else?

JB – Any youth interested in learning knots?

Eric – Yes.

JB – We'll schedule that at some point. Anyone interested in learning how to make Nancy's incredible bannock? At 1:30 pm.

Jonas – Floating bannock? Fried? That guy knows how to make it too (Ernest).

Ernest – I learned from my mother.

Julie – Since I was a young child I had no parents. I was raised by my grandparents. They taught me very well. They taught me how to work just like a man on the land. They said maybe in the future I'd share our stories and that's what happening today. And also today as we're gathered here. In the past when they were telling me stories they told me I'd be sharing these stories with others and that's happening today. When we worked on the land, they taught me how to work like a man out on the land in this kind of a setting. It's like I'm self-taught. I got married at an early age. I'm self-taught learning how to sew, make dry meat, dry fish, cleaning hides, caribou and moose. And today the young people I help them the young women, how to prepare fish and parkas. It's only through participating and doing the work that we learn and get the experience. Some of the elders that turn old and into their 90s they tend to not remember stories from their past. But I remember those things, some of the things that happened with my dad. When I got married we raised a lot of children. My husband used to go hunting and that's where we got most of our experience on the land. When we have children, we have to teach them how to work on the land and share our experience and this is what I did with my children. In the past we used to use dog teams and today we use snowmobile. When the snowmobile breaks down, you have to fix it and it runs out of fuel. Dog teams don't. Snowmobiles cost lots of money. There are lots of women elders in Behchokǫ̀ but they are afraid to speak, especially in meetings. The youth too – they are afraid to speak. We have to teach our children, that is the only way. The youth here are probably here because they are interested in the stories. The stories and experience they gather here will be good for them. When I was living in Frank Channel I asked one man to go – this one guy went up on the island and wanted to go to the washroom. He was too scared so he had the gun with him while going poop! There is nothing to be afraid of on the island but he was very afraid. This is all I have to say for now but I got lots more stories to tell. Masi.

JB – Thank you, Julie. We also have some i-tunes gift cards for the youth. We want you to decide what activities that you would like them to do to win one of these through participation, or maybe a competition. We have 4 cards. No, we have 5 cards. And theoretically, you could have all 5! So you guys can figure that out and every morning when we meet, we can figure out who gets a card. And you can include yesterday's activities too. They're $10 each. Are we ready to move into the activities?

END

12:45

NT – Weather is not supposed to be great for today. Should be better tomorrow for about a day and a half. How did everyone's morning go? (great) Great fishing and some wonderful interviews. The one plan we know of is that Nancy is going to make bannock in here at 1:30 and the film crew will also be in here to make sure we get that on film. Is there anyone else that wants to participate? Joanne, Kathy, Wayne, Terri. Because our two

camera gents will be here, we can't do an interview at the same time. Given the weather, we can't do more today. We can do Bobby today. Maybe Terri as well. Ernest will wait until tomorrow to see if he feels better. The other thing we can do today and then hopefully we can get out on the water. We can do a demo of the water sampling equipment. It's cool for the youth and elders to see what all is involved in Diavik's regular sampling program. Hopefully Kyla can do that.

JB –Some people wanted to cook fish on the fire tonight. Is that just for eating or testing? Hilda is going to cook up enough fish for 20 people in the oven. But we can also cook on the fire if people want to.

NT – Tomorrow we'll for sure cook fish on the fire for the tasting. I went through notes from planning session and there were some suggestions about medicinal plants in this area. We could do that with a few people in an interview and we could go out on the land for this? Maybe we don't do that today but park it for another time. What do youth want to do?

Eric – More fishing.

NT – After the bannock, we'll do some more interviews. Two at the most. Bobby this afternoon? (yes) Likely around 2:30 or 3. We'll find Terri after that, around 4 maybe. Do we want the youth to hold off on fishing until after the bannock is done? Bannock will take about an hour? (yes) Do we want to make a plan for tomorrow now or wait until tomorrow morning? Do we plan for breakfast again at 6:30 and then meet at 7:30 am to plan our day? (nods) If It's good tomorrow morning, lets meet around the fire at 7:30 and in here if it's cold. Dinner tonight is around 6. So should we do the water sampling demo at 1:30? Meet down at the dock at 1:30 pm for this. We talked about TK sampling, so now you'll see the science side of it. No other questions/comments?

Julie – If you cook bannock and it's good, you're going to have to make some more. Whatever you guys prepare for today, it will be okay. The young boys that go fishing, it looks like they enjoy it. And every time they catch a fish they do a little dance!

NT – Fish tasting for tomorrow, who is going to bake, boil, fry and grill fish?

Bake is Inuit; boil is YKDFN with NSMA tending the fire; frying is Tlicho; and grilling is LKDFN.

JB – slight change. We are going to do the demo for water sampling and then right after that, we can do the sample and water testing today. Then after that, you can go fishing again later if you still want to.

Julie – Fish heads are good eating too. I can take them back and give them to the elders. It's good to work together and laugh together. When we gather, it's good that we gather together here. And it's good when we work together and work hard and laugh that it passes a good message on to our youth to keep them well and keep their minds strong into the future. I'm thankful we're laughing and working together.

END

Day 3 – 4 Aug 2018

Daily Notes
2018 AEMP TK Camp
Diavik, Lac de Gras
August 4, 2018: Day 3

8:00 am

NT – I hope everyone had a good sleep. Kyla, do you mind explaining the weather to everyone?

Kyla – 21 km NNE wind currently. At 11 am it will go down to 8 km/h from the N, and will stay that speed the whole day, but it will shift to be from the W around 3 pm. A high of 11C.

NT – Any comments or thoughts about yesterday or the camp so far? Any comments about the youth?

Kathy – Thanks to the youth who caught all those fish yesterday, and to the ladies who processed all those fish – Nancy and Julie. And to Terri for the smoke house.

Nancy – If any men with muscles want to help out with the fish heads and the otoliths, that would be very helpful because it's hard work.

NT – Looks like weather will be good for a trip to the Narrows if everyone is interested. We will take 3 boats, it's about an hour in each direction plus time there. We can take water samples as part of the trip. Likely 3-4 hours for the whole trip. I'm wondering if we can get a sense of who would want to go or not. How are you feeling Ernest? Mason?

Ernest – I'll let you know in an hour or so how I'm feeling. Cough isn't as bad but I'm aching this morning.

Mason – I'm feeling okay, but I'll stay behind with Julie and Peter can go.

NT – The Narrows is the area between LDG and LDS. It's always been a well-known caribou crossing with grave sites and tent rings around. We were thinking of a few things this morning but please make your suggestions. What we have left to do before we go home is catching at least 4 more fish to do the TK and science together and doing the cooking and tasting of these. We have water to collect and do the tasting of. From 2 sites ideally. We have a few more interviews to do. And helping with the otoliths. So Joanne and I were thinking that maybe this morning we could do one of the water samples out close and taste that water before we go out to the Narrows. We're waiting for boats and weather as well. We can collect another sample on the way back. Then we get the water tasting out of the way today. Meanwhile this morning, some strong volunteers can help with the otoliths. And then tomorrow we can focus on the 4 fish and focus on the tasting. Sounds like some people

want fish to take home, especially whitefish, so we could think about setting nets tonight or tomorrow. Any thoughts?

Bobby – So we're doing one close to the camp? I can go help with that this morning.

NT – We had youth ready to go for water collection yesterday but we didn't have any elders around. Is there anyone else who wants to go with Bobby to help with that? Unless there is someone that can help with the fish? Regan, Eric and Zach on water, Mason on fish. Any elders willing to also help with the fish?

Jay – We only need one camera if there is only one elder with the water sampling.

NT – Yesterday when we talked about going to the Narrows, Jonas had suggested maybe a shore lunch. We have the option of having lunch here before we go, maybe 11 or 12, and then heading out; or having food there. Thoughts? (eat here before we go). A reminder for everyone going to the Narrows to pack a small bag with your own personal gear. We'll have maps and a survival kit and things like that.

Jonas – We are going to a common bear fishing area with lots of willows so we need to be careful.

NT – We'll try to be ready to leave for the Narrows around 12:30 pm. Let's get our bags ready this morning to give us lots of time to be ready when the boat comes. Let's try to meet in 10 minutes to head out on the boat for the water sample. It will likely be about an hour to an hour and half before the tasting.

END

Day 4 – 5 Aug 2018

Daily Notes
2018 AEMP TK Camp
Diavik, Lac de Gras
August 5, 2018: Day 4

JB – First thing we need to figure out is whether we're going to set a net. If we set a net, we need to do it right away. We don't have a need for a large number of fish in terms of the TK analysis that we do. So we could technically complete our fishing with a rod and reel without setting a net. We won't be getting any whitefish without the net.

NT – When is rain expected?

Kyla – Later in the afternoon. Light rain.

JB – How do people feel about whether or not we should do a net?

Bobby – So weather is going to be rainier throughout the day?

Kyla – Yes, 18 km/hr winds.

Wayne – Is there enough rain gear here? Spares?

CE – There is some, its limited.

NT – It's really up to you. I think we can get our 4 fish that we must get this morning to bake, boil, fry and grill. We can get those off the dock. If you want whitefish, we'd have to set a net.

Wayne – We all come from near water. Its not a big deal if we get whitefish from here. We can get fish where we live.

JB – The other thing we want to do is finish up the interviews. We have Nancy, Wayne and Ernest. We'll set it up so the youth can watch the video from last year.

NT – Where do we want to see that? In a youth tent?

NT – Looking to you Ernest to give us some guidance on whether or not to set a net. Winds same all day, some rain later. We have to do the TK analysis of 4 fish. It might be nice to do those this morning before the rain comes. We could try off the dock or set a net.

Ernest – That island off here, close by over there. You could have 7 or 8 fish in 3 hrs. Its not far from here, you could set it out this way. It doesn't take long, 10–15 mins and we're done.

Nancy – We could have more than that in less time off the dock.

Jonas – You have to think of others. Some people want whitefish from here. They want to compare it to what they know.

NT – Set one net? (yes) Who is going to go? Ernest, Bobby. Some youth? Regan and Zack to pull the net. Mason and Natasha to set the net. Plus one camera. That's one boat. Which elders want to pull the net? Ernest, Wayne and camera. The next question, I hope everyone had a lot of coffee this morning as I'm being demanding on decisions. Do we wait for the net, or do we start with fish off the dock?

JB – Wayne are you willing to fish off the dock?

Wayne – Yes, but I'm not as good as these other guys.

Eric – I don't want to do nets. I will cast off the dock.

NT – We have Inuit baking, LK grilling, YK boiling and Tlicho frying. So those four fish, it usually takes us 30-45 mins to have an elder really explain what they're doing in detail. To have cameras record it, youth document it. So we'll have 4 fish. We need 4 elders to volunteer.

Terri – We can't decide why we choose a fish, if there are only 4 to choose from.

NT – We have to do the otolith and the tissue sample on the same fish that we do TK on. Anyone to teach? Do you want to have that as their fish to cook? I have Bobby from the other day, but I don't think we have Nancy? So Nancy for Inuit, Julie for Tlicho, Jonas for YKDFN and Terri for LKDFN. And the youth will be filing out the forms of what the elders say. Apparently we're running low on wood but Kyla has called over and they are going to bring some more.

JB – So for the interviews we need both cameras? (yes) So we'll do those later this afternoon. And maybe tomorrow too.

NT – I-Tunes cards. Zach was out there when we did the first water sampling. And most youth were too. We want to acknowledge that. And we had Eric catching lots of fish for us. All these guys have been working really hard so thank you. And some extra treats for the boat drivers yesterday.

CE – Regan and Eric for going out at night to dump fish guts, which has been super helpful.

Jonas – Award for doing nothing? Give it to Wayne! (laughs)

Wayne – We talked about putting fish back in water with parasites in them. Those should go to the incinerator. So we don't think it's a good idea if they're not healthy. But not if there is worms and cysts and stuff in the meat.

Jonas – They take garbage back to camp.

Terri – When you have fish open and you see worms or cysts on it. You have to open it to check. You separate them. If you put it back in the water, the fish in the lake moves with the water. And other animals will eat it. Whatever they do when they fly, they'll poop it out and spread it. That's what Madelaine Drybones told me. When I see the healthy fish, I think about this and I don't think we can put it back in because it spreads. Traditionally we'd burn this type of fish guts.

JB – To be clear, we want Julie to do one fish. And we'll be recording what she says about the fish. Ok? Masi, koana.

See: TK FISH Inspection Notes, App 4 for more notes from Day 4

END

Day 5 – 6 Aug 2018 (Closing Circle)

August 6, 2018

Doris gave dried musk-ox around for everyone.

Natasha wanted to bring something from the land where she comes from down on the West Coast. A lady made cedar roses from the Squamish Nation. They harvest the bark once a year and then they role it like a tire and put it in a river for two years. Then they keep it in a shed and then they pound it like a blanket. Natasha asked the artist if there wasn't anything for the men? The lady said the men like it too and can give it to a lady.

Ernest: Is it poison.

Natasha: If I wanted to poison you I would have done it at the beginning of the trip.

Natasha passes the cedar roses out to the group.

Eric: Could I get a business card so my grannie knows what this is.

Wayne: What is this rose for. Can I plant it? (lots of laughter)

People take two for their sisters, mums etc.

Natasha: We will cover some admin concerns and then have a closing circle. We will get shuttled back to the camp before noon as the rain is coming in. Colleen will Diavik specific instructions when we are at the camp. Any questions? Does anyone want to volunteer to start the circle.

Jonas: Let's start here and go around like the clock.

Zac: My whole time here was amazing. Luxury living. The food. The whole camp was a learning experience. We are all like a big family. All these different nations, different people. It was an amazing experience.

Nancy: I had a good time here. Thanks to the cook for looking after us everyday. Thanks to Natasha, Colleen and Joanne. Thanks to the boats for bringing things back and forth. It is a holiday for me. I learned a lot about the fish work and taking out the otoliths. Thanks to the people that came here. I enjoyed it thank you.

Regan: Hospitality was good. I enjoyed my time here since day one. Now it makes me want to come back and see what comes up next. Good camp and good people. The camp sure opened my eyes. Seeing everything myself was a good time.

Kathy: I can't say much more than what has been said. About six years ago Natasha had me transcribe notes from the last camp and I asked her if I could help someday. People living here are amazing. Thanks everybody.

Bobby: I'm very thankful for environment to bring all groups into the camp. We enjoy life when we come here. This part of the country is our homeland. Sometimes we have a hard time coming back to our country side because of the cost to get back out on the land. It is a great pleasure. All the people putting the camp together and doing our chores together. Cooks are wonderful, Joanne, Natasha for putting all of our thoughts together and to the camp crew for keeping our tents and stove going. Keeping us safe. All the camera crew. It is always nice to see new faces, always a pleasure to come here. When you go back home, we'll soak it in again and make our thoughts come back to this time. When we come here it is a wonderful life. We try to show this to other cultures to work with. I thank Diavik for that. All the people for getting us here. For people going home, have a safe trip. I have hurt myself so take care of your body. Sometimes I feel guilty to be a young elder, but my body doesn't want to do the things I really want to do.

Hilda: Thanks for letting me come back. I didn't think I would be back after last time, I didn't know if I would. Pleasure to see old faces and to meet new people. It makes me appreciate that so much more. I appreciated a lot more this time because I had help with Julianna. Maybe I'll be back next time, I hope so.

Wayne – I just want to say thank you for everyone that attended this camp. It's nice to see the old faces and the new youth. Even though the weather was lousy the food was great. I think we did really good on this one with what the weather permitted. Anyways, hope to see you next time around and I wish everyone a safe ride home.

Julianna – I'm really glad I had the opportunity to come here. It was a really nice opportunity to be here and see your culture and be a part of it. Everyone here is doing a great job to see what the mine is doing. I'm really happy I got to be here.

Jonas – Last time I was here in 2012 things have changed a bit but not for bad. It's very important to bring together communities. When we started the mine, the elders said to make sure the land was looked after. The water was clean the animals are healthy. I don't think it's changed. I think the mine is doing their job. And that's good to see. I think I gained 20 lbs since I came. Good cook. The fire keeper was good. Thank you very much every one of you. God bless and see you next time.

Julie – Thank you each and every one of you. I see the young people catching fish at the dock. And also we went to the Narrows the land is very beautiful. When we look at the land it is very beautiful and I thank the creator. This is the first time I've been involved in this kind of a setting. We took samples of water and tasted the water. We tasted the fish and it tasted very good. To all the participants. We all come from different communities in this part of the north and it seems like everyone is having fun, especially the young boys the youth here. I'm thankful to participate as I sit here. I look out on the land and its very beautiful in every direction. I was hoping that I'd see at least one caribou but I'm not wearing my glasses so I can't see too far. We're very thankful for that cook she did a lot of work. We also thank the cooks helper she did a wonderful job. I'm very thankful that they gave me the opportunity to cook the bannock and I don't know if you tasted my bannock and if it was good or not? (good!) Where's the fire keeper, I want to take that log back to

Behchokǫ̀ and sit on the highway and hitchhike. Masi. It's good to laugh, it keeps us strong and healthy. Sometimes when we work together, when I started working the first time they made a small shack like that. I told this one guy to come with me so I could fix the hide and smoke the hide on the weekend b/c that's their days off. We had a candle lit during the night. And then this guy wanted to go to the washroom while I was fixing the hide in the evening and I told him to go himself. He was gone and I looked outside and I screamed to him and he was on top of the roof of the little shack there, sitting on top of the roof. I asked him what are you doing? Why on top of roof? And he says there is a black shadow on the rock. I had a flashlight, I went to go. And he told me not to but I went anyway. And there was a 45 gal barrel standing there! I told him to come down but he was still scared and stayed up there awhile. I really glad we have a strong will and its good to laugh and share stories. I'm thankful for the youth and them going fishing at the dock and catching fish and I hope they do that in the future to continue doing what they learned. On Thursday, my friend comes back and I'll watch her dance (Nancy).

Peter – I learned something new here. Regan, I went to school with his dad and stayed at Akaitcho Hall. I'm very thankful to be part of this group here with fish sampling and water sampling. Through the Environmental Agreement, the mine set up this camp to watch the fish and water. I think when they first started the mine, everything was written on paper. The predictions they were predicting on science and now they brought in the TK. The TK and science are working together and they are producing books and video to bring these together and it also brings the signatories to the agreement together, the KIA all of us, together and work together. Our time here together is very valuable for future generations. If they read the report, they will learn what we've seen and they will continue to learn. I'd also like to thank the cook, the cook helper, Natasha, Colleen, Joanne, all the elders and youth. I don't know what to say, thank you very much.

Mason – This is my first time experience on the tundra it was really nice. I'd like to thank Joanne, Natasha and Colleen for inviting me. It was really nice to see with my own eyes that the fish and water here are healthy instead of reading reports. I'd like to thank everyone from different regions for coming together. We share the same lifestyles we use the fish and the weather and things aren't different for us. It's nice to see the fish and water are healthy. It's nice to see new people here, I'm really happy I met you guys. Id' like to thank the camp worker here for hosting us and the cooks for providing great food for us. When I saw the food here, I couldn't stop eating. When I go back home, I won't be eating a couple of days. For youth for coming out here we all come from different communities and we shared knowledge and will take this home. Wherever you go from here, have safe travels and God be with you all.

Terri – A few days coming here for me is kind of short. It seems like I just got here and we're going home. I love being out on the land, it's more peaceful and quiet. You don't hear trucks driving and dusty. Here it's so peaceful. When I knew I was coming, I picked a youth and then he broke his leg so I was down and sad. We had to pick a youth quick and make a change. I'm really glad Eric came here with me. To learn the water sampling and fish sampling and just being out here. I'm really glad he came with us and that I had my uncle here with me. I'm really glad, the people in my tent we all speak different language but I made signs for Julie to tell her when dinner was ready. The happiest time for me was driving the boat, and the ladies in the boat with me were great, and Wayne! I got him wet when Kathy sat in the front. I think coming here and teaching the youth when we come here, I think it's a very good thing to learn from one generation to the next. I played dumb

when I came here, I know how to do fish sampling and water sampling because I want the youth to learn. So next time when I come back I can do it. I work for Ni hat ni and we make sure the mother earth is clean when we leave camp. When you smoke, you don't leave it on the ground as it will stay here forever. My kid taught me that. Don't through your garbage on mother earth, you bring it home no matter where you leave. We were taught by our Elders. Marsi cho.

Ernest - It is a good to see old friends and new faces. I've been here a few times already. I've been sick the last few days. I've had a bad cold but I'm getting over it. Maybe because I'm going home. I'd like to share some of my stories to the youth. Last time with the youth there was five of them. We didn't have anybody from Hay River this time. We missed the Metis youth. The rest are all here from different communities. To see new faces. I knew some of those people from before. August Enzoe and I are well known. One day the youth would be sitting here learning from one another. I've seen some of the elders who are gone already. We can't live forever. We are going to pass what we know on to the youth. I was invited to talk to the people last night. I was here in 1968 and flew with a chopper over here. Sometimes you saw caribou around. They hung out here in the summer time. In 2002 there was a lot of caribou here in winter. Anyway, after that we saw a lot of caribou in bad shape. Bad legs. Maybe from boulders on the side of highway and they were scared of the trucks. I saw a lot of three-legged caribou. Thanks for the new faces. Hopefully some of you guys will be back again. I have lots to say but it is getting late now. Masi cho.

Terri: I worked doing water and fish sampling for ten years. We made sure that when we cleaned up. We left nothing. Her son told her don't ever leave your butts on the ground. If you want to keep mother earth healthy then bring your garbage away. When we have a meeting then we should take everything away. Mother nature will take care of the rest. Have a safe journey.

Eric: First time here. Enjoyed being here overall seeing some old friends. Meeting so many people. We did lots of fishing. That was fun. Got to drive the boat a couple of times. Overall, I liked the trip here. Masi cho.

Colleen: I very much appreciate everyone coming out. Staying here to make sure the mine and Diavik are doing OK and you are OK with what is happening on the land. Especially the people that are missing the event in Yellowknife. Such a great mix here of knowledge and information and different communities with the same cause. Thanks for the relationships and the trust with one another. It has been a great camp

Natasha: It is always difficult to know what to say. I feel healthy out here. Julie was talking about being strong and brave to go out to the Narrows. That was one of the highlights of this trip. Even though the weather wasn't great it was a good camp. When we landed the seagulls and ground squirrels were here to welcome us. When we saw the mama bear and the cub made me think about how everyone was taking care of one another. It didn't matter how old we were or where we came from, we were all taking care of one another. I thank you for your patience in learning some of the science. I was laughing when we came back from the Narrows that the elders wanted the sample at 20 meters deep. We have spent the days learning from the elders watching the fish and watching the animals.

We spent some time talking to the youth about what they think about the future and what they think about what is happening here in Lac du Gras. I was overwhelmed by the knowledge and strength of these youth. Sometimes it is hard to learn to be strong in two worlds, but sometimes being strong in the other world takes them from the land. It is good that Diavik gives them this opportunity to come out on the land. Not only to see that the water and fish are healthy but that the people and cultures are healthy. It an honour to come here and an honour to work with Joanne. All the environmental crew that worked so incredibly hard to make sure the camp worked, thank you. Also thanks to the film crew who made sure that everything that was said was recorded and put all together to reflect what people said. Thanks for taking time away from your families and kids to be here with us. It is a privilege.

Joanne: I am really moved by the whole experience this weekend. In addition to totally loving being here with you. Appreciating Julie's kind heart. She is such a positive happy elder. I so appreciate the youth. I am confident in the future because of them. Each one of you have unique strengths and gifts. I see the leadership in you already and that makes me feel really good. I had a really special visit from a wolf, a mama bear and a cub. I had an experience that I am still growing from and learning from and to be visited by the wolf, cub and mama bear is really special. I dreamt about it last night and I feel strong.

I appreciate the courage that Diavik shows. They expose themselves, and take a risk by showing us what they are doing so we can judge for ourselves. That is not easy. I am grateful that Diavik have that courage. I also appreciate the people that I work with in this program. Natasha is smart and pretty. Colleen has been a blessing since she was hired independently by Diavik. She is solid. When we are not together I know that she is pushing for us. I appreciate Wayne for putting up with the teasing even though he doesn't like trout or tea or the sampling forms. It is really nice to have a former chief here. His leadership has always been an inspiration to me. Thank you Jonas. Peter is really special. He is not only a good interpreter. He is also an elder in waiting. It's good to be with my old friend Terry/Doris… The food was wonderful. Having all the Nations together is so special. The commonality in our values, in our world-views makes for a very hopeful future. I think our people will provide leadership, not only in the North, but in the world. For that I am grateful. Masi cho.

I also want to acknowledge Craig. He comes from Hay River. He hasn't had the chance to come out here before. I really appreciate how much he has enjoyed it.

Jay is so special. He is so capable. I am blown away by what you produce. The quality of the work you do is amazing. His work really mirrors the excellence of the elders and youth and their knowledge.

Craig: It has been very special this weekend. It has been humbling. It is great to see the TK and science come together for everyone. The food has been great. Thank you. It has been an honour to be here. Half of the fun of what we do is meeting the people. I don't get out much and this great. The Narrows was great. It was an emotional experience for me. Before, I didn't understand the connection between the Barrenlands and the people. I do now.

Terri: I am really glad to see that Rod helped me with a drying rack, just like my drawing. Hopefully it's there next year.

Jay: I just want to thank you for saying a lot of great things and allowing us to film this. I also think that Diavik is brave to do this. I have spent the last ten years filming indigenous cultures and I think this camp is great.

Kyla: I was just doing my job. I really do hope that here is a dream that can move into the future.

Uyarrai Kameemalik: I really enjoyed this camp and I enjoyed the stories. It was a great camp to work at. I hope I can come back in three years and see the same faces and new faces.

Natasha: We will put together the elements of a draft report. In November we have a two-day meeting to show the elders the draft report and a rough cut of the video from the film crew. The bios that you have all provided you must review as well, to make sure we get your words right. A camp photograph will be handed out too. The point is to make sure that we got our reporting right before we all sign off on the report. We were thinking the last week in November or the first/second weeks in December. Is there a preference?

Terri: It depends on the weather.

Jonas: As long as you don't do it on October 10. It's the Oilers game. I appreciate one person, to acknowledge one person. That is Regan. He knows what is going to happen ahead. That is special. He is always helpful and sees things. The old lady asked for salt to feed the fire. She saw the rain was coming and she asked for salt. It helped. She lived on the land and she knows these things.

Joanne: I am going to pass around tobacco. It appeared when it should. We are going to have a prayer song with the drum around the fire. She passes the tobacco around. Julie will also put the rest of the bannock on the fire.

Everyone puts tobacco and bannock in the pot. Nancy and Bobby say a private prayer and add a huckleberry twig.

Ernest: In the future I hope that some of the old faces and new faces will be back again.

A prayer in his own language. Many people join in. Then he puts the tobacco and bannock on the fire. All remain standing. Peter warms the drum just above the fire, the bannock and the tobacco.

Peter does a prayer-song that an old prophet did in Deline. I would like the Creator to help us to continue to do the work as signatories to the environmental agreement. Dene Tlicho Metis. That we go united back into our community. We also ask the prophets bring good health to each one of us.

We pray for all our ancestors that are buried here and all those we don't know about to help us and work with us to help keep the land.

END

Appendix 7 Verification Session

- Verification Session Agenda
- Verification Session Notes
- Verification Session Evaluations and Summary
- Verification Transcript Review (Signed)
- Verification for Report and Videos (Signed)

Agenda
DDMI Aquatic Effects Monitoring Program TK Study
Post-Camp Verification Session
December 6 & 7, 2018
3rd Floor, 5201 50th Avenue, Yellowknife

Thursday, December 6

8:30 am	Coffee
9:00 am	Opening Prayer
	Welcome, Round Table, Review Draft Agenda, Workshop Purpose
	First Video Screening & Group Discussion
	Report and Film Title and Acknowledgement Brainstorm Session
	Review Photo Collages from Report
12:00 pm	Lunch (provided)
1:00 pm	Review of Feedback and Recommendations for Next Time
	Review Author Biographies
	Discuss Edits to TK Field Forms
4:00 pm	Close

Friday, December 7

8:30 am	Coffee
9:00 am	Review of Fish and Water Analysis (Lab Results)
	Review of Fish and Water Analysis (TK Results)
	Draft Report Overview & Discussion
12:00 pm	Lunch (provided)
	Finalize Report and Film Title and Acknowledgement
	Complete Verification Forms
	Future Planning and Participants Discussion
3:00 pm	Closing Circle and Prayer

** Breaks will be scheduled as needed.*

AEMP 2018 TK Study Verification Session
Day 1, 6 December 2018
Yellowknife, NT

Attendees: Julie Wedzin (Tłı̨chǫ Government), Georgina Chocolate (Tłı̨chǫ Government), Peter Huskey (Tłı̨chǫ Government), Jonas Sangris (Yellowknives Dene First Nation), Ernest Boucher (Łutsel K'e Dene First Nation), Doris Terri Enzoe (Łutsel K'e Dene First Nation), Wayne Langenhan (North Slave Métis Alliance), Nancy Kadlun (Kitikmeot Inuit Association), Bobby Algona (KItikmeot Inuit Association), Natasha Thorpe (Facilitator), Joanne Barnaby (Facilitator), Colleen English, Kyla Gray (DDMI), Andrew Silke (Artless Collective)

Opening Prayer : Jonas Sangris

Natasha: Welcome, thank you for coming. The agenda is on the whiteboard. We'll be revisiting work from this past summer. For those who have participated in the camp before, you know that at end of the process we hope to have a report and video. At the camp, Kathy asked for a bio paragraph about yourself. We have those for you to review as authors of the report. We'd like to come up with a title for the report and video as a group. I put around yellow pieces of paper for suggestions and some ideas from quotes from the camp notes. We need to come up with a dedication as a team. Last time the title and dedications were around youth.

We have some photos that will go in the report and we want to make sure everyone is comfortable with these. Forms from the camp will be reviewed: we heard that some people had ideas how to improve them. We have the results from fish and water sampling. We have compiled your recommendations and ideas for how to improve the camp. They can be little things like wanting ice cream (laughter) but we want to review them all with you and decide what is important and will make a difference for the next camp. Health and Safety is particularly important.

Andrew: I can speak to the footage and shots in the video.

Natasha: Andrew sewed everything together and made a draft video. This is the second draft, we'll finalize it after we get your comments. I sent an email to all the youth, inviting them to take a look at the video, but we haven't heard back from them yet. We expect we will and will incorporate their feedback.

WATCH VIDEO

Wayne: When we go out there and you're the person assigned to do one thing, there should always be a second person on back up. So that if something happens, you can still get the whole works done. Just a suggestion.

Natasha: Ok, thanks. What do you think about the film? Any edit is or changes?

Ernest: Memories!

Wayne: Really well done. I like the way they put the drone to use. That did a lot.

Jonas: One of the things I was wondering about is that we only did fish and water. Maybe in the future we should try to get a caribou around the mine in the winter. Get one caribou and stash it and let the elders taste the caribou to see how it tastes. There is not only fish that live in the water, there are other species on the land. So I was just wondering about that one.

Doris: How long is the video? For me it's too short. We all got videotaped and sat around. There are important things in our own language that wasn't in there, it was cut short. The other thing is true what Jonas said, we only did water and fish, but there are caribou and plants. Berries should be tested.

Natasha: Are there any messages or ideas in particular that you're thinking should be in there but weren't?

Doris: If I was saying it in my own language, maybe my voice would be stronger than in English. Even though I speak English, my language is more important and powerful than in English.

Joanne: If you say it there and then we can work with you to review that and translate it.

Wayne: There was one other thing. There were interviews taken out there and I noticed there wasn't anything in here from there. I mentioned that the people of Łutsel K'e and other areas know more about trout. But we eat more whitefish. Not to be excluded or anything, but the emphasis should be on where the trout are and the people who eat them all the time.

Jonas: It's a good idea. We should do whitefish too. Not only trout in that lake. We can cook it on the fire or whatever.

Natasha: We pulled together your recommendations and we've included those. The reason from a science perspective for doing trout is for bioaccumulation of metals like mercury. We only caught 1 whitefish this year.

Wayne: We didn't set the nets long enough. The time past we got nice whitefish. Jumbos.

Colleen: We want to keep trout being used. It is ok to add whitefish, and we did in 2015. But we want to be clear that continued testing and tasting will be focused on trout; so we can add others but we don't want to lose that historical piece with the trout.

Doris: Is it only trout that they want to test? It can't just be trout. Everything that lives in the lake has to be tested. We have trout, whitefish, grayling, etc. If we're going to go and do fish tasting all the time, it can't just be one. We have to try them all. We have to see if they're healthy or not.

Wayne: Suckers are a bottom feeding fish. They're not good to eat because of the bones but we can look at them and take a careful taste.

Julie: I'm very thankful I've been part of this group for the program at Lac de Gras. My first time on the barrenlands and being involved in this group. She liked talking about the testing of water and fish. People never used to do that but it is good the mine is doing this. They should be doing this for the wildlife too. Taking samples. In the past, people live off the land and harvest food like berries. Lots of people eat fish. When you eat country food, you're healthier than eating processed food, store bought food. If they eat this type of food they can become diabetic. Being out on the land, we should have a dance out there. Being out on the barrens, one of the guys had long hair then and he's maybe trying to attract more women.

Joanne: If people could provide us more feedback on the video, there is lots of good memories, but in terms of sharing this video with others, does it say what we want it to say? I understand your point that 'in the language' is way more powerful and I think we can strengthen that in the future and in this one. We can take your words and work with that and add to it. Any other comments? Things you'd like to see?

Doris: One thing you missed: I was racing the guys on the boat and beat them. I tried to pretend that I didn't know how to drive a boat and I beat the guys after the man told me you have to follow us. I had to slow down and wait for them! When I went home, I told them I'd show them the video of when I beat them!

Andrew: We had quite a bit of footage at the Narrows. There wasn't a story on it specifically but we used it a lot in the visuals to support the message about the health of the land, etc. The boating to it was used.

Natasha: We did quite a few interviews and discussions at the Narrows. In the report there is a section on the Narrows. There is also a section in the report where we talk about the strength of the women involved. What might not be captured in the video, we can make sure it's in the report?

Doris: We only had fish tasting in a smaller area by the camp. We should have fished at the Narrows. Because the water in the inlet by the camp is different. We had weather issues that controlled us and limited the chance to get fish from other areas.

Nancy: These videos are short. There are a lot of people that don't read the reports from books. Like youth. What we should do is put the important parts of interviews with elders in videos so that young people can watch them. A lot of people don't bother reading reports.

Colleen: We give the footage of your interviews back to your organizations and you as well, so you can share and archive as you wish.

Bobby: Would it be possible to view the whole unedited film before we make the comments?

Natasha: It is 5 days of video. The raw footage is provided back to your organizations. So that's an option, once it goes back to your organizations. It's always there, it won't be lost. The word:for:word transcripts of the interviews are also provided to your organizations. That's maybe where your voice could be strong is to make sure that your organizations take that and put it into your TK database and share it. One idea that came out is that a 13 min video is more helpful for schools, for example, it's a nice length of time for them to work with and then discuss.

Joanne: If you can help make that happen: introduce the idea with teachers and principals in your local schools to share it and make it available. Individual teachers will use it as a resource. So whatever you can do to help.

Bobby: Would it be possible if we could get two or three CDs? Sometimes we use 1 a lot and we don't have a back-up. We could give one to local groups in our communities, or other places of environmental knowledge. I think giving more than 1 would be useful. Then we can get it around in the communities as well.

Natasha: We can do that again.

Doris: Can we put it on USB too? It's not only for us, it's also for the young people to be able to hear our voice and how things are now and how they'll be later on down the road. Because of the climate change, everything is not the same anymore. We all know that and we see it every day in our lives.

Joanne: We'll have another review of this tomorrow so you can think about it more today and tonight and we'll have another look tomorrow. So there is more opportunity to absorb what you've seen, what you liked, didn't like, suggestions, edit is, deletions. The discussion will continue tomorrow.

Natasha: Next steps for the video. We'll make notes on all your comments, Andrew will go back and make changes and then the video will be finalized. Key idea here is 'does the film tell the story that you want it to?'. That's a really important question.

Joanne: Georgina you weren't there so to hear your perspective is good.

Georgina: The footage is beautiful it looks good. I think it was Jonas that mentioned about the interviews with elders. There should be a short interview of the elders about fish. Fish stories. I interview a lot of elders and I've heard a lot of fish stories. That should just be put with the footage. An elder telling a short story. So that in the future, the youth will know how to treat a fish with respect and pay the water before they fish, it has to go with it. In the future, if they go out they won't catch nothing if they don't follow the rules and have respect for the fish and the water. More of sampling fish. I see that a lot. But more of our traditional way of life on the land so that you look both ways. It is hard to know that, but the young people need to see both ways: the traditional way and the scientific way of testing. I saw the dry fish in the video, that was good. Every part of the fish in our language should be captured. We need to relay that with it. Ekati is a big lake. Is that the only lake they go testing or other lakes around it?

Kyla: There is Lac de Gras and Lac du Sauvage. The mouth of the Coppermine River and other lakes around Ekati mine are also sampled; some by Diavik, some by Ekati.

Georgina: A couple more elders too. People that know about being on the land, drink tea, eat fish.

Natasha: A really good point and reminder. I think that the 2012 and 2015 participants that have been there many times feel they have already shared stories but there are others that also have stories to share.

Andrew: There are in interviews some good contextual, traditional comments by Julie and Ernest. So I think I can add to that traditional context a bit before the youth start to speak. That is something I can look into.

Doris: When we make a video about how it is around the Diavik area, about testing the fish, water. I know when I go there I speak for my community, for the water and fish and animals to be healthy. We're not here forever. We make sure our young ones will be safe. When we make the video, I think that's a good thing. All the stuff that we say at meetings is recorded and our TK is all saved and we're tracking down information from way back. We keep all those for down the road. The kids will see where their grandfather went and what kind of stories they had. So when it is recorded, and we can have it on USB, we can give it to our wildlife office so they can keep it and store it. It's a good idea when we sit around here like this that we record and give it to our first nation. Anywhere I go, I sometimes record myself on my phone and I tell my board or committee what I said and they hook up my computer and

take it all. Usually I don't try to memorize what I said. I was always told that your voice is more powerful if you say it in your language, it is more strong than speaking in English. At home I don't speak English, I speak my language to all my kids. They don't speak but they understand. They're trying to learn how to speak their language. They can say hi to their aunties and uncles in their language but they don't speak it with their friends.

Natasha: Doris spoke about that during her interview too, perhaps we can capture this in the video somehow. The importance of language. So a big thank you to Andrew, and to Jay and Craig.

Julie: It is very important to talk to the youth. When they see this on the video. Some youth don't go on the land. They visit me at Frank Channel and sometimes I ask them to check my nets and they say they don't know how so I teach them. I walk on the ice, take the pole out from under the ice and tie it and pull the nets out and take the fish out. We as elders and youth we don't know how much time we have on this earth. We have to take advantage of opportunities and we have lots of children and grandchildren. At times lots of youth think negative. But some of our children are healthy and have employment. We have to encourage our children about things that are not good in our lives, that break us down. But when we hear good words and encouragement, it makes us feel good and happy. But some people who use alcohol, we feel bad about these things. But there is lots of children and youth that can watch the video and learn from it. I don't see youth people at Frank Channel often but I like when they come and I like teaching them. I'm thankful you've been doing this for a long time. In the past I lived off the land and I had 6 children then. We took a boat and sometimes it took a month. A lot of our ancestors are not here today but when you're speaking, a lot of elders have a lot of stories. We are not in control of our time on earth but we have to teach the future generations so that they can be strong. We keep our language and use it to keep us strong. When we talk with each other here, we are one. I'm very thankful. I'll talk more tomorrow.

BREAK

Natasha: Thought I'd take a minute and show you what the 2015 report looked like. It is about 600 pages. Joanne and I talked about maybe shortening the report. It is really detailed about what we do and what our methods are. Goes over the results and includes TK shared around different topics: weather, being safe on the land, capturing comments regarding mining, changes in caribou, that sort of thing. So in the end the body of report ends up being about 100 pages. So we talked about where it could be shorter so it is more accessible. At the same time, what you share is precious so we want to make sure we don't miss anything really important in the report. So when we talk about what does the 2018 report look like, think about what you want to see.

Wayne: Part 1 and Part 2 for report. Can tease people to come back and read more.

Doris: Ever since TK started at the camp site, was it done with video each time. (No) 2012 was the first.

Nancy: Even if they're long, it is important for the future to be able to look up this information. It doesn't matter if people don't read the whole thing, it is important to still have the information.

Jonas: Introduce that young man.

Colleen: Thanks, Jonas. Was just about to mention him. This is Kofi Boa:Antwi. He has just started in a regulatory position with Diavik in the Environment department.

Kofi: Hi, I have been involved in the north for the past 12:13 yrs. I moved here from Cambrige Bay. I was the technical advisor with Nunavut Impact Review Board.

Doris : I met you there.

Kofi : I am so happy to join this company. I am interested in the focus on the environment with this company and leaving a positive legacy for the environment. For Diavik, I interface with regulatory bodies. Ensuring that Diavik is meeting terms and conditions in permit is and approvals and ensuring that when the project gets to closure, we'll meet all the requirements. (All introduced themselves)

Natasha: One thing we were hoping we could do today was to think about the dedication for the report and for the film. Does anyone have any suggestions for what we might want to put as a dedication this year? We also need a title. One thing maybe I'll say is that the report this year is very similar to 2015 but there is a larger part in the report about youth and about the Narrows. But you'll notice in the video, there was a real celebration of youth and we've echoed that in the report as well.

Joanne: We had such a strong voice coming from the youth which was wonderful so we wanted to really showcase that, how well-spoken they were. Any ideas for a title or dedication?

Natasha: Last time our title was 'feeling the spirit together…'. I threw up some other options as well on the white board.

Bobby: 'As one with the land for our environment, with our youth and elders'; 'As one with the land, as one people'? What I was thinking about is that every human being is from the land. As one with our land.

Jonas: On the barrenlands, we are one as indigenous people. Like from the west to the east to the north, we are all one on the barrenlands. My great grandfather hunted out there but from the north they've been here forever.

Nancy: The youth are our carriers. Carry our future, language, … The youth will be there after us, like we went after our elders.

Doris: Our ancestors trails we follow. And we still do it today.

Georgina: Our land, our water; the spirit of our lives.

Natasha: it is so beautiful the way all of you value working together where you put politics aside and you work together to teach and share. There is youth being taught to be strong in two worlds.

Ernest: I'm waiting for later and will put everything together to decide how to go.

Joanne: Stronger together.

Natasha: Do we want to sit on these and take a vote tomorrow? (yes) and let me know if anything comes up today and I'll add it or you can put it on the sticky notes on the paper.

Jonas: How do you say dedication in our language?

Natasha: Who do you want to honor?

Jonas: [in own language.] We have to honor our elders who travel and hunt there. We eat there, we sleep there. Our bag, our freezer, stuff like that. Many moons ago, that's where they hunt, trap. Bobby how do you say it in your language?

Bobby: We're always dedicating ourselves to our elders in our culture. We dedicate everything our elders have taught us. There are many ways to say it to.

Natasha: If you think of the report and video as a gift - of your time, stories, expertise. A gift of knowledge. We had a dedication for the video and the report.

Colleen: We can translate it and put it in multiple languages.

Jonas: There are words that mean many things to some of the elders. They have big words that some of us don't know. One word can mean four things.

****All agree that dedications should be in all languages. [As of March, 2019, multiple efforts were made to get these from translators, but since they were not received by all parties, this was not possible.]**

Natasha: We have everyone as an author to this report. So typically once we've talked through the report for two days and made sure that the film and report tell the story, we have you sign as authors. I'll just read the top. "We the undersigned are proud to present…." So we have a page we can all sign tomorrow. If you'd like to make any changes to the text, we can do that as well. Part A is the signature. Part B is that we have everyone who is an author has a picture and a little paragraph or two about each person. The Elders and the youth and everybody who was there. You may or may not remember but at the camp, Kathy was running around asking about bios. So we'd like everybody to take a look. Please read through it and make sure we got it right. This will be the final author biography for you. We'll hand those out to you now for your review. Are there any questions with the process or having your bio in there?

Ernest: I'm always thinking about that we're pretty close to my own community. I've known Bobby for a long time. We do water from the Coppermine river in the past. I went to Kugluktuk twice. I drink the water there. The guy who works there said the water goes up in a tank. In Kugluktuk they get a lot of water from inland. In the east arm, the way I look at it, there is mining going up all around us and every community the youth need to learn from the elders. So I'll think about it this afternoon. I've been involved with DFO and Lands and Environment so I've been there and I know what I'm talking about. It was only 5 days, with travelling. Once in awhile I think about it and I like the DVD to watch for memories.

Natasha: Please read through your paragraph. If there is anything you want to change, add, cut - please don't be shy and let us know what you want to change.

LUNCH

Natasha: I want for you to look at the photos we've selected and make sure that you are ok with these to be published, we want to make sure that you are comfortable with all of them. Camp life is first collage: we good with these? (yes) Next is fish sampling: good? (yes). Next is cooking/ tasting fish: good? (yes). Camp life again, general mix of pictures: good? (yes). Next is the interviews collage: it is good, maybe add pictures to this one, one of everyone? Berries/Narrows collage, monitoring: good? (yes).

Water sampling collage: good? (yes). Suggest adding a picture of Doris driving the boat. Youth: maybe missing a picture. Elders/youth together: good (yes). Cover photos, good? (yes). Women collage: good. There is also a big group photo. We can put this on the cover or on a separate page in the report. (everyone good with photos)

Natasha: In 2012, we did lots of consultation and we heard that forms can be too technical and wordy. So we asked what you look for and then developed more visual forms with check boxes that were easier to understand. The youth would work beside you and capture what you said. We used this in 2015 and then during the verification session, people asked to change the forms. And again in May 2018 people noted the same. So what we came up with was asking the same questions around girth, firmness, gills, etc., but not using the graphics. So we'd start with the type of fish. Then look at the outside and the youth asked if it was skinny, average or fat and working through all the questions about the outside of the fish. In the evaluation forms and some of the interviews, people said they still weren't happy with it and wanted some changes. So we have the time now to walk through this form and make some adjustments. I'm wondering if you have some general comments on the way the process went: working with the forms and answering questions while you worked on the fish. Wayne: you had some comments, maybe more on the water than fish form.

Wayne: You have dark red, etc., the fish is still healthy no matter what colour the gills are. Better to have a question such as 'what else do you look for to tell that it's a healthy fish'?

Natasha: This is different from the science. This is a way to try to capture your TK and expertise as users of fish.

Bobby: Maybe add colouration of the fish when you first pull it out. Even if we know it is been in the water awhile. It is alive and everything but the colour, the paleness and darkness of the skin itself.

Natasha: what do others think of that? It would be adding another thing.

Bobby: sometimes we can tell it is unusual by the colour of the fish skin. It can tell you a lot. About the water conditions. And sometimes when you look at the gills and they're pale, the skin will be different too. Sometimes the gills are pale even if it is alive, and the skin will be a different colour too. Really pale.

Natasha: Can I put this out to the rest of the group. Do you think this is something we should add to the form?

Jonas: the feel of it is most important. The texture of the fish.

Nancy: there are all different types of skin colours. If they're healthy or not, they're all different.

Natasha: So the skin colour may not tell you that much?

Wayne: The flesh on a fish sometimes is really white like paper. And it does taste a little different than the regular fish you get that's healthy. But that won't show up until after you slice it open.

Natasha: We're talking about the outside right now. Do you look at the skin to decide if fish is healthy or not? Or not really?

Wayne: Sometimes it is scarred.

Georgina: Sometimes there are fish with purple skin and in the meat. At Frank Channel. What does that mean? Is it healthy or unhealthy? Why does this happen? Is it because it's a river or lake?

Ernest: That's inland. If there is a scar on it, it could be a bear or wolves.

Natasha: I'm hearing a few different viewpoints. Julie?

Julie: When we set nets in the river, when we check the nets, when we catch fish in gill nets we put it in a bowl. And when we come up on shore we check the fish, the health of the fish. We look at the gill. If it's alive, the gills are dark red. If it is light, it's not alive. So when the fish is alive the gills will be red. Also when we got the fish, we check the guts and stomach. We take out the stomach content and check the organs. Sometimes it will have little cysts or if we don't know what to do with that fish. If it is unhealthy we leave it alone. Sometimes fish are fat. Sometimes fish are skinny. If it's not good to cook it's something like sticky. If it's healthy it makes good dry fish but if the gills are white it is less healthy. So we have to check the nets as often as possible to make sure the fish don't die while it's in the water, in the nets. So the youth went fishing with rods and sometimes they'd take fish with the gill nets. All these years in Frank Channel the fish in the past used to be very healthy but today things are changing. There are sometimes deformities. We don't know what to do with them. We give them to people with dogs. People know about these things. Red gills are good. At times fish would die in the nets and sometimes the firmness would differentiate. And today I didn't want to sit like this, it is very warm. Maybe if I bring in a caribou hide and smoke it you guys would run out because of the smell of the smoke. You as men probably see fish when you go fishing.

Joanne: Julie, do you notice the skin colour of fish?

Julie: Sometimes when the fish colouration is darker it is not very healthy. When the water is warm, the fish die faster as opposed to cold water. The fish if it is nice and fat, it looks whiter in texture. If it is unhealthy, it looks more darker. Water temperature sure makes a difference.

Natasha: When you're wanting a fish that tastes good, I think I'm hearing from Julie that you want a fish that is still alive. So you're saying when the gills are red and it is not mushy, it is going to be a good fish for eating. But if you catch a fish that's gills are white and the flesh is mushy or stays indented, does that just mean it is been dead for a long time in the net, or is it an unhealthy fish? I'm trying to understand the difference.

Julie: So during the fall and spring, we won't set the nets. Throughout the summer we set the nets and it is lots of work.

Wayne: you can still get a fish out of a net with light gills. If the flesh is still firm, the coldness of the water will keep it firm and you can eat it and it is just as good as one with red gills.

Natasha: If you got one with white gills and it is was indented, would you say it is not healthy or it is just been dead too long?

Wayne: firmness tells if it is been dead awhile. If the gills are really white, they've been in the water a long time and I use it for dogs.

Doris: When we put nets in our water and we find fish with white coloured gills, we know it is been dead for awhile and we won't eat it. We feed it to the dogs.

Natasha: It is not an indicator that the fish are sick. It is an indicator, it tells you it is just been dead too long. So your job is to make sure the fish are ok.

Doris: We don't just look at the gills, we look at the whole fish for health. But if the gills are white, they've been dead too long and we won't eat it.

Natasha: Maybe we could ask these basic questions: How does it look? How does it feel? Is there anything unusual? What else can you teach us about this fish from the outside? Why did you choose this fish? Then we change the form to ask these first and then move into more specifics: girth, firmness, gills, shape, deformities? Includes skin in looks. Would this work? Would it be more clear?

Doris: I think there were some similar things we did twice? It was repetitive.

Colleen: Move general questions up top and have the specifics drop down underneath. So they ask a general question, then have the specifics to check or circle so it is easy for the person filling out the sheet.

Doris: Change these around like that and then we can figure out if we need to add more.

Natasha: OK. This is for the outside of the fish. So now we've cut open the fish and we start asking about the inside of the fish. Again, with the consultations we did at the start and we asked what you looked for, this is what we heard, what is on this form.

Ernest: Could I get a copy of this form? We could use this in other places.

Natasha: Yes.

Doris: So all those things that we saw, those little white things. Where are those?

Colleen: Parasites is what those would be, third line down.

Doris: Maybe we change the name. White spots? Maybe 'parasites/white spots'?

Ernest: It depends what they eat.

Natasha: So what people talked about was what they look at when they cut open a fish. The flesh, worms, tumors, parasites. They look at the heart, liver, etc. I think all the items that you look for are there, but we may just need to restructure the form, similar to the outside of the fish.

Georgina; some fish have white spots on the fish pipe, some fish aren't like that they're smooth and clear. So if there are bumps on the pipe, we don't eat that. So it's good to write that down.

Natasha: Did people feel that it took too long or too short, when you were the one cutting the fish and having to teach.

Nancy: it was okay.

Doris: if you get a fish and it is healthy, what is there to talk about? The only thing that bothered me was when there were white spots and they put it back in the water. Cause then it goes to the seagull, and the other fish. So I would burn it. I don't want anything else to eat that.

Bobby: That is the thing to do.

Natasha: If you were cutting up a fish at home and there were worms in it, would you eat it? Or what would you do?

Nancy: If I was starving, I'd eat it. I'd want to take the worms out before eating it.

Natasha: Hearing from Georgina is that you want a smooth pipe. One thing we didn't hear a lot about, if it is healthy and got eggs, what do you look for? Are eggs the sign of a healthy fish or is it the colour of the eggs?

Bobby: Sometimes when you cut it open and there is a little slime around the egg and the egg has different colours on the egg: red or pink spots on the egg: those may not be edible. So when you look at the eggs, if it's a healthy fish they will be all one colour. If the egg has two different colours on it, then it is not good. Sometimes it can be really red.

Natasha: Do others of you find the same thing when you look at eggs? Is this something we should be capturing on the form, what Bobby's saying.

Ernest: the main thing is that it depends on what they're eating and you don't know what they eat. I've been to a lot of the mines but the forms you're talking about, I'd like to get it.

Natasha: I can work on this tonite and get it back to you tomorrow to look at. We're almost done here. Do we want to add more detail to the eggs section, or keep it more general?

Doris: When you were talking about eggs in the fish. Our water temp is not the same as other people. So when you say the eggs: we know our fish is healthy when the eggs are a brighter colour. We know that.

Natasha: Is there anything, I went back through the notes, nobody said anything about the milt? In terms of whether it's a healthy fish? So Joanne and I will play with this a bit tonight and bring it back to you tomorrow morning.

BREAK

Joanne: We are going to compare the 2015 forms to the 2018 forms. We did a water boil test, a tea test, and a straight from the lake water taste test. Do people still want to test three types? Tea/plain/straight from the lake?

Wayne: Do we use the same brand of tea each time?

Joanne: Yes.

Doris: All three is better. At home when they put in chlorine your tea has a ring around your cup. Fresh water is not like that.

Wayne: I was thinking about what Doris said earlier on. All fish close to the same spot. We should set a net up at the narrows.

Doris: In winter when you catch fish, you touch it and feel with your hands. Same with water. Water is cold you boil and drink it, it is good. When we go to Diavik you should try one from shore and from further out. Or maybe close to the mine.

Natasha: We had plans to get water from closer to the mine but there was bad weather.

Joanne: We can collect water on our way out to the camp to get water closer to the mine

Joanne: How did this form work for people? Did it make sense? Or was the other one better

Nancy: This form has more information.

Natasha: This form does not have more information it's just presented in another way.

Nancy and Doris like the other (newer) form better. Because you can write comments on it.

Joanne: Was everyone clear on how to answer these forms?

Natasha: People talk about is the ring on the cup when drinking the tea, should we add it to this form?

Doris: If we see it we can add it in the comments.

Natasha: This year people had a lot to say, this taste swampy, this taste fishy, people added these comments and that is great.

Wayne: can we put in a reminder what is comments from the in boat and what comments are from on land when tasting.

Bobby: another one can be the weather. If there is a big storm the water is unsettled a day or so and the water on the shoreline is churned up and it makes a different tea also. If the water is from on a calm day there is less sediment and tastes different.

Joanne: we can add another line to indicate weather conditions

Ernest: what goes up comes down at Diavik. Water turns and changes with wind.

Bobby: the water in Kugluktuk stays the same colour for days after a storm, a green colour. And sometimes when the weather comes then you can taste salty water. When the tides are high and the water is so high near the water intake, you can taste the salt water. The lake water is different because of the rock and environment. All the lakes have different rocks in them and so there is always a different taste in your tea and water, depending on the lake. When I travelled from Kugluktuk and stopped at different lakes along the way, I could taste the difference. So the water has the rock content and gives off a lot of taste. Depending on what is in the lake. Sometimes if it is good water it will really slowly turn colour in the tea. If it is more harder water, the tea will go black quicker. That's what I've found in traveling many lakes around the north. I'd also taste all the fish when I traveled.

Joanne: Are there any other things we want to add to this? Or takeaway?

Natasha: Would the top ones be easier if it was in a table? Sometimes it is hard to follow lines across. We can play with that.

Joanne: So we're going to add weather conditions in here. Is everyone ok with this? So we've made a point that we'll take a water sample closer to the mine on the way to the camp so that we don't have to be dependent on weather to get back there.

Natasha: The form used for tasting the fish from the very beginning has been this one that is very free form where you can talk and record whatever details you'd like. And then there is the ranking system for 1:5. So we don't want to take away anything from here, so that we keep it likes it always been, but we can add to the form. For example, if there are certain questions we want to ask.

Doris: If the fish is healthy, I know we'll be doing all of this. But if it is not healthy, we can't do those things. You know when we clean our fish and they're unhealthy, then I wouldn't cook it and eat it.

Joanne: But we're not going to pick unhealthy fish.

Doris: But what if we caught all unhealthy fish?

Natasha: I think we caught about 35 fish.

Doris: Do we bring all the fliers/pamphlets that were at the camp? The one on parasites?

Natasha: that came up at the planning session, that people would bring something from their community.

Joanne: So maybe at our next planning session, we could bring more copies of the DFO pamphlet? (yes)

Natasha: I think we have good direction on the forms now from you guys. I think it's going to take longer than tomorrow to change these. So we suggest doing some reviews of these and bringing them to our next planning session for review before we go to the next camp. Is that good? (yes)

Natasha: Recommendations - what went well?

Wayne: The cook.

Jonas: There needs to be more traditional food.

Natasha: Challenge with traditional food - can't cook it in the kitchen there. We talked about this during the planning session, too. Possibly bring own dry meat, or try to get dry meat. What about the camp itself?

Doris: Kitchen is too small.

Jonas: Can we go earlier? A week earlier?

Natasha: Timing - we wanted to talk about that. We keep running into the August long weekend and I know that's a problem because of the spiritual gathering. Are you asking because of weather, Jonas?

Jonas: Yes. The last week of July would likely be better.

Natasha: What is the range? What would be the latest you'd want to end it?

Wayne: Is there a chance to extend the time a little bit? Like from 5 days to a week, say?

Natasha: Some recommendations say a longer camp, too short.

Doris: 4 days was too short with everything we wanted to do.

Nancy: Especially when we had to do that fish heads until late.

Natasha: In a perfect world, how many days would it be?

Ernest: If you have bad weather, it limits you. So you want some cushion in case of bad weather.

Doris: Sometimes we don't get to see what we're there for because of the weather.

Wayne: 7 days.

Bobby: just a couple more days would be good.

Doris: 5 days at the camp. Then plus travel. Another question: do we always have to cook with birch wood? There's lots of burnt ground near Yellowknife, so why not use that? Spruce.

Georgina: different types of wood make for different cooking. Dry wood is good for cooking.

Doris: Birch can be burned when you're sitting around, but use dry wood for cooking and fish tasting. Birch makes everything black.

Natasha: So any other recommendations for cooking the fish?

Doris: We need more benches - enough for everyone around the fire.

Natasha: Listed some of the recommendations from the table.

Jonas: Need 3 drums (traditional drums) for the camp.

Doris: processing table too tall. Can just cut the legs.

Natasha: it is always challenging at camp as some people want more down time, others want a schedule. I'd like to talk about this comment regarding better time management and planning. Was it because we were feeling rushed with weather? Was this one persons' comment?

Doris: We're there for a reason. We do what needs to be done. When I go and before I left my community I look at the agenda. Then I take my notebook out and write down what I'm thinking. I go for my community. It's for the younger generation. They're going to see down the road. We want to do the best thing we can and do the right things for our community. That's how I think.

Natasha: You're bringing up something really important. There is preparation to be done before, then at the camp and then after. So maybe there are things we can be doing to help you with that. Maybe there is some way to change the way we do the report and video.

Georgina: maybe people can bring their own activities, like sewing. And also sharing cultures, what each group does out on the land. Then we can all do our own sewing and crafts out on the land, like how our ancestors used to. And from that time on and carrying into the future. Have free time at night to do those things.

Joanne: You're suggesting that we try to set it up so that we can share with each other.

Georgina: Yes, I want to see how Inuit do things different from us. And we can do our own crafts there and work with the land and share and show them what we do, too.

Joanne: Making nets in the old, old way - root nets.

Bobby: In the film, there are little things we leave out all the time. There was one item we went through in our camp. If the fish or the water was telling you something, what would they say. I've been here a lot and we're there to taste and sample the fish. All the time we see that film, those little things don't come up. The fish are telling us something. I didn't see it in the film again. Little questions in camp. When I look at that question, it is been asked before. We're seeing changes already. The first two camps we saw worms alright but the parasites on the meat itself, we didn't see that until this year. And the colouration of the fish was a bit different. That didn't come up on the film itself. I'd like to see some answers to that question in the film from a TK perspective.

Natasha: I know we have that in the report where we pull together the answers to those questions. But we didn't include that specifically in the video.

Joanne: A lot of people didn't respond to that question in the interviews. Maybe it's the way we asked it, or they needed more time to think about it. But there wasn't much on video because people didn't respond. You may have been the only one to respond.

Natasha: I have questions on the interview process itself. We have a guide, we don't always stick to it. We try to get at what knowledge you want to share, what you see. We've had the same questions since 2012. But because we have several elders that have been to 2:3 camps, it can be awkward to ask the same questions over again. We've captured a lot of fish stories in past sessions, so are people tired out of the questions. Do we need to change the questions a bit? Do we ask other elders to come and share their knowledge and expertise and stories on fish?

Joanne: I would really like to hear your recommendations for other elders that should have an opportunity to come to the camp. You know them. You know who knows the area. You know who knows fish. You know who is concerned enough to want to come to help. Who could share old stories, fish legends, water legends. That would be great to get your suggestions on other elders from your communities that could make a contribution.

Jonas: How many years you been doing this?

Colleen: 2002 for TK component. Changed hands. EMAB, Diavik, biggest method changes in 2012.

Jonas: Make sure water is clean, make sure fish are healthy. We're doing this for communities. But we never hear from the mining people. Are we doing a good job? What's happening? Some of the comments we hear : is it good, is it bad? We never ask the scientific people. We barely get feedback from the developers on what we're doing : is it helpful? Are we doing the right thing? Do we need to change the program? That's one thing always in my mind. Are we giving good recommendations? E.g. treating the water before putting it back into the lake.

Colleen: Regulators and Diavik are impressed with this program and fully support it.

Natasha: It goes beyond Diavik and Yellowknife, too.

Jonas: Before the mine started, we wanted to know what could go and what couldn't. There was a lady from Australia, a First Nation, and we asked her what went wrong, what have you learned. One of the elders said what about the land, wildlife, it is our food. How do we write this down? I want to ask because if it is not good, we need to know.

Doris: We're doing good, but when we go and do our TK, their priority is trout, water. But those of us here are all the fish, berries, animals around it. Diavik says first one on the list is trout and water sampling. For us around the table, we give our TK to Diavik, we look at everything and talk about everything. And they do take diamonds out of our land and we are the spokesperson for them. But for me when I go for TK, it means everything on the land. And what you eat. I did my homework already. And we do see white things in caribou now. But we're not allowed to do TK on caribou at Diavik. And there is caribou close to there. They're worried to see if there is anything wrong in Lac de Gras. And when they do their roads, it is dusty and animals eat around that. So when I'm here I want to know.

Ernest: I've been there all the way through, before the mine. All this time I was stepping on diamonds I guess. There used to be a lot of caribou and they'd swim from the island to the main land but not anymore. I used to work at Ekati and Misery in 2002 and there were so many caribou. Some day we won't have any caribou coming across. Now Ekati has another dike. The two mines are close to each other. The snow turns yellow near the mine. What goes up comes down. I fly around in the chopper. I see lots. But anyways, I could tell being there. Like Bobby the way he talks it is true facts. Same with Jonas. I've been to all the mines : Gacho Kue, Snap, Ekati. That new one up will last for awhile and it's on our traditional country. Lots of elders told me about this but they're all gone. Food and money for the young generation. I take one day at a time. Be careful what you say. We have another day tomorrow. I've been here a lot. I'll have more to say tomorrow.

Julie: No mines existed a long time ago. Nowadays there is a lot of exploration. The population of the caribou was plenty but today there are moratoriums on hunting. In the future… Our ancestors have all passed on but they didn't know about mineral extraction. Our leaders didn't learn how to read and write but now our leaders have rules and regulations that they follow. When Chief Jimmy Bruneau was alive, he was very well spoken even if he didn't know how to read. When he went on the tundra to hunt white fox, from the willows they would tie them together and that's how they would burn and make tea in the past. Those were the pitiful days. Those were the things that took place. The elderly couple that raised me and Chief Jimmy Bruneau used to visit my parents and late husband and talk about it. Over 30 years he was Chief for our people. And today there is no hunting and a moratorium on caribou. During this time he was asked to sign an agreement developed with ENR back then. He didn't want to sign and asked ENR to leave. But all our ancestors have passed on. Some of our elders are still living but unable to walk and cook for themselves. Some spend nights with me and I cook for them. Some elders are older than me. Because I was raised by an elderly couple I'm sharing this story of Chief Jimmy Bruneau. We do monitoring for whitefish, pickerel, and there are 5 different species. We use it as our food source. Some people may not have certain foods. In the past our ancestors travelled on the land on dog teams in those times. They had food for the dogs and if you use a skidoo it breaks down on you. Dogs rarely do. Some of our elders pass on stories and those are the stories I'm sharing with you. I have a lot of stories to share with you but I'll save some for tomorrow. That's all I'm going to say. Thank you.

Natasha: Sensing we're done for today. We've worked hard today and there was a lot of sharing and information. So as you can see on the screen, we've been writing down all these recommendations. The only thing we didn't get a good chance to talk about were some of the recommendations around youth, but I think we should do that tomorrow when we're fresh. As a reminder, we'll talk about the results from the fish and water testing. We'll review the titles and dedications tomorrow. We'll sign the author page and verification forms.

Wayne: I want to say something before we break up. When Jonas mentioned earlier about the way we were doing things here. I never said before and I thought about it. We haven't heard back on what we're doing, how we're doing. But it seems to me that we can have more feedback on how they're using the information so maybe we can learn more that way. Seems like the mine is happy with the way things are proceeding here, I wonder if it's a good day to ask for a raise? (laughter)

END

AEMP 2018 TK Study Verification Session
Day 2, 7 December 2018
Yellowknife, NT

Attendees: Julie Wedzin (Tłı̨chǫ Government), Georgina Chocolate (Tłı̨chǫ Government), Peter Huskey (Tłı̨chǫ Government), Joline Huskey (Tłı̨chǫ Government, part of day), Jonas Sangris (Yellowknives Dene First Nation), Ernest Boucher (Łutsel K'e Dene First Nation), Doris Terri Enzoe (Łutsel K'e Dene First Nation), Wayne Langenhan (North Slave Métis Alliance), Nancy Kadlun (Kitikmeot Inuit Association), Bobby Algona (KItikmeot Inuit Association), Natasha Thorpe (Facilitator), Joanne Barnaby (Facilitator), Colleen English, Kyla Gray (DDMI)

Joanne: Colleen will be finishing up and moving to Australia so we just wanted to let you all know. Today we'll start with the scientific results. We'll leave the video until later for our second review to make sure we don't run out of time. We also need to look at planning for the future. And we need to give you an overview of the report so that you know what you're supporting when you sign on to the author sheet.

Julie: When we're here at meetings I really appreciate the stories being shared. I'm happy to hear what we're talking about.

Joanne: We will turn it over to Colleen for a discussion of the fish and water results.

Colleen – *presented water sampling results*

Bobby: Can we see the early sample results from before the mine started? We have some of these chemicals in our bodies naturally.

Doris: We could see changes and not know where it is coming from like climate change.

Wayne: Could we get graphs done from over the years?

Bobby: Can we see fish cysts?

Colleen – *presented cyst data for years 2002 – 2018*. We can see that this is something that we can monitor and record more carefully going forward; there is room for improvement.

Doris: What happens between fish camps? I would like to see results from all fish. I am frustrated with how little is shared in the communities.

Ernest: We need to report back, so our people know why we are here.

Colleen: There is more done than the TK fish program. There is regular sampling for other species in the food chain of fish; for example, bugs that live on the lake bottom and in the water column plus the sediment on the bottom of the lake. And they sample smaller fish called slimy sculpin that tend to stay in specific areas their whole life, like close to the mine and further from the mine, so that their health in different areas can be compared. These studies try to limit the collection of larger fish like trout in order to limit the loss of large fish in the lake as you need quite a large number of fish per sample program.

Wayne: Is there different labs used to compare results?

Colleen: Yes. Baseline started in 1996-98. They have changed or used different labs over the years but it is a very diligent process in selecting labs.

Jonas: What changes have you seen?

Colleen: We did see a blip in mercury levels in small fish in 2007 but we increased efforts to look for it, and it hasn't shown up again since – not in the water, sediments, fish. And it was tested at really low levels. The biggest impact is from nutrients from groundwater that gets released from mining. So I notice that there are more small bugs that live in the water column over the years. The mine water is what gets treated before it is released. And nutrient levels in the lake will go down and return to more normal levels naturally over time. That is a big difference between metals and nutrients.

Mercury slide – remain below guideline levels for consumption.

Natasha: I am now going to walk through the report and show you what each section looks like and includes.

Review of Summary Section

Review of TK Water Results Section

Ernest: I noticed that the water didn't taste as good from the bay near the camp, too much wind churning it up. And I have noticed in the past that the snow is yellow near the mine – so that maybe it's the mine blasting dust settling on the land.

Review Results of TK Fish assessment

Bobby: Fish #29, I don't remember why I said, 'it would not be my first choice'. (others agreed they were not sure why this was said)

Jonas: The water level on Lac de Gras seemed lower, this year it is higher on Great Slave Lake.

Georgina: We don't get the words of our elders back into our communities.

Doris: We should consider using audio recordings and not just note taking at the camp. I would like to review the report at home.

LUNCH BREAK

Joanne: We went through some of the recommendations yesterday but there are a few left to talk about. People asked for more youth. This past camp, we didn't have the usual amount, but if we had the one from each group, are you satisfied with that or looking to increase further?

Bobby: I always thought about a boy and girl, at least 2 per group. At least for our group anyway. I think it would be helpful for us. And I think it would be good for the future.

Georgina: I think that people who do TK work should also come. I think groups have this. They could document their information. They could teach people in the future. I think we should all be involved together. I think young people don't know where to start or what to do; they need help and need to learn how to help their elders and take notes. And learn the history of their ancestors. The trails are important. We can teach some people when they go on the tundra – there are our ancestors trails and the caribou. In the future the youth will become elders.

Joanne: That's a new category of people. Georgina suggests that people with experience with TK should be added to our group. So they help teach the young people the skills they need to group. And Bobby is suggesting 1 male and 1 female youth from the regions. In terms of numbers at the camp, I'm not sure if we can do that?

Colleen: Yeah, that would be a problem.

Joanne: So we can add that as a recommendation to explore and see what options may or may not be there.

Colleen: I know some had already done this, but it's also very important to make sure we identify alternates. To me, it is more important to focus first on filling the camp before we think about expanding the camp. I feel like it's a missed opportunity when we don't get the numbers that we're asking for.

Doris: Better to have 2 youth and 2 stand-bys. I had plans to go to the gathering but had committed to Diavik camp.

Joanne: Idea of camp more often than once every 3 years.

Natasha: Is there a way that we can support you better to help you get more youth out there? There is so much energy and effort that goes into planning this and it is heartbreaking when there are empty seats. I'm just wondering.

Bobby: Maybe if we go in our group in our communities if Diavik could come up with a youth program for those interested in going out on the land and working with Elders. To say in the community to get a list of young people who are interested in coming to the camp, as opposed to just the organization saying who should be there. Finding those who want to go and learn something. On the list of young people, you would for sure have 1 or 2 who are really up for coming. And in classrooms. Maybe at the school.

Joanne: Although there is an age limit. 18 yo.

Nancy: At Diavik they have to be 18, but to come here they don't? When we pick youth from communities, we phone the schools to see who can come. We take recommendations from the principal or other teachers.

Joanne: That's good, we just want to be sure we don't have people who can't come to the camp.

Colleen: Janet does that for Kugluktuk specifically with the school, I know. And Nancy, the youth have to be 18 here or at the mine.

Natasha: We've put an ad in News North for another project and asked youth to submit a poem, story, drawing or anything to make an effort to show why they wanted to go. I was worried we'd get too much response but in the end we got the right number. The other idea would be do we just want youth everywhere, or do we just want one from each? Does it have to be one from NSMA vs Tlicho etc.

Wayne: Beyond my power. The organization decides that. Also there are problem kids that may benefit from it.

Colleen: That won't likely happen at Diavik if they can't pass the background check, just so you know.

Natasha: Wonder if we have this discussion again 3 yrs from now to find the best ways to support everybody?

Doris: In my community, my niece and nephew went to Gacho Kue with the school for a day trip. I don't know if they were 18 yo. And then there was a youth conference at home. Don't know how you promote it. Put up a poster at the store, band office and school asking if interested in going? And ask why.

Natasha: Joanne and I can easily help with a poster, or putting it on Facebook to forward. I don't mean this in any way as a criticism but sometimes it feels to me like we try with the organization and it gets stuck. Fully understand they're over worked without enough staff. But that's why I ask what more can we do.

Wayne: What is the age span?

Colleen: Each group has own. I think NSMA is 25 to still be a youth. Doris said LKDFN is 18-30.

Georgina: With field forms, every column has to be filled, so if they're not trained to do this work we won't get the information. So you have to put more effort into the form and training. We can't just leave them blank or say 'nothing'. So if the TK person is there they can teach the young person to do it again in the future. And they'll come back again if they have a positive experience. We can't bring a new youth out there when the work is unknown. Age in Tłı̨chǫ is 18-25.

Natasha: Last time we had it in 2015, we had youth for the camp come to Yellowknife 1 day early and did training in video documentation. But then we were told that youth were pulled in 2 directions so we cut that this year. So one idea next time is to bring them in a day early and TK researchers could teach the youth in advance how to do the forms and/or a TK interview. We could do training easily.

Doris: Or send us the form(s) beforehand and we could go over it with the selected youth beforehand.

Julie: Young people, 18 and over, the principal of the school should select the young people. We have stories of the past and legends and the young people could write these things down. Long before my time, there are stories that exist. My grandparents raised me to tell stories of the past. They predicted how people will be raised in the future and how these alcohol and drugs and that young people will depend on the elders to teach them. They don't know the stories of our ancestors and the sharing of these stories is very important. They should maintain these stories and maybe in the next 3 yrs we don't know whats going to happen. We want the youth to live a healthy lifestyle and we want to share these stories and prepare the fish and make dry fish. They will see and learn this. We will talk about the fish. How they collect and test water. Those are things for the youth to learn. Within the school system, we should ask the teachers to select the individuals to go on the tundra and do the monitoring. So if they are asked and interested, they can come. There are a lot of young people today all over in each community but when we see them using intoxicants, if they use it, it would be good if we keep them in our prayers and turn their lifestyle back to our ancestors' stories. I wanted to share that with you and I'm thankful for hearing this from you.

Bobby: When is the next community visit from Diavik?

Colleen: I'm not sure. I could ask the Communities team.

Joanne: If the camp is 3 years away, if it could be put in the schedule for 1 year before the camp to discuss these things in advance.

Bobby: Coming from industry and coming to communities, they are motivated to get the young people out, the elders are. If mining or industry say we want to help you with your youth, this would probably help too. That would really help our elders in our community with our youth. A lot of youth sometimes they really enjoy the TK way of doing things. A lot of them do. But a lot I can see are going to be office workers as well too. I think if an industry company would come into community to help with the youth – as you know, we're all having problems with youth. I think it would help motivate young people. I know they do this as well. But if industry was to say something to social workers or KIA members or whoever, they'll tell young people about the programs and what we're doing and that we're doing it for all our futures. I think that would be really good in my opinion.

Natasha: Review of Methods section. Colleen is reminding us that we may want to add something formal here in terms of a recommendation for recording cysts in fish. So we'd need to come up with some wording. So we'd be looking to change the science form to record cysts etc. for all fish. So the TK form lists cysts, but we just need to make sure the youth are recording it. It can't be left blank. Is what I wrote here ok? (nods) Doris talked about having youth here at the verification session. We talked about the challenges with that but do you want to make that a recommendation?

Bobby and Doris: Yes.

Doris: We aren't going to be here forever, they need to be part of the whole process.

Wayne: Could we not give them a questionnaire? Ask them what they want to be involved with?

Natasha: Yes, we can. We could also hold this type of meeting on the weekend, too, so that they don't miss school. Depending on how you guys feel about this.

Doris: Doesn't bother me.

Bobby: The last time we did this, there was at least one youth who came to me said that it was a long time to sit and listen to meetings like this, I would really like to come again and listen and learn some more. That was from one youth from my community. They wanted to come and listen some more. So that's why I was asking how come we didn't have youth in this session. In our communities, a lot of youth get a chance to sit and come to meetings like this. And like ourselves we've been doing this ever since it began and we know what we're doing as opposed to someone new learning everything.

Joanne: So are we good with the recommendations? (yes)

Joanne: Today we have typed up the suggestions for the video and report titles and the dedications for each of those. I'm going to pass the list around to you and you can vote on it. Or you can come up with something else if you feel so inspired. So maybe we'll let you have a look at these and we'll give you 5 mins to have a look and select your preferences. That way we can finalize these. Try to select one but if you feel strongly about two, you can put both.

VOTING

Jonas: I'd like to hear from Kyla. You work at Diavik. What do you think of what they're doing? What about the camp etc.?

Kyla: I've been at Diavik 4.5 years. I believe we do a very thorough job. I do the sampling. It is fun. As far as a change, I don't think I've been there long enough to see a big change. I love my job. It is fun sitting here with you and hearing your concerns and working to address those. It is good.

Natasha: Our youth, Our Future won as the most popular. So we have one that's the most popular, and some other ones that also were popular. I wanted to point out that the group/person that chose this, liked it for everything so that's why we ended up with 4 for watching land for future, we love our land water air and stronger together and on the Barrens I feel good.

Doris: For me I marked for the same title for both the video and report.

Natasha: Lets do the report title, then the video title, then the report dedication and video dedication. Our youth, our future – for the report? (0) For the video (1) Or for both (4)? Ok, that wasn't everyone. We need to work through this. Ok, same title for both.

Jonas: Something is missing. Someone made the recommendation that no one had a chance to look at. Natasha read from sheet for dedication.

Natasha: For the dedication for the report and video, what do we want to select?

All: The dedication for both will be 'the land is yours to care for'. With the title for both being 'Our Youth, Our Future'.

BREAK

Joanne: We understand that all of you want to come to the camp. But we also want to know other people, your knowledge of your own communities, we'd rather hear your suggestions for elders who know that area, the fish, they could also make a contribution. If you could provide us with those suggestions, that would be wonderful. I don't know if we want to do that here or if we want to write down names. We have stickies, maybe everyone could write down 4 suggestions maybe.

Joanne: It is getting late. If we did the video again, it would be really late. Do people have comments from seeing it yesterday. Do you have any further comments?

Wayne: I like the colour and the drone footage.

Doris: I want to see me driving the boat and being ahead of the men. All the ladies want to see it.

Joanne: Could they add a still into the video? We can ask.

Janet: it was good. I like it, it was nice.

Joanne: If there are no further comments, we talked about the idea of putting together a little short one, a little vignette. We had an idea. Because we had a couple of elders and a couple of youth for sure and we thought that it would be nice to focus that on traditional laws. That was Artless Collective and Natasha and Joanne. Something that can easily go on Facebook. I really like the idea of youth talking about laws with Elders.

Doris: I liked the way Zach talked.

Wayne: Maybe when we go back to our communities, we go back to the communities and ask the principal to incorporate something into the school year where they do 1 day a week or whenever out on the land. Get them out of the classroom.

Doris: That's happening in our community.

Jonas: We do that too. We had 1 week on Mackenzie Island this past fall. It was good.

Doris: Your kids do that too?

Colleen: Yellowknife school district does that too.

Joanne: Anything further on the video?

Natasha: The thing with the short video is that we could insert that into the longer video. To get the elders voices heard more. If you feel this, don't be shy to say.

Colleen: Be wary that the short video is meant to be a teaser to lead to the longer video.

Jonas: It's a good idea. We have our laws and some people don't practice it but it's good to share. Even for the mine workers, it's things to do and not to do. It's a lesson we're trying to teach our kids. Like Zach, he must have listened. You have to always remember. Our elders always taught us that – own language – we have our own traditional way of things. We try to teach that. Now it's not really happening. With government and devolution. It's become strong with non-natives. So when you say traditional law, there is a lot of maintenance with it. If you do it with hunting, you take what you need and leave some behind for other animals to feed on. We help the land. The government doesn't follow the same. They charge you for wasted meat. It's not waste, it's for someone else to use. So these are things we're trying to teach our kids, people like us who know some of them. Those are really strong words when you say it traditionally and practice it.

Bobby: For some of us we tell legends and stories in evening camp. Especially the youth. Over the summer, a couple of youth asked us what kind of story are you going to tell us today. So I tell them stories and legends and the law of the land and our ancestors. I tell them a lot of those stories. In late evening when everything is done for the day and we're sitting around camp. Youth ask me for stories and I give them without hesitation. All legends and stories. Telling stories is one of our elder's trait is. The rules and the laws of the land.

Joanne: we're basically finished our meeting so we thought we'd do a quick round table and then give you a copy of the group photo before we do a closing prayer. So just a few words.

Jonas: As one of our laws, you follow the sun. So you usually go around the table. And Elders first. You have to respect that, you always have to do that.

Julie: I'm very thankful for the meeting here. All this discussion that we have. We're talking about TK and our TK is becoming stronger. As I'm sitting here with the feeling I have and the difficulties I'm facing today, it makes me feel like I can't think clear today. But we had a good discussion and we walked on the barrenland and it looked beautiful and we went on the boat and we need to keep the young people coming. They may not know everything but we hope they learn from everything with our TK and knowledge so that they can go on the land. I'm facing uncertainty today. My husband is not with me and I don't have my parents. I feel like an orphan and face difficult times. But I've heard a lot of good things

here and for future generations we are seeking answers. Those things that the youth learn from us and scientists for employment. My grandchild I raised, I don't know how things will take place, it may be worse than it is today. When I hear you speak, it makes me stronger as I listen to you. We don't know what will be taking place in the future. That's what I think. Masi.

Georgina: Masi cho for being here the last 2 days. I've learned a lot from the elders who worked on the barrenlands. I missed being there and I wished I was there to work with elders and youth. The water and fish is our future. I miss working with youth because most work I do is with elders. I haven't worked with youth that much. So I think the youth should be more involved with TK and learn about the forms and how to fill it out and not leave it blank to make the report better. The videos and report are very well done and I'm happy to see that. I hope I can be more involved in the future. Listening to Julie has been awesome. She tells me stories and that helps me a lot. They're my teacher and I still learn from them after 10 years of work. Every day you learn something. The elders are our teacher. I'm happy to be here with you for the last meeting. I hope everyone goes home safe and sound. Thank you for the good report and meeting.

Jonas: That AEMP that's taking place is not only for us but for the youth of future generations and we walk in the footsteps of our ancestors who were in their snowshoes. Today it's not like that. As for industry the mining company is there to extract minerals. It would be good to hear from everyone – young people, elders – we don't want a negative impact on the water. We are caretakers on the land. Over 20 yrs ago a lot of our elders were alive then and spoke about the land. There are our elders that spoke about the monitoring that would be taking place and it is happening today. We do this for our young people and there is no income and less and less trapping. Without employment, we can't survive. We have to watch out for one another and be united as one. There are many issues we face but it is important to talk and learn and teach the next generation to have a better life. Our elders have spoken in a similar way as to what we say today and we speak for the next generation. Everything is up to our creator. He is the one that can help us have a better life. Some of the people that are here and the company I work with care for our wellbeing and feed us and give us a good meeting place. Colleen I worked with you years ago and you will be missed. Thank you all very much.

Nancy: thank you. I'm happy for the report from this summer. I work at the heritage centre. I show these videos. The office asked to watch them twice from last camp. Without a camp like this, we wouldn't know how our water is going to be. Looking at it with our own eyes makes us strong and want to do more. Colleen you're so expert we'll miss you. Have a safe life wherever you're going to be.

Bobby: TK we've come to know a lot us elders about it. It's not just about 100 yrs or more ago, it's something we as elders are trying to teach – how we came to be. All animals, plants, stars, and what we do on this land and how we came to be. Not only living things that we come to talk about but it is rock it itself, the very element that we come from. We talk about that in our TK. I give those to our young people and hopefully they can use that and be a lot more at ease in the future. That's what I try to teach for our young people. Not just our young people, but everyone that we share TK with. We've worked and lived with it all our lives. In our language it is *pitquhiit* – listen to our elders and gain a lot from our elders and give it to our young people. I have many grandchildren and I talked to them a lot and give them words in my language. Words are being lost in our youth. We have to be stronger now to give young people encouragement to live on and be happy for their lives. I'd like to thank the translator for all his work and all the Panel and Colleen, Natasha and Joanne and everybody that works for us. Colleen

you've been great to work with over the years and thank you for sharing your knowledge and time. And I thank the group for their knowledge and stories that you all shared. I gained knowledge from you also. I'm from the barrenlands and others live in the tree line. I haven't lived there and they talk about their TK of how they use the trees. I'd like to thank Diavik again for the chance to keep on doing this. And everywhere we go, we want to be healthy. I want you to be healthy and see you again in the future. Thank you all and have a safe trip home too.

Doris: Marsi cho. Thank you for me being here to bring my TK with me. It's nice to be with you here to follow up. Coming here thinking about the land and animals and water and fish is very important to all of us. So we can protect it. I always think like that wherever I go. There are places where you can't drink the water. I was picked this year for this. I don't mind if other people are picked for future years. Thank you for all the good work you guys are doing here. I met Colleen a long time ago and I'm going to miss her. But life still goes on and I'm going to thank Peter for translating. I can understand but it's nice to have Peter make it clear. Safe travels home. It's a long time home. Marsi Cho.

Ernest: Everybody knows me here. I've been working with the youth over 40 yrs. And I'm still working with the youth we learn from each other. I've been involved for quite awhile. Colleen was working for Diavik and I knew her for a long time. And she's been there and she's leaving us in April and she'll never see snow again. I thank her for all she has done. We haven't got very many elders in the community. I know a lot of people from Coppermine from 1968 staking claims. It's hard in the barrenlands, like the ones where I came from near Artillery Lake. I'm thankful for this. I've known Joanne from before and this guy beside me I've known too long. Thank you it's too bad we don't have a youth here this time. We don't know if we'll be here next time but that's all I have to say for now. Marsi.

Wayne: I know some of you had other things scheduled. Myself, I have a flexible schedule. Thank you all for being here. I think we should put more emphasis on getting more youth here. I like the movie. It could maybe be a couple of minutes longer. I was pleased that those people out there had the drone. That really made a difference. I would like to thank our facilitators here. They did a great job as usual. I don't know when we'll meet again. Back to the coast for you, Natasha and Hay River for Joanne. I know Colleen, I hope she has a really good time living in Australia. It has to be better than Trumpland. It meant a lot to have Peter here for this meeting to help us out. Safe journey home to everyone. No flat tires to those driving. I know it's a long journey sometimes it's very tiring so I wish everyone who flies a safe journey home. I hope to see you at the next meeting.

Natasha: I want to say a really big thank you to each and every one of you with how generous you are with your time. I'm always really nervous coming up to this meeting to make sure that we did a good job making sure we got your information right. Thank you to Colleen and the work you've done for this program. I know it's been a tough day for Julie and a tough month for Colleen so I just want to honour that space and wish everyone safe travels home. It is always such a pleasure to work for the Elders alongside Joanne. Thanks for the opportunity to work with you.

Colleen: Thank you all for your kind words. I will really miss you guys. You've been so great to work with. Thank you.

Joanne: I'm sorry you are finished! I'm going to miss you. It has been a real honour to work with you. It has been an honour to work with all of you. I feel you are so generous and willing to share your time, knowledge, your wisdom with us. Especially with your youth. That kind of commitment is very special. I

hope I see you all again soon, in good health. I want to thank Natasha. She is a really good boss. It is a real joy. I so appreciate Julie spending today with us, and yesterday. She really is making a big sacrifice coming here and being with us. I love her for that. Be safe, be happy. Share your love. Masi.

Peter: I'm very thankful to be invited back to do the interpreting. It helps me gain knowledge from my elders and neighbouring Aboriginals that we learn from one another. At the same time, through the Agreement, the people who are involved are the care-takers of the land so that it can be monitored. I want to thank you for that. Thanks for the help from Colleen, over the years. I'm very thankful and I know that she'll be back. Thanks also to Natasha.

EVALUATION FORMS COMPLETED

CLOSING PRAYER (Julie)

END

Aquatic Effects Monitoring Program Verification Session: Evaluation Form

Thank you for participating in the verification session for the Aquatic Effects Monitoring Program Elder-Youth Camp which was held in Yellowknife on December 6-7,2018. We hope you enjoyed your time at the session. We appreciate your feedback to help us improve future sessions.

1. How would you rate the session for **working and communicating together**?
   - ✓ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

2. How would you rate the session for **mutual respect among participants**?
   - ○ Very good
   - ✓ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

3. How would you rate the opportunities for you to **share your knowledge and experiences**?
   - ✓ Too many opportunities
   - ○ Enough opportunities
   - ○ Too few opportunities

4. How would you rate the **recording and documenting of TK during the session**?
   - ○ Very good
   - ✓ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

5. How would you rate the **facilitation of the session**?
   - ○ Very good
   - ✓ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

6. How would you rate the **outcomes and findings of the session**?
   - ✓ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

7. How would you rate the **amount of time** to discuss the topic(s) during the session?
   - ✓ Too much time
   - ○ Enough time
   - ○ Too little time

8. How would you rate the **venue and food** for the session?

- ○ Very good
- ✓ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

9. How would you rate the **logistics** for the session (e.g., hotel, travel, and honoraria)?

- ✓ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

10. **Overall**, how would you rate the session?

- ✓ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

11. What were the strengths of the session? What did you enjoy about the session? Is there anything you recommend for the upcoming camp that you could share?

The session is the very strong to work with other people,

I enjoy by listening and learning from each other it is like learning how to write Report.

Share more of the Knowledge Involvedment and youth,

12. How could the session be improved? Is there anything that could be changed?

I really think we should at least the one youth and One Elder, for Session and Camp.

Aquatic Effects Monitoring Program Verification Session: Evaluation Form

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- ○ Very Poor

2. How would you rate the session for **mutual respect among participants**?
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- ✓ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

3. How would you rate the opportunities for you to **share your knowledge and experiences**?
- ○ Too many opportunities
- ✓ Enough opportunities
- ○ Too few opportunities

4. How would you rate the **recording and documenting of TK during the session**?
- ○ Very good
- ✓ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

5. How would you rate the **facilitation of the session**?
- ✓ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

6. How would you rate the **outcomes and findings of the session**?
- ○ Very good
- ✓ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

7. How would you rate the **amount of time** to discuss the topic(s) during the session?
- ✓ Too much time
- ✓ Enough time
- ○ Too little time

8. How would you rate the **venue and food** for the session?

- ❍ Very good
- ❍ Good
- ❍ Neither good nor poor
- ❍ Poor
- ❍ Very Poor

9. How would you rate the **logistics** for the session (e.g., hotel, travel, and honoraria)?

- ❍ Very good
- ❍ Good
- ❍ Neither good nor poor
- ❍ Poor
- ❍ Very Poor

10. **Overall**, how would you rate the session?

- ❍ Very good
- ❍ Good
- ❍ Neither good nor poor
- ❍ Poor
- ❍ Very Poor

11. What were the strengths of the session? What did you enjoy about the session? Is there anything you recommend for the upcoming camp that you could share?

More Elder and youth

12. How could the session be improved? Is there anything that could be changed?

More Day

Aquatic Effects Monitoring Program Verification Session: Evaluation Form

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1. How would you rate the session for **working and communicating together**?
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- ○ Poor
- ○ Very Poor

2. How would you rate the session for **mutual respect among participants**?
- ✓ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

3. How would you rate the opportunities for you to **share your knowledge and experiences**?
- ○ Too many opportunities
- ✓ Enough opportunities
- ○ Too few opportunities

4. How would you rate the **recording and documenting of TK during the session**?
- ○ Very good
- ✓ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

5. How would you rate the **facilitation of the session**?
- ✓ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

6. How would you rate the **outcomes and findings of the session**?
- ○ Very good
- ✓ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

7. How would you rate the **amount of time** to discuss the topic(s) during the session?
- ○ Too much time
- ✓ Enough time
- ○ Too little time

8. How would you rate the **venue and food** for the session?

- ○ Very good
- ○ Good
- ✓ Neither good nor poor
- ○ Poor
- ○ Very Poor

9. How would you rate the **logistics** for the session (e.g., hotel, travel, and honoraria)?

- ○ Very good
- ✓ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

10. **Overall**, how would you rate the session?

- ✓ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

11. What were the strengths of the session? What did you enjoy about the session? Is there anything you recommend for the upcoming camp that you could share?

RESPECT, LOTS OF KNOWLEDGE SHARING GOOD INTERPRETER

12. How could the session be improved? Is there anything that could be changed?

HARD TO IMPROVE

Aquatic Effects Monitoring Program Verification Session: Evaluation Form

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1. How would you rate the session for **working and communicating together**?
- ◉ Very good
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- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

2. How would you rate the session for **mutual respect among participants**?
- ◉ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

3. How would you rate the opportunities for you to **share your knowledge and experiences**?
- ○ Too many opportunities
- ◉ Enough opportunities
- ○ Too few opportunities

4. How would you rate the **recording and documenting of TK during the session**?
- ◉ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

5. How would you rate the **facilitation of the session**?
- ○ Very good
- ◉ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

6. How would you rate the **outcomes and findings of the session**?
- ◉ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

7. How would you rate the **amount of time** to discuss the topic(s) during the session?
- ○ Too much time
- ○ Enough time
- ◉ Too little time

8. How would you rate the **venue and food** for the session?

- ○ Very good
- ✓ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

9. How would you rate the **logistics** for the session (e.g., hotel, travel, and honoraria)?

- ○ Very good
- ✓ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

10. **Overall**, how would you rate the session?

- ○ Very good
- ✓ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

11. What were the strengths of the session? What did you enjoy about the session? Is there anything you recommend for the upcoming camp that you could share?

WISDOM GIVEN TO YOUTH, LISTENING to other ELDERS STORIES
ALSO GIVEN A CHANCE TO SHARE ALL KNOWLEDGES, TOGETHER AS ONE

12. How could the session be improved? Is there anything that could be changed?

GOOD - NEED MORE YOUTH + ELDERS
GIVE US MORE to time to be AT CAMP.

Aquatic Effects Monitoring Program Verification Session: Evaluation Form

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1. How would you rate the session for **working and communicating together**?
- ☒ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

2. How would you rate the session for **mutual respect among participants**?
- ☒ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

3. How would you rate the opportunities for you to **share your knowledge and experiences**?
- ○ Too many opportunities
- ☒ Enough opportunities
- ○ Too few opportunities

4. How would you rate the **recording and documenting of TK during the session**?
- ☒ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

5. How would you rate the **facilitation of the session**?
- ☒ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

6. How would you rate the **outcomes and findings of the session**?
- ☒ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

7. How would you rate the **amount of time** to discuss the topic(s) during the session?
- ○ Too much time
- ☒ Enough time
- ○ Too little time

8. How would you rate the **venue and food** for the session?

- ◉ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

9. How would you rate the **logistics** for the session (e.g., hotel, travel, and honoraria)?

- ◉ Very good
- ○ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

10. **Overall**, how would you rate the session?

- ○ Very good
- ◉ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

11. What were the strengths of the session? What did you enjoy about the session? Is there anything you recommend for the upcoming camp that you could share?

12. How could the session be improved? Is there anything that could be changed?

Aquatic Effects Monitoring Program Verification Session: Evaluation Form

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1. How would you rate the session for **working and communicating together**?
   - ◉ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

2. How would you rate the session for **mutual respect among participants**?
   - ○ Very good
   - ◉ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

3. How would you rate the opportunities for you to **share your knowledge and experiences**?
   - ◉ Too many opportunities
   - ○ Enough opportunities
   - ○ Too few opportunities

4. How would you rate the **recording and documenting of TK during the session**?
   - ◉ Very good
   - ○ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

5. How would you rate the **facilitation of the session**?
   - ○ Very good
   - ◉ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

6. How would you rate the **outcomes and findings of the session**?
   - ○ Very good
   - ◉ Good
   - ○ Neither good nor poor
   - ○ Poor
   - ○ Very Poor

7. How would you rate the **amount of time** to discuss the topic(s) during the session?
   - ○ Too much time
   - ◉ Enough time
   - ○ Too little time

8. How would you rate the **venue and food** for the session?

- ○ Very good
- ✓ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

9. How would you rate the **logistics** for the session (e.g., hotel, travel, and honoraria)?

- ○ Very good
- ✓ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

10. **Overall**, how would you rate the session?

- ○ Very good
- ✓ Good
- ○ Neither good nor poor
- ○ Poor
- ○ Very Poor

11. What were the strengths of the session? What did you enjoy about the session? Is there anything you recommend for the upcoming camp that you could share?

Good to go Back again to DAVIK Fish Camp.

12. How could the session be improved? Is there anything that could be changed?

Get more youth with Edith's meeting

Results of the Verification Session Evaluation (2018)

Question*	Very Good	Good	Neither Good nor Poor	Poor	Very Poor
How would you rate the session for working and communicating together?	6	-	-	-	-
How would you rate the session for mutual respect among participants?	3	3	-	-	-
How would you rate the recording and documenting of TK during the session?	3	3	-	-	
How would you rate the facilitation of the session?	3	3	-	-	-
Overall, how would you rate the outcomes and findings of the session?	3	3	-	-	-
How would you're the venue and food for the session	1	4	1	-	-
How would you rate the logistics of the session? (N=5)	2	3	-	-	-
Overall, how would you rate the session?	3	3	-	-	-

*N=6 for all responses, except where noted

Question	Too much time	Enough time	Too little time
How would you rate the amount of time to discuss the topic(s) during the session (N=6)	1	4	1

Question	Too many	Enough	Too few
How would you rate the opportunities for you to share your knowledge and experiences? (N=6)	2	4	-

What were the strengths of the session? What did you enjoy about the session? Is there anything you recommend for the upcoming camp that you could share?

- Would be great to go back again to the Diavik fish camp
- Wisdom given to youth, listening to other elders stories; also given a chance to share all knowledge, together as one
- Respect, lots of knowledge, sharing, good interpreter
- More elders and youth
- The session is very strong to work with other people. I enjoy by listening and learning from each other, it is like learning how to write a report. Share more of the knowledge, involvement of youth

How could the session be improved? Is there anything that could be changed?

- Yes, youth with elders at the meeting
- Good – need more youth and elders. Give us more time to be at camp.
- Hard to improve
- More days
- I really think we should at least take one youth and one elder, for the session and camp

Verification Form for the

DRAFT Diavik AEMP TK Camp Transcripts

I, Jonas Sangris (name), on Dec 7, 2018 in Yellowknife, NU/NWT have reviewed the draft transcripts of my interview held as part of the Diavik Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) camp held on Lac de Gras from August 2-6, 2018.

With my signature and when all corrections that I have indicated are made, I agree that the notes are correct and can be used in reports, presentations and publications by TCS and DDMI, in particular related to the Project, as well as in cultural and educational initiatives. As promised, copies of these will be returned to me and my community organization.

I would like to be included as an author of the AEMP TK Camp Report for 2018, which will include my photo, a brief biography, and my signature on the title page.

- [x] Yes
- [ ] No

Jonas Sangris

Signature of Participant

Kyla Gray

Diavik Diamond Mine (2012) Inc.

Natasha Thorpe

Thorpe Consulting Services (TCS)

Verification Form for the

DRAFT Diavik AEMP TK Camp Transcripts

I WAYNE LANGENHAN (name), on DEC 07, 2018 in HWY #3, NU/NWT have reviewed the draft transcripts of my interview held as part of the Diavik Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) camp held on Lac de Gras from August 2-6, 2018.

With my signature and when all corrections that I have indicated are made, I agree that the notes are correct and can be used in reports, presentations and publications by TCS and DDMI, in particular related to the Project, as well as in cultural and educational initiatives. As promised, copies of these will be returned to me and my community organization.

I would like to be included as an author of the AEMP TK Camp Report for 2018, which will include my photo, a brief biography, and my signature on the title page.

- ✓ Yes
- ○ No

Wayne Langenhan

Signature of Participant

Kyla Gray

Diavik Diamond Mine (2012) Inc.

Natasha Thorpe

Thorpe Consulting Services (TCS)

Verification Form for the

DRAFT Diavik AEMP TK Camp Transcripts

I, Bobby Algona (name), on Dec, 7/18, 2018 in _____, NU/NWT have reviewed the draft transcripts of my interview held as part of the Diavik Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) camp held on Lac de Gras from August 2-6, 2018.

With my signature and when all corrections that I have indicated are made, I agree that the notes are correct and can be used in reports, presentations and publications by TCS and DDMI, in particular related to the Project, as well as in cultural and educational initiatives. As promised, copies of these will be returned to me and my community organization.

I would like to be included as an author of the AEMP TK Camp Report for 2018, which will include my photo, a brief biography, and my signature on the title page.

- ✓ Yes
- ○ No

Signature of Participant

Kyla Gray

Diavik Diamond Mine (2012) Inc.

Natasha Thorpe

Thorpe Consulting Services (TCS)

Verification Form for the

DRAFT Diavik AEMP TK Camp Transcripts

I, Nancy Kadlun (name), on Dec 7/18, 2018 in Kugluktuk, NU/NWT have reviewed the draft transcripts of my interview held as part of the Diavik Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) camp held on Lac de Gras from August 2-6, 2018.

With my signature and when all corrections that I have indicated are made, I agree that the notes are correct and can be used in reports, presentations and publications by TCS and DDMI, in particular related to the Project, as well as in cultural and educational initiatives. As promised, copies of these will be returned to me and my community organization.

I would like to be included as an author of the AEMP TK Camp Report for 2018, which will include my photo, a brief biography, and my signature on the title page.

- [x] Yes
- [ ] No

Nancy Kadlun

Signature of Participant

Kyla Gray

Diavik Diamond Mine (2012) Inc.

Natasha Thorpe

Thorpe Consulting Services (TCS)

Verification Form for the

DRAFT Diavik AEMP TK Camp Transcripts

I, ERNEST Boucher (name), on Dec 7. 2018 2018 in _____, NU/NWT have reviewed the draft transcripts of my interview held as part of the Diavik Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) camp held on Lac de Gras from August 2-6, 2018.

With my signature and when all corrections that I have indicated are made, I agree that the notes are correct and can be used in reports, presentations and publications by TCS and DDMI, in particular related to the Project, as well as in cultural and educational initiatives. As promised, copies of these will be returned to me and my community organization.

I would like to be included as an author of the AEMP TK Camp Report for 2018, which will include my photo, a brief biography, and my signature on the title page.

- ○ Yes
- ○ No

Ernest Boucher

Signature of Participant

Kyla Gray

Diavik Diamond Mine (2012) Inc.

Natasha Thorpe

Thorpe Consulting Services (TCS)

Verification Form for the

DRAFT Diavik AEMP TK Camp Transcripts

I, Doris (Terri) Enzoe (name), on Dec 07, 2018 in Lutselke, NU/NWT have reviewed the draft transcripts of my interview held as part of the Diavik Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) camp held on Lac de Gras from August 2-6, 2018.

With my signature and when all corrections that I have indicated are made, I agree that the notes are correct and can be used in reports, presentations and publications by TCS and DDMI, in particular related to the Project, as well as in cultural and educational initiatives. As promised, copies of these will be returned to me and my community organization.

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- [x] Yes
- [ ] No

Dai (Terri) Enzoe

Signature of Participant

Kyla Gray

Diavik Diamond Mine (2012) Inc.

Natasha Thorpe

Thorpe Consulting Services (TCS)

Verification Form for the

DRAFT Diavik AEMP TK Camp Transcripts

I, Julie Wedzin (name), on Dec. 7, 2018 in _____, NU/NWT have reviewed the draft transcripts of my interview held as part of the Diavik Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) camp held on Lac de Gras from August 2-6, 2018.

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- [x] Yes
- [ ] No

Julie Wedzin — Kyla Gray

Signature of Participant — Diavik Diamond Mine (2012) Inc.

Natasha Thorpe

Thorpe Consulting Services (TCS)

Verification Form for the

DRAFT Diavik AEMP TK Camp Report and Video

December 2018

I, BOBBY ALGONA (name), on DEC 7/18, 2018 in Yellowknife, NT, have reviewed the draft outline for the Diavik Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) report prepared by TCS and video documentary prepared by aRTLeSS Collective conducted on Lac de Gras from August 2-6, 2018. An interpreter as well as Natasha Thorpe, Joanne Barnaby, and Colleen English carried out the verification of the camp notes and transcripts with me in August, 2018.

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- ☑ Yes
- ○ No

Please print and sign your name.

Participant

Kyla Gray

Diavik Diamond Mine (2012) Inc.

Natasha Thorpe

Thorpe Consulting Services

aRTleSS Collective

Verification Form for the

DRAFT Diavik AEMP TK Camp Report and Video

December 2018

I, Nancy Kadlun (name), on Dec 7th, 2018 in Yellowknife, NT, have reviewed the draft outline for the Diavik Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) report prepared by TCS and video documentary prepared by aRTLeSS Collective conducted on Lac de Gras from August 2-6, 2018. An interpreter as well as Natasha Thorpe, Joanne Barnaby, and Colleen English carried out the verification of the camp notes and transcripts with me in August, 2018.

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- [x] Yes
- [ ] No

Please print and sign your name.

Nancy Kadlun

Participant

Kyla Gray

Diavik Diamond Mine (2012) Inc.

Natasha Thorpe

Thorpe Consulting Services

aRTleSS Collective

Verification Form for the

DRAFT Diavik AEMP TK Camp Report and Video

December 2018

I, Ernest Boucher (name), on 12 7 2018, 2018 in Yellowknife, NT, have reviewed the draft outline for the Diavik Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) report prepared by TCS and video documentary prepared by aRTLeSS Collective conducted on Lac de Gras from August 2-6, 2018. An interpreter as well as Natasha Thorpe, Joanne Barnaby, and Colleen English carried out the verification of the camp notes and transcripts with me in August, 2018.

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☒ Yes
○ No

Please print and sign your name.

ERNEST Boucher

Participant

Kyla Gray

Diavik Diamond Mine (2012) Inc.

Natasha Thorpe

Thorpe Consulting Services

aRTleSS Collective

Verification Form for the

DRAFT Diavik AEMP TK Camp Report and Video

December 2018

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☒ Yes
○ No

Please print and sign your name.

Doris (Terri) Enzoe
Participant

Kyla Gray
Diavik Diamond Mine (2012) Inc.

Natasha Thorpe
Thorpe Consulting Services

aRTleSS Collective

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- [x] Yes
- [ ] No

Please print and sign your name.

Julie Wedzin

Participant

Kyla Gray

Diavik Diamond Mine (2012) Inc.

Natasha Thorpe

Thorpe Consulting Services

aRTleSS Collective

Verification Form for the

DRAFT Diavik AEMP TK Camp Report and Video

December 2018

I, Georgina Chocolate (name), on Dec. 7, , 2018 in Yellowknife, NT, have reviewed the draft outline for the Diavik Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) report prepared by TCS and video documentary prepared by aRTLeSS Collective conducted on Lac de Gras from August 2-6, 2018. An interpreter as well as Natasha Thorpe, Joanne Barnaby, and Colleen English carried out the verification of the camp notes and transcripts with me in August, 2018.

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- O Yes
- O No N/A

Please print and sign your name.

Georgina Chocolate
Participant

Kyla Gray
Diavik Diamond Mine (2012) Inc.

Natasha Thorpe
Thorpe Consulting Services

aRTleSS Collective

Verification Form for the

DRAFT Diavik AEMP TK Camp Report and Video

December 2018

I, WAYNE LANGENHAN (name), on Dec 07, 2018 in Yellowknife, NT, have reviewed the draft outline for the Diavik Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) report prepared by TCS and video documentary prepared by aRTLeSS Collective conducted on Lac de Gras from August 2-6, 2018. An interpreter as well as Natasha Thorpe, Joanne Barnaby, and Colleen English carried out the verification of the camp notes and transcripts with me in August, 2018.

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- ✓ Yes
- ○ No

Please print and sign your name.

WAYNE LANGENHAN

Wayne Langenhan

Participant

Kyla Gray

Diavik Diamond Mine (2012) Inc.

Natasha Thorpe

Thorpe Consulting Services

aRTleSS Collective

Verification Form for the

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December 2018

I, Jonas Sangris (name), on Dec. 7, 2018 in Yellowknife, NT, have reviewed the draft outline for the Diavik Aquatic Effects Monitoring Program (AEMP) Traditional Knowledge (TK) report prepared by TCS and video documentary prepared by aRTLeSS Collective conducted on Lac de Gras from August 2-6, 2018. An interpreter as well as Natasha Thorpe, Joanne Barnaby, and Colleen English carried out the verification of the camp notes and transcripts with me in August, 2018.

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- [x] Yes
- [ ] No

Please print and sign your name.

Jonas Sangris

Participant

Kyla Gray

Diavik Diamond Mine (2012) Inc.

Natasha Thorpe

Thorpe Consulting Services

aRTleSS Collective

Appendix 8 Recommendations

Appendix 8: Suggested TK Experts for future AEMP Camp Participants

Name	Indigenous Organization
Harry Rabesca	Tłı̨chǫ Government
Noel Drybones	
Michael Louie Rabesca	
Moise Rabesca	
Jonas Sangris	Yellowknives Dene First Nation
Morris Martin	
George Martin	
Kathy Arden	North Slave Métis Alliance
Adrian D'Hont	
Tony Whitford	
Al Harman Jr.	
Alice Ayalik	Kitikmeot Inuit Association
Marie Oniak	
Jack Ovilok	
Mona Tiktalik	
N/A	Łutsel K'e Dene First Nation

Suggestions provided during the Verification Session, December 7, 2019

Diavik Diamond Mines (2012) Inc.
P.O. Box 2498
Suite 300, 5201-50th Avenue
Yellowknife, NT X1A 2P8 Canada
T (867) 669 6500 F 1-866-313-2754

Mark Cliffe-Phillips
Executive Director
Mackenzie Valley Environmental Impact Review Board
P.O. Box 938
Yellowknife, NT X1A 2N7

4 July 2019

Dear Mr. Cliffe-Phillips:

Subject: DDMI Response to Information Requests for the Environmental Assessment of the Processed Kimberlite to Mine Workings Proposal (MVEIRB File No.: EA1819-01)

Diavik Diamond Mines (2012) Inc. (DDMI) is pleased to provide the Mackenzie Valley Environmental Impact Review Board (MVEIRB or the Board) with responses to the Board's and Parties' 163 Information Requests (IRs) as part of the MVEIRB's Review of DDMI's Processed Kimberlite to Mine Workings Proposal. DDMI's responses, including associated Attachements #1 - 13, to the Board's and Parties' IRs have been uploaded to the MVEIRB's Online Review System.

DDMI received IRs from the Board on June 18, 2019 and from the following parties by the June 20, 2019 deadline for parties' submission of IRs:

- Environmental Monitoring Advisory Board
- Fort Resolution Metis Council
- Government of Northwest Territories – Lands
- Lutsel K'e Dene First Nation
- North Slave Metis Alliance
- Northwest Territory Metis Nation
- Tlicho Government

DDMI also received late IR submissions from the Canadian Northern Economic Development Agency on June 21, 2019 and from theYellowknives Dene First Nation on June 26, 2019.

In the responses to IRs, DDMI has included clarifications on our environmental assessment approach, and provided the location in our previous submissions, including the Summary Impact Statement, where specific information requested can be found. In a few instances, DDMI has provided additional information as requested by Parties and the Board.

We thank the Board and Parties for their ongoing input and look forward to the next steps of the Review, including the Pre-Hearing Conference and the Hearing. Please do not hesitate to contact the undersigned or Kofi Boa-Antwi (867 447 3001 or kofi.boa-antwi@riotinto.com) if you have any questions related to this submission.

Sincerely,

Sean Sinclair

Superintendent, Environment

cc: Catherine Fairbairn, MVEIRB
Kate Mansfield, MVEIRB
Ryan Fequet, WLWB
Anneli Jokela, WLWB

DOGRIB EXPERT RECOMMENDATIONS FOR WATER LICENCE

Summarized from Technical Reports Submitted to NWT Water Board December 1999

The following recommendations are listed under one of four TAC subcommittees.

EFFLUENT QUALITY SUBCOMMITTEE

GENERAL

1. The water licence should require a nondegradation standard whereby the water will be treated to the level existing in the lake or at least to the drinking/aquatic water standard. (Myers, p.5)
2. Metals and other waste components should meet Canadian water quality guidelines (lowest values) at edge of mixing zone. (Sprague p.5)
3. The conceptual goal would be to meet, as a minimum, Aquatic Life Guidelines in Lac de Gras receiving waters(at the end of the discharge pipe). (Moran, p.8)

CADMIUM

4. A much more definite knowledge of leaching rates should be obtained before mine development. (Sprague p.2)
5. Board should require firm documentation that there will be no deleterious buildup of cadmium before there is permission to proceed. (Sprague p.2).

TSS

6. There should be a firm diagnosis of the amounts and duration of suspended sediment from dredging, and how far it will travel (Sprague p.3)
7. TSS from dredging or dike construction should be regulated not to exceed LDG background +10% at the 200m boundary. The recommendation is to stop dredging if the concentration 200 m from the dike increases over background levels (preexisting in the lake) by 10%. (Myers, p.14)

PH

8. pH of wastewater should be reduced as Golder recommended because of apparent toxicity caused by high pH and ammonia in wastewater. (Sprague, p3)
9. pH should be regulated within range 6.5 to 8.4 in order to avoid moving the lake pH beyond favourable limits. (Sprague, p.5) Upper limit should be permanently stabilized at 8.4 (p.6, transcripts p.286)

AQUATIC EFFECTS MONITORING

GENERAL

10. Require a report which interprets limnology of the lake and aquatic ecology done by wise person (Sprague, transcripts p.287)

11. Avoid studies on fish which sacrifice fish (Sprague, transcripts p.293);

TOXICITY TESTS

12. All wastewater streams should be non-lethal to fish; end-of-pipe toxicity tests recommended. (Sprague, p.5)
13. Toxicity tests or monitoring should be conducted at 60 m boundary for sublethal effects on fish, waterflea, alga, and bacterium. Tests should be done on dilutions (a range of effluent concentrations) of the end-of-pipe effluent and then calculations should extrapolate to the mixing zone. (Sprague p.5, 6)
14. Diavik needs to provide information on the potential toxicity to fish of all reagents to be used in any of the water treatment processes and in the kimberlite processing plant. There is evidence in the technical literature that some of the coagulants proposed for use, such as Percol 368, may affect the uptake of oxygen by the gills of fish, for example. (Moran, p.7)

BENTHIC MACROINVERTEBRATE TESTS

15. The benthic survey should be the number one tool for monitoring (yearly should be suitable) (Sprague p.7). The proposed program should be strengthened; sampling done twice per year at start, then reduced to once annually (Sprague transcripts p.293).

CHEMICAL MONITORING

16. Should be done for very toxic substances that are strongly bioaccumulative and slowly excreted (i.e. mercury and cadmium). Measurements should be made in the sediment at selected locations, in selected invertebrates that remain fixed in given locations, and in appropriate species of fish, with emphasis on liver and kidney levels. (Sprague p.7)

SNP

17. add TOC to SNP in PKC pond water; add also to PKC treated effluent (Morin, p.5)
18. add groundwater wells as stations (Downing & Wright)
19. add the following metals to be regulated: total aluminum, cadmium, copper, mercury, silver, uranium, chromium, cobalt, antimony, (Morin, p.13)
20. the list of proposed discharge limits (see Supporting Documentation, Class A Water License Application, p.76) needs to be expanded to include the full range of constituents expected to be discharged. The long-term discharge limits should be based on data from actual samples collected monthly from all the various sources of waste water generated over a minimum of a year. Since such data will not be available for several years, interim discharge limits could be based on a non-degradation standard for Lac de Gras. Also, DDMI should be required to monitor for a full range of likely constituents until such time as it can be demonstrated that steady state conditions have been established in the mining and process waters.(Moran, p.8)
21. Erosion and runoff control measures, other than simply monitoring the proposed Surveillance Network Program (SNP) sites, need to be designed and put in place prior to the start of construction. As described on pages 46 and 47 of the Supporting Documentation, no runoff or erosion control measures appear to be planned for the period during construction. Runoff and erosion control measure include, but are not

limited to silt fencing, erosion barriers, detention or retention ponds, filtering systems, temporary mobile treatment systems, etc. (Moran, p.10)

MINE DESIGN & CONSTRUCTION

DREDGING

22. During a high runoff year, Diavik should decrease its dewatering or dredging operations. In other words, there could be substantial problems caused in the North Inlet if dredging coincides with high return interval runoff events. The Water Licence should specify that decisions to dredge should be made in May based on the snowpack and expected runoff. (Myers, p.13)
23. The sediment concentration limit of 165 mg/l limit proposed during dike construction should be changed to specify limiting the increase at 200 m from the dike to a 10% increase over background levels. The contractor should also pump water from inside the silt curtain to inside the dike to confine the spread of the suspended sediment. Once the dike is completed and prior to dewatering inside the dike, this sediment could be allowed to settle prior to sending it to the North inlet. (Myers, p.4)

PKC TREATMENT PLANT

24. Treatment plants should be built at the beginning.(Myers, p.3). To protect against above normal runoff years and large storms, it is strongly recommended that the treatment facility in the PKC be built within the first year or two of operation. (Myers, p.4, 12)
25. The new technology would ideally be tested and piloted on representative material from all of the mined zones. (Downing & Wright,p.1) This would involve laboratory tests beginning with jar and cylinder settling/filtration tests using representative drill core material from the various kimberlite pipes and waste zones.
26. The PKC water treatment plant should be commissioned within a year or two following the startup of operations. According to water balance information (supplied from Diavik) this should then provide sufficient led time to develop and if necessary modify the plant process regime or design, prior to it being required. The metal precipitates formed by hydroxide and sulphide precipitation can be extremely fine and hard to settle. Assurance the sand filtration can accommodate these requirements need to be provided well in advance of the need to discharge PKC water. Also a faster schedule for commissioning of the PKC treatment plant will provide contingency to extreme climate events or other unforeseen parameters relating to the process plant and quality of the pit inflow water. (D&W, p5)
27. Treatability testing data are needed to resolve key issues prior to final design. For example, one must determine the specific reagents needed to achieve acceptable effluent quality. Multiple reagents and multiple treatment stages will probably be required to effectively remove all species of dissolved and total metals present in the predicted PKC wastewater. Designing the multiple reactor vessels should be based on laboratory and pilot testing results in order to ensure adequate hydraulic residence times and proper environmental conditions are provided. (Moran, p.5)

28. Diavik should be required to have an operable water treatment plant at the site from the beginning of construction activities. This plant should be capable of removing both suspended solids and dissolved chemical constituents (metals/ metalloids, anions, nutrients) as well as organic compounds (oil and grease, diesel fuel, process reagents, sewage effluents, etc.

NORTH INLET MANAGEMENT PLAN

29. The dredging water will add substantial sediment quantities to the North Inlet. This will eliminate much of the storage volume in the inlet, particularly in the West portion where the initial settling will occur. Several suggestions if included will decrease the risks. First, the time before pumpage to the treatment plant occurs should be increased. Second, add controls to the flow between the west and east side so that the residence time in the west end can be controlled by using the freeboard. Third, increase the volume in the west end to increase the residence time to improve settling. Fourth, increase the frequency of monitoring of the suspended sediment in both compartments. (Myers, p.4)
30. the water licence must require the capability to vastly improve the active treatment capacity of NI treatment plant, or to reduce pit inflows. (Myers, p.5)
31. The pit inflow water is discharged by gravity to the north inlet from a point near the treatment plant. This should be evaluated for flocculation and /or coagulation prior to discharge to North Inlet. In turn this would diminish the load to the treatment plant prior to discharge to Lac de Gras. (D&W, p.5)
32. Backwash from the filters should be deposited in a separate contained area in or near the North Inlet and not combined with the pit inflow water. The backwashed flocculants will begin to breakdown with turbulence and the high dilution of the pit inflow. In effect the current design appears to provide a continuous loop for a portion of the recovered colloidal material to be re-suspended. (D&W, p.5)
33. It is recommended that the Pit Inflow Treatment Plant include flocculation and sedimentation basins to provide adequate agglomeration and settling of the coagulated particles prior to filtration, as is the standard practice for coagulation / flocculation and rapid sand filtration plants. The Pit Inflow plant designs reviewed for this report indicate no flocculation or sedimentation basins are to be provided within the treatment plant itself. (Moran, p.9)
34. Diavik must be prepared for contingencies by constantly testing the hydrologic assumptions and be prepared to vastly increase their pumping and treatment capacities. (Myers, p.10)
35. The potential for additional pit inflow outlined in this review indicates that the water licence must include plans to accommodate additional flow. Because the potential flows would overwhelm the north inlet and decrease its treatment capacity, and because there appears to be little opportunity to increase its treatment capacity, the water licence must require the capability to vastly improve the active treatment capacity or to reduce the inflows. The inflows could be reduced by a much expanded grouting program or by the selective placement of dewatering wells in the bedrock around the pits. Improved active treatment capacity would include increased pumping capability and much larger filtration systems. (Myers, p.12)

COLLECTION & DIVERSION SYSTEM

36. The first recommendation is that all stormwater conveyance ditches, pipelines and culverts be sized for the 100-year storm runoff event. It appears, based on section 4.4.4, that the ponds are designed on snowmelt runoff rather than the storm runoff. There is an 18% chance of such a storm occurring during the 20-year life of this mine. Because failure of the drainage conveyance could cause unwanted, and illegal, discharges to the lake, the proposed drainage system must be upgraded. (Myers, p.12)
37. If the toxic concentrations are going to be 10 or 100 times higher than predicted, then additional protection, or resizing of the ponds, or additional liners to further minimize seepage losses could be critical. (Morin, p.3)

TREATMENT PLANT SLUDGES

38. Therefore, it is important that Diavik perform the following: test the potential toxicity of these sludges; prevent sulfide oxidation; and provide long-term secured disposal of the treatment sludges.(Moran, p.7)
39. It is recommended DDMI provide designs for collecting, dewatering, thickening, testing, and disposing of treatment sludges. Provisions must be made for the long-term secured disposal of treatment sludges based on their potential toxicity and leaching characteristics, as determined through laboratory testing. (Moran, p.9)

Diavik Diamonds Project
An Environmental Assessment

by
Tony D. Pearse

for
Dogrib Diavik Working Group
Dogrib Treaty 11 Council

June 1999

Table of Contents

Executive Summary

Overview

Diavik's proposed diamond mines are located on Dogrib traditional lands in the heart of the Bathurst caribou range and the headwaters of the Coppermine River. The Lac de Gras area is a high value summer foraging ground for the caribou, and a travel focus for the twice yearly migrations of the herd. The water of Lac de Gras is some of the purest natural water on the planet. Little scientific understanding exists for either of these complex natural systems. Both are sensitive to disturbance, and both face escalating pressure as mining activity expands in the region. The thresholds of stability and resilience for both these ecosystems are unknown, and there are no obvious means to mitigate or reverse many of the adverse impacts to them that can be expected from the proposed project.

Any prediction of the large-scale effects to these systems over time is entirely speculative, and thus the proposed project constitutes a large-scale experiment with potentially serious and irreversible effects to the renewable resources of the region.

Caribou

Diavik's claim that their development will not change the distribution and abundance of the caribou herd comes with too much uncertainty to be credible. The relationship between the Bathurst herd and its range is complex and not well-understood, and Diavik's caribou assessment only partially meets what is needed to have reasonable understanding of the project's impacts on caribou.

Diavik's environmental assessment relied too heavily on computer models and assumptions, without adequate real-world data to support the analyses. Little annual variability has been incorporated in the assessment to enable a realistic appraisal of potential effects to be undertaken.

Diavik's proposed mitigation measures are untested and have high degrees of uncertainty and risk attached to them. Therefore they cannot be relied upon as assurances of effective mitigation if negative impacts arise once the project is underway.

Cumulative effects to the caribou have not been properly assessed by Diavik. The boundaries for the assessment had no ecological relevance to the caribou ecosystem. Many activities outside the boundaries, as well as within, were not assessed. On-going exploration on Diavik's and other mineral properties were exempt from the assessment, in spite of evidence which shows effects to caribou behaviour. BHP's current expansion of mining and road construction into the Sable and Pigeon pipe sites also escaped review.

Diavik's assessment and Dogrib knowledge agree that the Lac de Gras area, in addition to being a focal point for migration of the herd, is also important for summer foraging prior to southward migration in the fall. The relative value of this habitat and its significance to the herd was not determined. If displacement from the Lac de Gras range occurs, the effects on the well-being of the population are unknown. The disturbance threshold beyond which the caribou population, presently stable, could go into decline is also not known. No answers to these and other fundamental questions have been provided.

Government's comprehensive study produced no meaningful plans to deal with impacts if the project is allowed to proceed.

There is no monitoring plan designed that reflects the caribou ecosystem and the range of potential effects. Thus there is no obvious means of informing management that corrective action is required.

There are no contingency plans for modifying the mining operations if a monitoring program was to demonstrate cumulative or population-level impacts to the herd. Indeed, it is not clear that any contingency plans are possible.

Further, there is no agency or structure in existence for the integrated study and management of the Bathurst herd. Government has failed to act to properly protect this valuable resource in the face of escalating industrial activity in the area. The consequences of failure will be borne by the Dogrib and other aboriginal people who depend upon the caribou.

There is also no mechanism in place, or proposed, for the legally enforceable regulation of the project with respect to its overall effect on caribou and caribou habitat. Since there is nothing developed to ensure continued well-being of the herd, there cannot be any confidence on the part of the Dogribs that the caribou will be kept safe.

WATER

Numerous and significant uncertainties are identified in this report with respect to the proponent's predictions regarding mine drainage quality, volumes of water, storage capacity of tailings facility, security of containment from groundwater access, water treatment process, discharge water quality, leaching rates of cadmium from water-retaining dams, and ultimate ecological effects of water quality changes in Lac de Gras.

Natural variability in the hydrology and geochemical parameters characterizing the site has not been properly folded into the predictive work. Diavik's predictions are characterized by a pattern of underestimating potential problems associated with

drainage and effluents from the various mine components. Conclusions drawn from predictive work on mine drainage geochemistry were not uniformly conservative. It is the conclusion of the Dogrib expert review that water quality from various mine components may be significantly worse in terms of contained metals and other contaminants than predicted.

Diavik's water quality, geochemistry, and environmental assessment reports clearly deal only with dissolved metals—no information is provided on total metals. Consequently it is not known to what extent total concentrations differ from the dissolved values used for the predictions. This situation creates an unacceptable uncertainty in Diavik's predictions, and assessments, of environmental impact in the receiving environment.

Diavik downplays the significance of the deficiencies in the water quality predictions by taking the view that its proposed water treatment plant will ensure that discharge concentrations of any potential contaminants will meet regulated levels. The consequence is that we have no realistic picture of the challenges facing the water management system, and no way of assessing the impacts of upset conditions on site. The company's view begs the question of why do any geochemical assessment at all in the environmental approval stage if the water treatment plant can handle any and all demands. This is not a sound approach to determining the environmental acceptability of a proposal.

The key to environmental protection of the lake from Diavik's project is the proposed water treatment facility. It is the one barrier between the liquid hazardous wastes being produced in the waste rock dumps and tailings facility and the pristine, sensitive aquatic environment of the Coppermine system. It is, therefore, a requirement of the environmental approval stage to demonstrate its viability for achieving environmental protection. This assessment is not before us.

No evidence has been presented to demonstrate that the proposed treatment plant, faced in this setting with considerable technical challenges not explicitly acknowledged by the company, is environmentally, technically, or economically viable. This is an unacceptable basis for recommending the project should be approved for permitting.

The proposal to construct open pit mines that are hydrologically and directly connected to unlimited volumes of water, in an arctic environment, relies on unproven technology. It will be characterized by unique and novel engineering challenges for handling high rates of groundwater inflow and ice accumulation on the pit floors and walls. It is not clear that this can be done in an environmentally sound or safe manner. Diavik has not demonstrated the technical feasibility of its proposed in-pit sump pumping system in this environment.

Water volumes from pit inflows of groundwater could easily be 10-fold (or more) greater than predicted. Diavik selected the low end of hydraulic conductivity ranges to predict groundwater flow volumes. This is not conservative. The rock structure in the vicinity of pits is characterized by numerous extensive and wide planar features (fractures, faults, dykes) that greatly increase groundwater flow rates—so much water can flow through these rocks that at least on one occasion borehole drilling was thwarted because of high water volumes.

Diavik has not demonstrated any defensible contingency to handle such high pit inflow volumes. No water balance and sensitivity analysis has been presented for pit inflows and storage capacity in the north inlet. In the event of failure of the water management system to contain unexpectedly high volumes, substantial emergency discharges of untreated minewater to Lac de Gras will be unavoidable.

DIAND's independent expert suggested that it is unlikely that Diavik's proposed sump-pumping or horizontal drains will be able to handle the resulting pit inflows, and that alternate means of dewatering will be required. Diavik's assessment only addressed the impact of changes in the average groundwater flow rates, not the high flows that can be expected.

The presence and effects of high volumes of ultra-fine-grained clays found in the kimberlites appears not to have been considered in any of the water quality testwork or water management planning. These clays potentially pose very significant difficulties for water treatment because of both their pronounced ability to transport toxic metals and their very small grain size. The plausible consequence is that significant quantities of clay could be released through discharge water and create turbidity in the lake, even though permit requirements for total suspended solids were achieved. Further, greater than predicted concentrations of metals could escape because of their attachment to clay particles. No assessment of the potential effects of these issues has been provided.

Proposed mitigation at closure of sulphide oxidation and metals leaching in waste rock and tailings through aggradation of permafrost and capping is unlikely to be successful. Diavik's predictions for sulphide oxidation in the waste rock piles reveal that the process could last for two hundred or more years.

Therefore, collection and treatment of waste rock and tailings impoundment drainage, cited as technically and economically unfeasible by reviewers in the comprehensive study process, will almost certainly be necessary for two centuries or more.

Leaching of cadmium and other metals from rocks used to construct the water-retaining dikes in Lac de Gras is likely to occur at higher rates and concentrations than predicted by Diavik. The company's methodology to arrive at its predictions is questionable since it was based, in part, on assumptions which have no scientifically

defensible basis. The release of cadmium is an irreversible, unmitigable effect in which the uncertainties are high and the biological consequences unknown.

The issue of kimberlite toxicity is not yet satisfactorily resolved. Diavik's preliminary study outlined further work required to determine whether water arising from mining activities is toxic, what the causes of toxicity might be, and whether toxicity can be effectively mitigated.

The combined, interactive effects of all sources of nutrients, heavy metals, dissolved solids, and sulphates discharged from the site have not been determined. Overall cumulative ecological impacts in the lake from the combined sources are unknown. Uncertainties are high. Consequences could range from insignificant to very significant.

Diavik has acknowledged that tailings pond effluent is an environmental hazard that must be properly contained and treated prior to discharge. Diavik assumes that the permafrost located beneath its proposed tailings and waste rock dumps will act as an impermeable barrier to pond effluent and drainage. Safe containment has not been proven. The area is underlain by fractures and faults that could significantly increase opportunities for water flow, and permafrost cannot be relied upon to prevent effluent escape. There is no identified contingency if seepage into the groundwater system occurs. An option to install an impermeable liner in the tailings impoundment was rejected by the proponent as uneconomic. All this is not conservative planning.

Several reasons exist why Diavik may have underestimated the capacity of the tailings facility to store the anticipated volumes of tailings and effluent. The company maintains that the design size of the containment is more than adequate to handle the now-reduced expected production volumes of kimberlite. However, the additive potential effects of ice build-up, slow settling of tailings, and under-estimated water balance, have not been rigourously evaluated. In particular, the water balance sensitivity has not been examined in accordance with the high variability of annual precipitation observed in the region, and the operational limits of the water management system have not been properly defined. This, too, is not conservative.

There are no specified contingency plans for running out of storage room in the tailings impoundment. Raising the dam height is the one theoretical contingency the company has for managing higher-than-expected tailings volumes, but the company admits that there is a "deformation-sensitive" feature of the proposed dam that would make raising it very difficult in the future.

Regulators are accustomed to treating the design of mine components at the permitting stage. This is not something that should happen here. The circumstances in this case are unusual—the hazards created and the uncertainty of success are high,

flexibility and contingency options are rare, and consequences to lake ecology significant. The drainage collection system, containment structures, and the water treatment plant, are the key components for environmental management of toxic mine drainage on the site.

It is critical that the design of the waste and water management systems, and their ability to handle both natural variability at the site and upset conditions, be carried forward at the environmental review stage in enough detail so that its effectiveness in achieving protection of the environment can be demonstrated.

UNDERGROUND OPTION

My report provides an analysis which shows that an all-underground option is an economically profitable venture. Diavik has yet to demonstrate the economic feasibility of this alternative one way or the other.

The report also concludes that an all-underground alternative dramatically reduces environmental risk relative to Diavik's proposed project. The difference in risks for both caribou and Lac de Gras water is far too substantial not to be properly addressed at this stage of the review.

Diavik, and government, have failed to do this. If the underground-only option is economically viable, then it must be properly evaluated in the environmental review. It has not been.

If Diavik contends that the approach is not economically viable, then that contention must be proven. It has not been.

THE COMPREHENSIVE STUDY

In a number of critical areas for the Dogrib the comprehensive study process conducted by government failed to deliver technically defensible conclusions and recommendations.

For caribou the RAs agreed with the company that significant adverse effects from Diavik's project, and other projects in the herd's range, were unlikely. This conclusion was reached with an unproven and unreliable methodology applied to too few data, particularly with respect to the complexity of the caribou ecosystem and the high variability which characterizes it. The findings are not conservative, and err on the side of increasing the risk to the herd.

The same holds true for the water and aquatic resources of Lac de Gras. The overall picture of the combined, interactive effects of Diavik's various effluent releases to Lac de Gras has not been fully described or comprehensively assessed in the *CSR*. The assessment has been done on a piecemeal basis, and we do not have an integrated

picture of what is likely to happen to the lake in the long-term. Much uncertainty characterizes the *CSR's* findings.

Despite the fact that there is no apparent precedent for mining a "wet" open pit in an arctic environment, that Lac de Gras is a rare resource with extremely pure water and sensitive aquatic components, that Diavik has consistently underestimated water quality and volumes to be managed, that closure issues with respect to treating drainage from the waste rock and tailings have not been resolved, that we do not have an integrated or reliable picture of what will happen to Lac de Gras over time, and that the environmentally worst alternative has been selected by the proponent, the RAs concur, without substantive justification, with essentially all of Diavik's findings and recommend the project be allowed to proceed for licensing.

This is not conservative, not sound environmental decision-making, and not acceptable.

The RAs' finding of "unlikely significant adverse effects" to Lac de Gras rests entirely on Diavik being accurate with all its predictions—something my report suggests is very unlikely. If Diavik has significantly underestimated the quantity and quality of its various mine effluents, or the effectiveness of its containment and treatment arrangements, then the complete suite of impact predictions for Lac de Gras is called into question.

The comprehensive study failed because the RAs accepted the proponent's assertions that the all-underground was not economically viable. Given that all parties agreed that an underground operation would be environmentally superior, the RAs were delinquent in not requiring an independent verification of Diavik's assertion. Such verification was imperative.

By the time the *CSR* is completed, we have no idea what the contribution of the various experts was to the final resolution of the technical issues and the conclusions drawn. This is unfortunate. Expert review is critical not only because it makes the assessment more technically robust, but also because independent critical thinking can be seen to have been brought to bear on substantive issues in a consistent and thorough way. The first objective may have been achieved, but because the second objective was lost half way through the review, all becomes obscured.

The *CSR* fails also because the RAs deal with unresolved assessment issues by shifting their consideration to the regulatory stage. In too many cases the RAs let strategic environmental issues slide, requiring the proponent to produce at the licensing stage "more" information (typically unspecified), and to conduct monitoring and studies after the project has been licensed to verify predictions.

Follow-up monitoring is specified all too frequently by the RAs as a way of supposedly addressing undetermined impacts, or as if it were some kind of mitigation technique. Monitoring is not a mitigation measure. It cannot be used as a means of justifying acceptance of an unevaluated impact. The preponderance of critical, unresolved issues that have been addressed by requiring after-the-fact monitoring is an alarming trend exhibited by the RAs.

For all these reasons, the *CSR* does not deliver at the end of the day a package that properly considers, or will protect, Dogrib interests if the project is allowed to proceed to licensing as is.

CONCLUSIONS

The goal of environmental assessment is to demonstrate that the potential effects of a project are reasonably well predicted and that, where required, effective mitigation is available and practical. It should also address uncertainty by ensuring that appropriate mitigation, monitoring, and adaptive management can be undertaken so as to deal effectively with the uncertainties. This goal has not been reached for the project at hand.

If the project were to proceed to permitting on the basis of what we now know with any certainty about the project, it can reasonably be stated that the ultimate effects to the caribou and the water of the upper Coppermine are almost completely unknown, and any plans to deal with potential effects are mainly speculative.

It is the view of the proponent, and the RAs, that many of the issues discussed in my report are more appropriately dealt with at the regulatory stage than at the environmental review stage. However, this misconstrues the purpose of an environmental review. Licensing and regulatory approval have a different task. The objective there is to establish the specific technical terms and conditions under which the project will legally operate.

The success of the Diavik environmental review is undermined by both the RAs and the proponent by relying too heavily on the regulatory regime to resolve too many key environmental issues through permits and licences.

The current, extremely serious environmental situations with both the Giant and Colomac Mines demonstrate graphically why this reliance is not workable and not acceptable. In both cases the licensing process was unable to accurately identify and assess the issues, predict potential environmental situations which have resulted and, thus, was unable to set terms and conditions which could deal with the contingencies when they happened.

Even if they had been able to do this, government is clearly not committed to meaningful enforcement of regulatory requirements. In rationalizing its dismal record of enforcement at the Colomac Mine before the Water Board in March of this year, DIAND testified that its prevailing policy is to attempt to negotiate compliance of regulatory requirements with mine operators, not legally enforce it.

The regulatory regime has shown that it cannot deliver effective environmental assessment or protection. The demonstration of environmental viability of a proposed project, comprehensively and independently examined, must precede the regulatory stage.

In the case at hand there is a sufficient collective weight to the matters raised in this report with respect to caribou and water that the overall environmental acceptability of the project is far from demonstrated, that cumulative risks and uncertainties are very significant, and the aggregate outcome cannot be accurately predicted.

Many of the environmental risks and uncertainties can be avoided or greatly reduced by pursuing an all-underground approach to mining.

The purpose of the *Canadian Environmental Assessment Act* will be thwarted if the project is allowed to proceed to licensing with so many fundamental questions unanswered. The proper course of action is to ensure that the critical unresolved issues and uncertainties are resolved at the environmental assessment stage. The *Act* provides a mechanism for doing this. The work not completed by the *CSR* should be moved to further review under an independent environmental assessment panel.

Part One
Introduction

This report is an assessment of the environmental issues pertaining to the proposed Diavik diamond mine to be located within the traditional territory of the Dogrib people. The project is to last approximately 20 years and, as presently described, will consist of three open pit mines which will produce diamond-bearing kimberlite ore for a processing facility to be constructed on an island in the large lake the Dogrib know as Ekati (Lac de Gras). Some 252 million tonnes (Mt) of waste rock and 26 Mt of tailings will be excavated from beneath the lake, and permanently left on the island.

The property comprises 1,183 sq km, and is owned by Diavik Diamond Mines Inc, a joint venture of Rio Tinto and Aber Resources. It abuts BHP's presently operating *Ekati* mines to the north. A total of 53 kimberlite pipes, 24 of which are diamond-bearing, have been discovered on the property. BHP's property also contains more than a hundred kimberlite pipes, a number of which could be mined in the future.

Situated on an island in the center of the lake, the proposed project has obvious implications for long-term water quality and aquatic life of the upper Coppermine river system. Additionally, the Bathurst caribou herd's migration route and summer range includes the mine site and surrounding area. Both of these situations mean the project has significant implications for the Dogrib people who rely on the resources to be affected.

The Dogrib Treaty 11 Council established a Diavik Working Group to conduct an independent environmental review of Diavik's proposal (see Attachment A - Members of the Diavik Working Group). The working group, in turn, commissioned the writer to assist with the technical aspects of the review.

The working group was given two objectives by the Treaty 11 Council. It was, first, to review the available information on the project with the aim of determining whether the potential environmental risk of the project was properly identified by the company, and described with a degree certainty sufficient for the Dogribs to accurately understand the significance to them of the company's proposal.

Second, the working group was to determine whether the proposed management and mitigation of identified adverse effects were likely to reduce the level of impact so as to be acceptable to the Dogrib people. Achieving these objectives would enable the Treaty 11 Council to make an informed decision regarding the environmental acceptability of the proposal.

A third objective emerged during the review. This was to examine the environmental review process undertaken concurrently by government for the same project. The

working group wanted to know whether the government's assessment of the project by way of a comprehensive study under the *Canadian Environmental Assessment Act* would properly address and resolve the issues of concern to the Dogrib, and reflect these in its recommendations to the Minister.

Appropriately, these objectives formed the basis of the present report.

STUDY APPROACH

The review was supervised by the Diavik Working Group, a group of Dogrib representatives (2 appointed by each community) chaired jointly by Alphonse Nitsiza and Violet Camsell-Blondin. Coordination of the Working Group's activities was done by Ted Blondin. Zabey Nevitt (Dogrib Environmental Coordinator) and Tony Pearse (technical advisor) were responsible for addressing the technical aspects of the review and preparing the report. Authority for the Working Group to conduct an independent assessment of the proposed Diavik project was provided by a resolution at the 1998 AGM of the Dogrib First Nation.

The Working Group provided the focus of the review—caribou and water. Diavik's *Environmental Assessment* and related documents were read by the technical people, and areas requiring expert review were identified. Experts in the areas of caribou ecology, mine drainage, and geotechnical aspects of mining were located, and tasked with reviewing the relevant materials provided by the company. Their reviews were focused on a set of questions developed by the writer. Reports were tabled by each of the experts, and submitted to both Diavik and the government where they were placed on the public registry.

Diavik responded to each of the technical reports; government did not. The company's responses were sufficient to clarify the issues for two of the reports, but the detailed response on geochemistry issues required several exchanges between the Working Group and the company. At the end of this, the material was pulled together and this report prepared. Additionally, the Dogrib Traditional Knowledge team prepared a report on Dogrib knowledge related to caribou ecology in the Ekati area, and its findings were incorporated into this report. Material available on the public registry was also utilized.

Some 8 meetings of the Working Group have taken place over the past 6 months or so, all lasting 2 to 3 days. The Working Group reviewed information on the Diavik project, and reviewed progress made on the Dogrib review. Tasks were assigned, and schedules and workplans were set in motion by the Working Group. At the last meeting, the Working Group reviewed the final draft of this report, and formulated its recommendations for follow-up action to the Dogrib chiefs.

PROJECT DESCRIPTION

The kimberlite pipes that Diavik proposes to mine are located under the surface of Lac de Gras, under 10 to 20 m of water and covered by layers of glacial till and lake sediments. The pipes lie off-shore of a small island situated in the middle of the lake. The island has an area of about 17 sq km, and the proposed mine will occupy about half the island.

The mine-related structures on the island include two waste rock dumps, a tailings impoundment, processing facility and camp, water treatment plant, and airstrip. To extract the ore, 3 water-retaining dikes will be constructed in the lake to enclose the areas which will be mined. Once constructed, the enclosed water will be pumped into the main body of the lake, and the sediments and till removed and stored on east island. At this point the pipes will be exposed, and open pit mining will commence. The pits will be developed in sequence. Underground mining in two of the pipes will continue after the open pits reach a maximum depth.

Drainage from the plant site and waste rock piles will be collected and sent to the tailings impoundment. Diavik proposes to use pond water in the tailings area as reclaim water to operate its diamond processing facility. Water can be stored in the tailings area until about year 11, at which time continuous discharges from the tailings pond will be necessary. This water will need to be treated, and so will be directed to a water treatment facility located near the north inlet. After treatment, this water will be discharged into Lac de Gras.

A greater source of water will be the pit inflows. This water will be directed to the north inlet, now sealed off to form a settling basin, where it will sit for some time before being pumped to the water treatment plant where suspended solids will be filtered out before it is discharged into the lake.

At the end of the project, water from Lac de Gras will be siphoned back into the pits until the level of the water equals the lake level, at which point the dikes will be breached so that lake water can mix freely with water inside the dikes. Fish habitat will be constructed on the inside of the dikes and around the rims of the submerged pits.

At closure the tailings pond will be drained, and the effluent will be processed in the water treatment plant that was used to treat mine drainage during operations. Water from the site will continue to receive treatment until such times as quality meets the regulated objectives for mine discharge. Options to control the quality of drainage from the waste rock dumps and the tailings impoundment include, according to the proponent, the installation of a “cap” of finely ground granite to form a relatively impervious layer on top of the waste rock. The concept is that this will move the

active layer up and out of the waste rock, allowing the underlying rock to freeze, thereby inhibiting the formation of undesirable drainage.

UNIQUENESS OF THE PROPOSAL

It should be noted that Diavik's proposal has several unique features that demand attention for environmental assessment. First, it appears to be the first project to involve the construction of "wet" open pits in the Canadian arctic environment. Unlike other open pits mines within continuous permafrost zones (for example, BHP's nearby Ekati mine), Diavik's pits will be constructed in unfrozen ground that is hydrologically connected to unlimited volumes of groundwater under Lac de Gras.

Second, because of the potentially very high inflows of groundwater to the pits, exposure to sub-zero temperatures for most of the year will present daunting problems for dealing effectively with glaciation and ice build-up in the pits. The combination of a "wet" pit and its location in an arctic environment cannot be said to be proven technology. Diavik has presented no information to demonstrate that open pit operations in this setting will be routine. Management of pit inflows is likely to be a novel and challenging experience.

Third, the tight configuration of the mine facilities on a small island in the middle of a large lake limits the company's ability to deal flexibly with contingency situations, such as storing excess water if necessary. This can be contrasted to most other mining situations, for instance the BHP situation where there is adequate "room to move" in upset conditions (as has already been necessary this past winter).

Fourth, a significant portion of Diavik's kimberlites are comprised of smectitic clays which, as far as conventional mine tailings are concerned, are orders of magnitude smaller in size, and present challenging situations for water management. BHP has similar clays in some of its pipes, although to date has been processing kimberlites from the Panda pipe which have lower clay contents. The success of handling these clays, particularly in this setting, is still undemonstrated, and the system for doing so must be considered experimental. As will be shown in this report, very little attention to these clays has been paid in the development of water management and environmental planning for the project.

PART TWO
CARIBOU

The Bathurst caribou herd is the dominant biological feature of the traditional Dogrib territory. It is also the most important, since Dogrib survival and culture has always depended upon the caribou, and today still forms the foundation of their land-based economy. It does not need to be emphasized here that any industrial project located within the customary range of the caribou may have important implications for the continued well-being of the Dogrib people. It is critical, therefore, that the potential effects of the project be accurately understood so that the significance of any changes to the health of the herd can be evaluated by the Dogribs.

The Dogribs are concerned about the potential long-term impacts on the Bathurst caribou herd from the Diavik project. They are also concerned about the potential cumulative effects of that project with existing and other proposed future projects. The proposed mine site is in the heart of caribou migration routes and summer feeding grounds, and the mine itself will be situated across a number of caribou trails which are used to cross the east end of Lac de Gras. The Dogrib believe the mine will affect the caribou and their feeding grounds, and therefore will have direct relevance to the lives of Dogrib people.

As will be shown, great uncertainty remains as to how the project might ultimately affect the herd.

WHAT WE KNOW ABOUT THE CARIBOU

As part of the environmental review of the proposed project, Dogrib traditional knowledge researchers interviewed eight Dogrib elders : Suzie Bruneau (92), Louis Whane (77), Moise Martin (88), Jimmy Martin (77), Sammy Football (94), Pierre Judas (90), Zimmy Mantla (82) Joe Suzie Mackenzie (84). All of these elders harvested caribou around Ekati between 1922 and 1998. Appendix D provides a fuller description of this research.

The Dogrib have traditionally harvested caribou in both the boreal forest and the barren lands. The elders state that the Ekati area has always been an important place for the caribou. They say that when they cannot find caribou in areas closer to the villages, they can travel to Ekati and always find caribou there. The area is known to the Dogrib as "like a freezer"—an area where resources, especially caribou, are always plentiful.

For some reason, Ekati appears to have special significance for the herd. This knowledge is confirmed by more recent observations of caribou biologists. The

satellite tracking of caribou that has been conducted by the GNWT over the past two years shows the importance of the area along the north shore of Ekati to the Bathurst herd.

There appear to be two features that make Ekati special. First, the area is clearly important as summer foraging habitat, since large portions of the herd spend mid-July to end of August here. The Dogrib elders know that the caribou have a more varied diet while foraging in the barren lands than they do while in the boreal forest. At least 21 species of plants have been identified by the elders as forming the food of the caribou. The interviews consistently describe the area around and east of Ekati as an important foraging area, and the variety of plants as being important for winter survival:

> "Caribou stay northeast of ek'adii because there are good food for caribou, like ?adzìidegoo, all the kwetsï, ?ît'ô and kòò. That's why they stay, and roam around there and eat their food before migrating into boreal forest." [Moise Martin:Diavik-99/03/18-1/2].

> "...There is always caribou food [on ?k'atìtata]... and caribou always migrate there." [Zimmy Martin:Diavik-99/03/18-1/2]

Second, the points at the west and east ends of the lake appear to serve as focal points along the migration route, particularly during the fall migration south when ice has not yet formed on the lake.

During open water season, rivers and lakes tend to divert movements of caribou to favoured, often traditionally used water crossings, particularly where rivers enter or exit, at narrows and/or where islands provide temporary stopping points. Caribou moving onto the east island tend to move around the east end of Ekati rather than crossing from the east island to the south shore. Consequently, the water crossing between Ekati and the south end of Lac de Sauvage is heavily used.

Dogrib knowledge tells us that the caribou trails leading through the Ekati area also incorporate the east island. Annual migrations comprise thousands of caribou which move on and off the east island by way of several water crossings.[See map overleaf] These water crossings serve two purposes. First, they allow caribou to continue moving towards the boreal forest if they are north of Ekati. Second, the time in the water provides relief from insects.

Dogrib knowledge also informs us that the Ekati area, especially the area to the east of the lake, is important for caribou in the winter. Diavik's work does not mention winter use of Ekati by caribou.

Other information regarding caribou behaviour that is relevant to the matter at hand include observations that caribou:

- are startled by noise and movement;
- often adapt to new situations;
- will move towards the smell of healthy vegetation;
- will move away from the smell of smoke;
- will roll in mud to create a protective coating from insects;
- will use water to escape from insects;
- will go to high, windy areas to escape from insects.

Based on their knowledge the Dogrib elders expressed several concerns relating to the development of the mine. They know, for example, that noise and movement at the same time can cause the caribou to move in fear rather than follow their leaders to the best foraging area or to the birthing ground. If fearful, caribou may move away and be forced to take the same routes year after year in order to avoid industrial activity. This will cause overuse of their habitat and create an increasingly smaller area within which they can find sufficient food while traveling.

They also know that caribou can adapt to some kinds of disturbance. This, too, has its negative consequences, since caribou may move onto the development site and get into trouble. They may, for example, use polluted areas such as tailings ponds in the same way they use muddy areas to roll in. They may also use the exposed piles of waste rock for open, windy areas to avoid insects, or get trapped because water crossings have been destroyed or are inaccessible.

The Dogribs are also concerned about what may happen if airborne pollution from the mine destroys the varied plant community. They worry about what will happen to the caribou's ability to "fatten up" in the summer and fall, or to use the vegetation to maintain their health throughout the winter.

Another concern is the effect on caribou behaviour from the noise and smells of the mining activities. Dogrib knowledge tells us that caribou do not adapt to fire or smoke, but move away from these things. Vehicle exhaust, diesel generator emissions, and blasting smoke and dust may have the same effect. Caribou moving away from the area because of these things may not get to consume the variety and amount of plant food they need for the winter. Smells from these sources at the mine site may also prevent the caribou from detecting the vegetation on the other side of the mine site, with the result that they may not go around the mine, but be diverted in an entirely different direction, possibly away from Dogrib territory.

It is these concerns that form the context for assessing the adequacy of Diavik's environmental assessment from the Dogrib perspective. In the sections that follow, I first review what Diavik did, and then provide an assessment of the work using the

concerns of the elders and those of a scientific expert hired by the Diavik Working Group to evaluate the company's caribou impact work.

DIAVIK'S CARIBOU ASSESSMENT

For its environmental assessment, Diavik conducted two years of surveys around the proposed mine site to begin to describe how and when caribou use the area. Assessment was conducted in a local study area (approximately 700 sq km including east and west islands plus shoreline along east, north and south side of Lac de Gras), and in a regional study area (approximately 12,500 sq km extending from north of Lac du Sauvage south to McKay Lake, from east of Afridi Lake west to Courageous Lake).

For the spring migration, caribou begin arriving at Lac de Gras about early April, increasing in number and rate of travel by late April. Most of the pregnant cows have passed through the area by 3rd week in May. There are few caribou between mid-June and mid-July. Diavik's surveys reveal the wide variability over the two years in the numbers of caribou migrating through the area. In 1996 about 100,000 caribou moved through regional study area while 57,000 passed through the local study area. In 1997 about 70,000 caribou moved through regional study area while 21,000 through local study area.

During insect harassment in the summer caribou aggregate on wind-exposed uplands that are often near large lakes. The east and west islands of Lac de Gras appear to offer this kind of habitat, since the animals will move onto these islands during the summer. Diavik's 1996 and 1997 surveys showed about 20,000 to 25,000 caribou arriving from the north, and up to 8000 crossing to the islands.

After insect harassment diminishes in late summer (August to mid-September) caribou disperse across the tundra north of Lac de Gras to feed in small or large but scattered groups. This is an important season for growth and building up of fat reserves required for winter survival.

In the fall, caribou which have spent the summer weeks dispersed along the north shore of Lac de Gras, begin to move south. Small groups of caribou begin to increase in size during September, and soon start to move south, either as a general drifting or as rapid concentrated movements driven by harsh weather.

During this October to November southward migration Lac de Gras forms a natural barrier where caribou collect before moving back and around the lake to the east or west. Some animals swim the lake. However, generally the lake acts to funnel the animals through the narrows at the east end of the lake or to the west at the outflow. Local topography also funnels some caribou onto the west and east islands before

they return to the mainland and move around the large lakes. During this period the potential for interaction between the herd and the project is at its greatest.

The study areas selected by Diavik to assess impacts to caribou represent only a small portion of the entire range used. It is known with some certainty that the Bathurst herd's winter range can vary widely from year to year, and there is no way yet we can predict where the herd will winter. The calving ground, which currently appears to be shifting gradually westward from Bathurst Inlet each year, is better known and shows less variability.

Diavik's assessment identified four types of impact:

1. Habitat Change
2. Changes to Migration/Movement
3. Behaviour Changes
4. Health & Mortality Effects

HABITAT CHANGE

Diavik recognizes the importance of the Lac de Gras area as a summer foraging grounds for the Bathurst caribou. The footprint of the project would obviously remove available habitat on the east island from use, and there would be a zone of influence around mining activities which would affect caribou. Caribou might be disturbed by activities, noise and odours associated with the mining, and they might also be attracted to certain features of the development.

To attempt to determine the impacts of the project on effective habitat loss, the company used a computer model to describe the value of various habitats near the mine site, and how the use of these habitats might be affected by various development alternatives. The computer model is intended to evaluate the potential of an area to support caribou based on known, or assumed, knowledge of what the habitat provides for the animals.

Habitat types were evaluated in the field to determine the presence of important food plants and cover from predators. Habitats were then rated from 1 - 10 as to their capability to support caribou. The assessment includes identifying a zone of influence around human developments within which habitat use is likely to be reduced by disturbance from mining activities. Diavik defined zones of influence at 2 -3 km around most development, 0.5 km on either side of airstrip, and 7 km off either end of airstrip.

Diavik concludes that about 45% of the local study area is useable caribou habitat (most of this is high suitability). The project will directly alter about 2.2.%, and removals due to the zone of influence disturbance will bring the total loss to 3.45%

(12.4 sq km). Diavik concludes that the level of habitat reduction is so small that any localized shifts in habitat use will have no measurable effect on broad seasonal distribution. Further, the impacts of lost habitat are immeasurable at the regional level.

Diavik's proposed mitigation includes keeping the mine footprint as small as possible; implementing dust control measures during all phases of mining; salvaging suitable soils for reclamation; conducting progressive reclamation and revegetation of rock storage and other sites no longer needed.

CHANGES TO MIGRATION/MOVEMENT

Diavik notes that caribou may be blocked or deflected by mine structures, or by activities which cause disturbance. Steep rock piles and open pits will force caribou to move around them, and high berms may form a visual barrier also causing caribou to move around or away from them. Roads and linear developments may also divert caribou.

Diavik's approach to assessing these effects was to model them on a computer. The modeling was done for the regional study area; detailed local analysis was not undertaken. Diavik concluded that any such diversions would be localized and that there would be no serious or significant long-term effects to caribou movement from the project.

To mitigate any such effects, Diavik proposed the following measures:

- keeping the project footprint small;
- providing movement corridors around perimeter of east island and at strategic locations throughout the mine site;
- constructing roads with a low profile (less than 1m) except where roads are used to deflect caribou;
- constructing ramps and associated movement corridors on country rock piles; and
- a number of other measures to control caribou movements on or near the mine site.

BEHAVIOUR CHANGES

Diavik reviewed the scientific literature on caribou behaviour in response to human activity and concluded that caribou have a high tolerance to disturbance. They also concluded that caribou strongly avoid moving vehicles, and that the frequency of traffic is important in knowing whether roads form barriers or not. Reactions to

winter roads are unpredictable, since both avoidance and use of such roads for travel have been observed.

The presence of insects is also a factor in determining how tolerant and how close animals will move towards development sites. Disturbance from aircraft is variable; maintaining minimum altitudes of 300 m (600 m during calving and post-calving) will, Diavik suggests, result in negligible disturbance effects to caribou.

Observations show that caribou respond to loud sounds (explosions) by moving faster, but not necessarily away from the source.

Caribou are strongly motivated to reach calving grounds during spring migration and not easily deterred by human disturbance; movements are more variable in fall.

Again, Diavik used its computer model to assess the potential for change in caribou behaviour.

Diavik proposes several mitigation measures to reduce the impact, including:

- awareness training for all personnel and contractors;
- right-of-way for caribou by reducing traffic speed when caribou are around;
- suspending blasting when caribou are within certain distance of mine; and
- implementing aircraft corridor guidelines.

HEALTH & MORTALITY EFFECTS

Diavik identified potential sources of mortality for caribou, including ground vehicle/caribou collisions, collisions with aircraft, accidental losses associated with movement into hazardous areas around mining operations. Sub-lethal effects include reduced health of animals from increased energy consumed to avoid disturbances or obstacles; altered activity budgets, and increased stress levels within the zone of influence.

Diavik evaluated cumulative effects for females during spring and fall migration. The company used a computer model to assess energy cost of migration along pathways of least resistance, and then looked at different development scenarios to see the effects. The points of entry and exit were designated at equal intervals on south and north boundaries of regional study area. The model also used secondary entry points at 10 km distant from development sites, which was assumed to be the maximum distance at which caribou might detect human activity or infrastructure. Interpretations were made by Diavik with consideration for behaviour reported for Bathurst herd and other caribou populations.

Diavik concluded that there would be a low potential for mortality of caribou directly related to industrial development. Any incidental mortality from time to time would not have significant consequences at the population level.

Hunter access to the regional study area along the winter road was not considered by Diavik to be a factor since caribou do not winter in the area.

Winter road vehicle collisions with caribou were also rated by Diavik as insignificant, since accidents involving caribou have not been reported to date. Reports from Lupin mine reveal only 3 caribou have been lost over 17 year period.

The computer model defined the project footprint having as its widest diameter of 6 km, and having no linear features to deflect caribou. Diavik's computer analysis revealed that there are no strong tendencies to avoid major landscape features, except the widest part of Lac de Gras.

Using the Gordon Lake migration route as baseline, the analysis determined that total energy cost of migration was a loss in body weight of 3300 g; 200 g of which is lost while moving through the regional study area. The main effect during spring migration is diversion around the west side of east island, which adds about 4 g of body weight loss to the total migration cost.

Some few thousand to 80,000 caribou would move through the zone of influence and be affected (based on 1996/97 observations). Diavik concludes that this effect is low. Diavik also predicts only a small increase in energetic cost associated with crossing roads such as Misery road. Diavik assumes that once mining activities are over in 25 years, migration movements will return to near baseline conditions.

For fall migrations the model predicts the known crossings at the outflows of Lac de Gras and Lac du Sauvage, and from east island to south shore. Diavik concludes that their project could result in a moderate impact on energy costs of fall migration (>1%) for some caribou, and may cause a few accidental deaths for the duration of active mining. Again, Diavik contends that the impact will greatly diminish following closure.

Overall, Diavik concludes that the potential energy costs imposed by the project represent an increase of less than 1% of the energy needed for entire migration path between wintering and calving grounds, and that this is insignificant at the population level. Diavik's modeling shows that disturbance from the project's operations could, under a worst case scenario with peak numbers of migrating caribou moving through the zone of influence, potentially reduce calf production for the Bathurst population by 0.1 % to 0.5 %. The model also shows that project-related effects could reduce conception rates in individual animals by up to 25 %. However, since the proportion

of the herd moving through the zone of influence is not that high, the effect at the population level is non-measurable.

In work done during the comprehensive study period Diavik presented a description of a worst-case scenario involving caribou on east island. The worst case event would involve a panic retreat of up to 10,000 animals (2 - 3 % of the Bathurst population) into the lake during hazardous ice conditions. Based on statements made by an elder during a caribou workshop that, when larger herds fall through ice, the ice breaks into smaller pieces enabling most animals to swim to shore. Diavik concludes from this that "the likelihood that more than 1% of the population would be lost from such an event seems very remote."[1] This is not a definitive or conservative estimate of the impact, however. There is other, well-documented historical evidence, ignored by Diavik, that in fact thousands of caribou can drown when ice gives out during a water crossing.

AIR QUALITY ISSUES

A significant concern of the Dogribs is the dust and exhaust emissions from the mine which might cause caribou to change their migration behaviour, or, perhaps more critically, would contaminant the plants nearby that caribou need for food. It is a real concern. Data from the BHP mine are already showing that airborne contaminants are being deposited on the ground at some distance from the mining activity. Lichen surveys in 1998 (pre-operation) reveal significantly higher levels of cobalt, chromium, copper, lithium, molybdenum, strontium and titanium in the mine area than in the reference areas more distant from the site. Snow surveys in the spring of 1998 also showed increased levels of ammonia, antimony, manganese, uranium, vanadium and suspended solids relative to reference locations had accumulated during the winter.[2]

Potential sources of airborne emissions from Diavik's proposed project include:

- dust from mining in open pits
- dust from rock storage areas, tailings facility and haul roads
- dust from gravel runway
- power generation emissions
- emissions from diamond recovery plant

Dust deposition can affect aquatic, vegetation and wildlife resources. Diavik states that the largest particles usually settle out within 6 to 9 m of the source, meaning that they would remain within the pits or adjacent to haul roads on the east island. Smaller particles would tend to settle out approximately 100m from the source on, or

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1 Axys Environmental Consultting Ltd. *Probability Assessment and Contingency Plans for Worst Case Upset Scenarios Involving Caribou*. April, 1999.

2 BHP. Environmental Agreement Annual Report. 1998.

very near, east island. The smallest dust particles travel greater distances, and would tend to be deposited either on the lake surface or adjacent mainland as influenced by the prevailing winds. It is important to note that data from 1998 pre-operation surveys at BHP's mine suggest that dust may be traveling significantly further than estimated here by Diavik.

In addition to dust, there will be significant quantities of other contaminants that will be released to the atmosphere from the mining operations. These are identified in the following table.

	Daily Total Emissions (t)	*Annual Total Emissions (t)*	*Project Lifetime Total Emissions (t)*
Total Particulates[1]	8.9	3248	55224
Carbon Monoxide	2.8	1022	17374
Nitrogen Oxides	16.5	6022	102382
Sulphur dioxides	0.2	73	1241
Volatile Organic Compounds	0.8	292	4964

TABLE 1. Cumulative Airborne Emissions from Diavik project. Date from Table 6-1, *Environmental Effects Report, Climate and Air Quality*, September 1998. Note 1: values are for summer rates. Diavik contends that winter emissions of particulates (dust) will likely be much lower. However, this will be offset by the inability to use water to suppress dust during the winter.

Diavik contends that of the six parameters investigated (total suspended particulates (TSP), inhalable particulates, CO, NO_2, SO_2 and O_2), five would be below established ambient air quality guidelines beyond the project site. The exception is dust (TSP), which would exceed guidelines adjacent to areas of intense activities such as blasting for short periods. On-site, particulate concentrations would be higher, but within the occupational health criteria used for mining by NWT Safety and Public Services.

ASSESSMENT OF DIAVIK'S CARIBOU STUDIES

The Diavik Working Group had an expert caribou biologist, Richard Farnell, review the company's material relating to the project's impacts on caribou. In addition to pointing out several specific deficiencies of the company's assessment, Farnell's general view is that Diavik's conclusions that effects to the herd at a population (or regional) level will be immeasurable and insignificant are not technically defensible, for a number of reasons as outlined below.

Some context is necessary. First, it is challenging and time-consuming to conduct a program that will properly detect the effects of industrial activity on caribou populations. We know that caribou population responses to human developments are largely not well documented because of the lack of sufficient baseline information prior to development, the lack of investment in research and monitoring, and the long lag-time in population responses. However, we also know after 20 years of research on the Central Arctic herd that oil and gas development on the north slope has resulted in avoidance of, and fewer movements within, the zone of development activity by female caribou. This constitutes a functional loss of habitat, although its long-term effects on caribou populations are unknown.[3]

The task is complicated by fact that effects can be large-scale and unpredictable, and the fact that the high degree of natural fluctuation in caribou populations and movement can mask the effects of human impacts. The threshold levels for human activity that affect caribou are elusive and hinder good assessment of impacts.

Another complicating factor is the fragile relationship between large caribou herds, their predators, alternate prey populations, and food availability. Successful mitigation of project effects on predators of caribou is essential to prevent serious potential population level impacts. With respect to the Bathurst herd, very little about these relationships are known.

BASELINE STUDIES

Diavik's baseline studies confirmed Dogrib traditional knowledge that there is a high potential for large groups of caribou to come in contact with the mine. However, Diavik should have acknowledged that the occurrence of caribou over the life-time of the project could be much greater than that documented. Potentially post-calving numbers in the 10's of thousands could seek the east island for relief from insects and shade during summer and equally as many could encounter the mine footprint area during fall migration. With only two year's data collection, not much can be said about the natural variability from year to year in the herd's use of the Ekati region.

Both traditional knowledge and scientific observations agree that the Lac de Gras area has a particular significance for the Bathurst herd. Unfortunately, the significance has not been explained by Diavik—we do not know why this is preferred habitat for caribou, nor have we an explanation of how critical this area is in relation to the remainder of the herd's range. If displacement from this area due to mining activity was to occur, what alternative habitats do the caribou have, and what would

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3 Cameron, R.D., E.A.Lenart, D.J.Reed, K.R. Whitten and W.T.Smith. "Abundance and Movements of Caribou in the Oilfield Complex near Prudhoe Bay, Alaska. *Rangifer*, 15 (1). 1995.

the displacement mean? These concerns, expressed by the Dogrib elders during the interviews, have not been answered by Diavik's assessment.

Diavik's conclusion that only 2.2 % of the habitat in the local study area is lost is simplistic. If it is critical habitat in some way, the net effect of its loss may be much greater than a simple % calculation would have us believe. We simply do not know the significance of the predicted loss.

Another deficiency is that not all the area affected by the project was taken into account by baseline studies. The most obvious example is that the studies did not include collection of baseline information along the southern portion of the Echo Bay winter road. This bisects a significant portion of the herd's winter range and has high potential for interaction with caribou and winter transportation activities in this area. The effect of winter road traffic on caribou behaviour has not been assessed to date.

In addition, Diavik's large claim block, where continued exploration and development could take place over the life of the project and beyond, was not part of the baseline studies or impact assessment. This is particularly critical since the bulk of the claim block lies to the east of the project, an area that the Dogrib elders have described as very important for the Bathurst herd. This is an area that has been, and will likely continue to be for some time, heavily used by aircraft in further exploration of the claim block.

There is evidence that aircraft-supported exploration has already affected caribou behaviour in the area. In an information package distributed in March 1998, Qaivvik Ltd. describes "continual disruptions" to its 1992 and 1993 commercial hunting operations in the Lac de Gras area from helicopter and fixed-wing activity, to the extent that "the caribou migration was disrupted."

IMPACT ASSESSMENT

Diavik defined a regional study area within which to assess the potential cumulative impacts of its project in combination with other projects and activities. By definition, there are other projects and activities which affect the Bathurst herd which were left out of the analysis. The boundaries of this assessment area were not based on ecological criteria, and thus the area selected has no demonstrable relevance to the ecology of the herd. For this reason the assessment is not scientifically defensible, nor particularly meaningful in understanding the additive effects of the Diavik project to the effects of other human activities that may be affecting caribou within their home range.

As Farnell points out, if there is experimental design to this research it is not obvious from Diavik's assessment reports. An impact study that sets out hypotheses and predictions followed by a technically sound methodology to test them is lacking.

For its cumulative effects assessment, Diavik conducted field work to identify behaviour of caribou during the spring migration. Farnell concluded that this study was severely limited in scope and treatment since it was carried out over only 10 days during one seasonal period. Results consequently suffer and should not be used to draw any solid conclusions.

Similar conclusions can be drawn about Diavik's assessment of cumulative effects on caribou during the summer. The company conducted an 8-day survey in August that was supposed to provide quantitative information for the habitat model. As for the spring study, the Dogrib reviewer concluded that this study was not reliable for assessing effects in late summer on caribou.

Farnell also found that Diavik's conclusion that "conclusively caribou react more strongly to naturally occurring disturbances than to human related ones" is a meaningless misuse of extremely limited data.

Unreliable estimates from models can arise from poorly understood ecological trends that greatly affect model outcomes and subsequent management regimes. They should be used to evaluate relative rates rather than absolute, with an emphasis on short-term thinking. In this case, Diavik's use of a computer model as a tool to assess impacts is misused by predicting absolute levels of energy cost for caribou moving through the area. This implies higher levels of understanding and certainty than really exist.

Cause and effect prediction from models should always be treated cautiously. They should not be substituted for field studies and experiments, and models that are not corroborated by observation and real data are of little use. Models will have better certainty if established by conducting field test of the model assumptions and field validation of the predictions. Models have to be followed by studies and be reviewed from time to time as a part of adaptive management in order to be useful. Neither the model nor the proposed monitoring program does these things.

> "All models have assumptions and you should be leery of all models that are not verified by data. Anybody who comes up and says here's a numerical model and here's the result, don't believe them unless they have observational data to support it."
> *(Rick Thomson, modeler for Diavik's sediment distribution studies in Lac de Gras, Yellowknife Technical Sessions on "No Net Loss", January 25, 1999.)*

It is unreasonable to conclude that there will be no residual effects. The question of whether caribou will avoid, or habituate to, human activity is weighted towards the former in ecosystems with abundant predators.

Even though the project footprint area will only be a very small portion of the herd's annual range, a large portion of the herd does interact with the project area. The potential for impairing caribou movements and affecting their use of large tracts of habitat is much greater. Other developments in the herd's range, not assessed by Diavik, will contribute to cumulative effects.

The concerns expressed by the Dogrib elders relating to the effects of airborne emissions on caribou movement and habitat have not been properly assessed by the company. Diavik has presented data about the expected emissions from the site during operations, and has modeled dispersion of these according to the prevailing wind patterns.

As Table 1 indicates, a significant loading of airborne pollutants into the nearby environment can be expected over the lifetime of the project. It is not known how the caribou will be affected by the dispersed concentrations of these substances around the mine site, but it is conceivable they will be detected by the animals at significant distances beyond the zone of influence identified by Diavik. Caribou may then make significant adjustments in their movement corridors which, if maintained over time, could result in large tracks of foraging habitat being excluded from their range. The concerns the Dogribs have expressed in this regard remain unanswered at this point.

Svoboda also points out that the loading of airborne contaminants onto the tundra vegetation may alter the vegetation communities, particularly lichens, that comprise important wildlife habitat, and affect the health and movement patterns of some species.[4] Diavik has estimated the direct impacts of the project's footprint on vegetation species diversity to be about 44% at the local level—representing a loss of "high magnitude".[5] However, the alteration of vegetation communities beyond the footprint from airborne contaminants has not been quantitatively assessed. Diavik provides a literature review to support its view that such effects are not likely to be extensive. It is interesting to note, however, that anecdotal evidence at the BHP site is that dust transport is a more significant problem there than predicted.

The potential effect of the waste rock stockpiles does not appear to be fully appreciated. Caribou make use of lakeshores and rocky uplands for insect relief

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4 Letter to Brenda Parlee from Josef Svoboda, February 26, 1999. "Comments on the Diavik Diamond Mine Project at Lac de Gras, NWT".

5 *Environmental Effects Report - Vegetation and Terrain*. August 1998. p.51.

habitat. The country rock piles, which will rise some two times higher than present topographic highs, will become a long-distance target for post-calving aggregations, and for northward migrating caribou in spring. The effectiveness of Diavik's proposed mitigation (caribou movement corridors and ramps) for this is not proven.

Combined mining activities could act as a barrier to caribou movements during fall. The proposed project will physically alter caribou movements including water-crossings. Blockage and entrapment of caribou on east island is a reality and has the potential for big effects. The problem of caribou attempting to move onto the lake with a thin ice cover is very real and could result in significant mortality to caribou.

Farnell notes that Diavik's selective use of the scientific literature was biased and confounding, and unfortunate in that Diavik indirectly used the European experience to justify their case about caribou. The European animals do not have natural predators and are accustomed to people. In contrast, North American caribou behaviour is dominated by the need to avoid predators, and are not accustomed to people. Therefore, predictions about how caribou will behave in relation to human and industrial activity will not be reliable to the extent they were based on the European situation. Quite the opposite reactions to disturbance could occur.

MITIGATION AND MANAGEMENT

Diavik assumes that their proposed mitigation measures will be effective. However, this is an untested assumption without validation, and comes in some cases with a high degree of uncertainty and risk. Mitigation measures need to be tested against adverse effects, and Diavik offered no evidence that such mitigation will be effective at its mine site.

Diavik proposes to herd animals away from hazardous areas; this may compound negative effects already associated with human activity.

Diavik's proposed wildlife movement corridors and diversionary structures are not well described. They are also untried and untested measures, and so cannot be properly evaluated in terms of their likely success.

The threshold for disturbance from exploration (helicopters) is highly dependent on the frequency of flights. Farnell reports that helicopter activity is thought to affect caribou distribution and perhaps breeding and reproductive success in Yukon when it is acute. The minimum flight distances and altitude required by GNWT wildlife regulations do not deal with frequency of exposure. This situation has not been assessed, and is not mitigated by regulating flight levels as implied by Diavik.

For the winter road, there are no serious mitigation plans for convoying, timing these activities, caribou-friendly ice road design, or assessing additional traffic frequency

from other operators was provided. Moreover the right-of-way policy for caribou during other seasons at the mine site is not proposed for the winter road.

CONCLUSIONS ABOUT CARIBOU

Diavik's claim that their development will not change the distribution and abundance of the caribou herd comes with so much uncertainty that Farnell concludes it is invalid. The relationship between the Bathurst herd and its range is complex and not well-understood, and Diavik's caribou assessment only partially meets what is needed to have reasonable understanding of its project's impacts on caribou. The project is plagued with the potential for significant impacts that were not fully investigated by Diavik.

It is reasonable to assume that with good planning and sound environmental management conducted by Diavik on-site, the risk to individual animals passing through mine area can be significantly reduced, particularly if there is on-going participation of Dogribs in the mine caribou management program. However, Diavik's proposed mitigation measures are untested and have high degrees of uncertainty and risk attached to them. Therefore they cannot be relied upon as assurances of effective mitigation if negative impacts arise once the project is underway.

More significant than the project's effects on individual animals near the mine site are the cumulative, long-term, herd-level effects of the project—alone and in conjunction with other projects. Cumulative effects have not been properly assessed by Diavik. How will migration be affected from the cumulative activities of Diavik on its various mineral properties and other players conducting exploration and development work in the diamond fields? What will be the effect of BHP's current expansion of mining and road construction into the Sable and Pigeon pipe sites? If the herd is displaced from critical summer habitat in the Lac de Gras region, what effects will this have on the well-being of the population? Will the herd's population go into decline for some reason? Will the Dogrib's ability to harvest the herd be negatively affected from any cumulative change in behaviour or condition of the animals? The answers are not before us.

From the Dogrib perspective, the risks of the project to the herd's well-being are significant. The consequences of the impacts are unknown, and the consequences of being wrong are serious. The bottom-line is that we simply do not know how the Diavik project will affect the Bathurst herd in the long-term.

A recommendation by government to allow the project to proceed at this time is done in the face of having no meaningful assessment of the cumulative effects of this project, and other activities, on the Bathurst herd, and having no demonstrated

techniques for monitoring, mitigating, or managing impacts. There is no monitoring plan designed that reflects the caribou ecosystem and the range of potential effects.

There are no contingency plans for modifying the mining operations if a monitoring program was to demonstrate cumulative or population-level impacts to the herd. Indeed, it is not clear that any effective contingency plans could be developed.

There is no agency or structure in existence for the integrated study and management of the Bathurst herd. Government has not met its responsibilities in this regard. This is not a new issue. It was a salient concern of Dogrib and other aboriginal groups during the 1996 BHP environmental hearings. Despite numerous recommendations for an integrated monitoring and management body, nothing has been done. Government's failure to act to properly protect this valuable resource means that it will continue to reap the substantial economic benefits of diamond mining without accepting the environmental costs or the risks of the development. These will be left, as has been the case, to the aboriginal peoples to deal with. It is on all accounts an unacceptable arrangement.

There is also no mechanism in place, or proposed, for the legally enforceable regulation of the project with respect to its overall effect on caribou and caribou habitat.

With no accurate assessment of effects, no viable contingency measures in place, no ecologically sound cumulative effects monitoring program, no regulatory ability to protect the herd, no structure for integrated management of the herd, and great uncertainties as to the risks created, how can we conclude that the project will be safe, and should be recommended for approval? There is nothing developed to ensure continued well-being of the herd, and there are no known measures we can call on to do this.

The Dogribs cannot have any confidence that, if the project proceeds on the present basis, the caribou will be kept safe.

PART THREE
MINE WASTES AND WATER QUALITY

The mining operation will bring to the surface for permanent disposal on east island the following materials:

- granite and associated country rock (biotite schist, pegmatite)
- kimberlite wastes (tailings) and associated mudstones
- sediments from the bottom of Lac de Gras
- waters from the open pits, underground workings, and other minesite components

The project will result in three large waste storage facilities containing some 252 million tonnes (Mt) of granitic waste rock and 26 Mt of kimberlite tailings. Table 2 below summarizes the quantities of metals that will be brought to the surface. This inventory represents an environmental hazard, the challenge of which for Diavik is to ensure its safe disposal forever. The substances listed are harmful to life if they are released into the environment in certain forms and quantities. Some of those listed are more easily released than others, while others are more harmful to life even at very low concentrations. Beneath the surface, in their present form, these materials are relatively secure and immobile, and present little threat to the environment. On the surface, blasted into smaller particles and exposed to air and precipitation, the opportunities for enduring chemical reactions and release of contaminants are increased almost infinitely.

Since the particular rock types involved in the Diavik project contain minerals having these toxic metals, and since such minerals are prone to chemical activity under surface conditions, the objective of securing and disposing of these waste materials safely must be achieved.

The reality of the project is that the disposal of such rock at the surface represents the construction of a geochemical reactor that will be active, at least without successful mitigation, for possibly two hundred years or more into the future before it slows to background rates.

Diavik has recognized this problem, and has proposed ways of dealing with it. The test for environmental approval is to determine whether the problem has been identified with sufficient accuracy, and whether the proposed mitigation and management solutions will work.

	Granite		Biotite Schist		Kimberlite		TOTAL
	228,600,000 Tonnes		25,400,000 Tonnes		26,000,000 Tonnes		280,000,000 Tonnes
	ppm	*Weight in Tonnes*	*ppm*	*Weight in Tonnes*	*ppm*	*Weight in Tonnes*	*Weight in Tonnes*
Aluminum	87,000	20,071,080	80,000	2,032,000	750	19,500	**22,122,580**
Arsenic	4	914	2	51	22.4	46 [6]	**1,011**
Cadmium	>0.1	>23	>0.1	>2.5	0.3	8	**>33.5**
Chromium	127	29,032			183	4,758	**33,790**
Cobalt	41	9,373	22	559	96	2,496	**12,427**
Copper	385	88,011	62	1,575	65	1,690	**91,276**
Iron	1800	411,480	37,000	939,800		0	**1,351,280**
Lead	70	16,002	34	864	18	468	**17,334**
Molybdenum	22	5,029	5.9	150	36	936	**6,115**
Nickel	64	14,630	67	1,702	2000	52,000	**68,332**
Strontium	888	202,997			1,190	30,940	**233,937**
Uranium	8.8	2,012	3.2	81	2.4	62.4	**2,155**
Zinc	238	54,407	98	2,489	72	1,872	**58,768**

TABLE 2. Inventory of Heavy Metals Brought to Surface by Proposed Diavik Project.[7] Data are from two sources: whole rock analyses provided in the Baseline Geochemistry study; and Table 2 of Technical Memorandum - Risk-Based Reference Concentrations for Protection of Wildlife. There are significant discrepancies for some metals between the two sources; the highest values have been selected to be conservative.

The Working Group contracted a technical expert, Kevin Morin of Mine Drainage Assessment Group (MDAG), to review Diavik's testwork and water quality predictions. His report was submitted to Diavik and placed on the public registry. Diavik responded to some, but not all the issues raised by the Dogrib reviewer. The following discussion demonstrates that, on the basis of Morin's review, Diavik has significantly and consistently underestimated the problem of mine drainage from the

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6 While kimberlites show very little arsenic present, the mudstones have a mean concentration of 22.4 ppm. Diavik has not provided estimates of overall total mudstone abundance, but definable mudstone "units" are estimated by Diavik to comprise about 2-8% of each pipe—this is likely an underestimation of total mudstone that can also occur as fine-grained matrix in the volcaniclastic kimberlites. I have used the 8% number to provide a conservative estimate of arsenic quantities.

7 The list above illustrates how very low concentrations of trace metals in rock can present geochemical hazards. An excellent example is cadmium which, in the whole rock analyses cited above, appears throughout all rocks at, or just below, the detection limit, and yet presents a metal leaching problem for waste rock at this site.

waste rock dumps and tailings pond. It is also shown that substantial uncertainties remain about the company's proposals to deal with the problems.

Much uncertainty characterizes Diavik's predictions about the nature of drainage from waste rock dumps, groundwater, and tailings pond water. Morin concluded that Diavik's water quality predictions for the various mine components are not accurate, and on a number of fronts tend to underestimate the levels of acid production and metal leaching that could result from exposing the waste rock and kimberlite tailings to the atmosphere.

A number of these issues were raised with Diavik, and their consultants' responses tended to downplay the critical important of accurately assessing potential water quality problems on the mine site. They adopted the view that, since they intend to collect and treat the water anyway, there is no need to be overly concerned with inaccuracies of water quality prediction on site.

There are two fundamental flaws to this position. First, to the extent that water quality may be worse than what Diavik predicts, there is an increased risk in the event of accidental discharges and from slow-release seepages from ditches, etc.

Second, no information is presented on the technical efficiency of the proposed water treatment plant, and what limits there may be between input quality and desired discharge targets. The costs of treating water may become onerous, to the point where the company will opt not to do it, and, depending on discharge targets, there may be no technically feasible method of treatment. Indeed, Diavik has already ruled out certain water treatments on the basis of high cost. I discuss these issues further below.

WASTE ROCK

The principle environmental management issue for the waste rock dumps is the potential for precipitation and air to move through the piles and react with any sulphides to generate acid drainage. Such drainage has the potential to leach metals contained in the rock. Both acidity and metal leachates can be harmful to downstream aquatic environment. Significant metal leaching can also occur without the formation of acid to assist it and without the presence of air to accelerate it. Diavik has recognized the occurrence of significant amounts of sulphide-bearing rocks and, appropriately, invested considerable effort in characterizing the geochemical features of all waste rock and in predicting the quality of the drainage that might result.

The proposed project consists of four kimberlites pipes which are to be mined in three open pits, with additional underground mining when the pits have reached maximum feasible depth. To extract the kimberlite, some 252 million tonnes of

granitic waste rock will be brought to the surface and stored in the north and south waste rock dumps. These will rise about 300 feet above the lake, just under 3 times the present high point.

The granite contains sulphide minerals in trace amounts which Diavik incorrectly contends will be non-acid generating and environmentally harmless. Also, a notable component of the country rock, ranging up to 17% abundance in one pit, is comprised of biotite schist which contains significant pyrrhotite, a sulphide mineral which oxidizes rapidly under surface conditions.

WATER QUALITY PREDICTIONS

For its geochemical predictions, Diavik assumes an overall average of 10% biotite schist in the country rock for prediction purposes. Tests on the schist show it to have a high net acid generating potential. In one type of test (i.e. kinetic) designed to examine the speed and duration of chemical reactions in the rock, the pH (an indicator of acidity) of drainage from the schist decreased quickly to as low as 2.7 (very acid) under surface conditions.

Diavik predicts that the oxidation of the schist in the waste rock could last more than 200 years, although the process may be exhausted more quickly than this, they say, because of the low overall sulphide concentration (avg. 0.12 wt %S). Any excess acidity should be neutralized by silicate minerals in the more abundant granitic waste rocks.

Morin's review identified a number of uncertainties relating to Diavik's predictions about the quality of drainage that might be expected from waste rock dumps:

1. Over Estimation of Available Neutralizing Potential

   In their geochemistry studies, Diavik overestimated the amount of neutralizing potential in the various rock units available to buffer acid generation in the biotite schist. Up to 10t/1000t of measured neutralizing potential was unavailable, and thus a higher percentage of schist becomes net acid generating, as do higher portions of the other country rock units. Contrary to what Diavik predicted, up to 65% of the biotite schist, up to 3% of the granite, 10% of the pegmatite, and 21% of the lake sediments could also be net acid generating. Diavik was questioned on the reason why their results had omitted consideration of the unavailable neutralizing potential. In response, Diavik has now agreed that up to 64% of the biotite schist will be net acid generating, although they will wait until further work

is carried out to determine if the percentages of the other rock types will have to be raised.[8]

2. Under Estimation of Acid Generating Potential

Diavik underestimated the amount of sulphide in the rock influencing the rate of geochemical reactions. Diavik's mineralogic studies assert that the granites contain only "trace" levels of sulphides and that the other waste rock units (diabase, pegmatite) contain "almost no" sulphides. However, Diavik's geochemical data reveal that granite and pegmatite contain up to 0.25% sulphide, a concentration which can generate acidity and release metals for decades. The International Kinetic and Static Databases, containing results for hundreds of minesite around the world, show that sulphide levels even as low as 0.09%S (less than ½ of the maximum level in Diavik's granite and pegmatite) can generate net acidity for many years.

Diavik's more recent mineralogy studies on the results of the kinetic tests recognize the previous underestimation of sulphide and acid potential. Morin concludes that "the actual levels of sulphide and acid generation are apparently still being refined at Diavik, and the trend is clearly towards increasing values of sulphide and acid potentials in reports through time." Nevertheless, all rock units at Diavik already contain sufficient sulphide to confirm they will generate acidity.

Diavik's testwork reports that granite, pegmatite, and diabase were "unresponsive" and "stable" during kinetic testing. In reality, pH was falling and sulphate production rates were 0.5mg/kg/wk and higher. For each million tonnes of country rock this "unresponsive" rate would release at least 500 kg sulphate each week into waste rock drainage. While aqueous metal concentrations were relatively low in these "unresponsive" tests with several kg of rock, many metals were still detectable. These low concentrations can only increase on-site as the rock increases in the dumps from several kg, to several tonnes, to millions of tonnes.

3 Problems with Quality Control

Variations in duplicate tests show that reported sulphur and neutralizing potential (NP) values could be up to a factor of 2 or more in error, which is important for rock units like granite. This means that there could be more acidity generated by Diavik rock than currently predicted. Other parameters such as alkalinity, ammonia, calcium, flouride, iron, nickel, nitrate, phosphate, selenium, sulphate, and zinc also have large analytical discrepancies.

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[8] Letter to Violet Camsell-Blondin from Murray Swyripa. Response to Information Request. May 14, 1999.

The tests for some elements (antimony, arsenic, calcium, nickel, selenium, and silver) were particularly prone to problems, and Diavik's quality assurance/quality control (QA/QC) work shows that the analytic errors generally underestimated concentrations. Actual concentrations of these elements could be a factor of 4 or more above test results.

Diavik's first response to Morin's comments on this are unsatisfactory. The QA/QC showed the accuracy of the tests was poor. The initial QA/QC work was never used in the geochemical reports to illustrate the range of errors in predictions. Diavik responded that the laboratories developed corrective actions based on the early QA/QC, but there was no subsequent check on QA/QC using the same technique to demonstrate this, no data have been presented to verify this, and the original QA/QC work was never continued.

Further, the company reportedly used time-series diagrams to assess QA/QC of analyses, but these cannot be used with kinetic testwork because periodic concentrations can fluctuate wildly until the test stabilizes. Because of this, one cannot compare results from one analysis to a later one to decide if the analyses are acceptable, when the concentrations can naturally change significantly each time. Besides, no data were presented to support this. One reason may be because another check on QA/QC, called charge-balance error which was not used by Diavik, shows the analyses are simply of poor quality, so any time-series analyses are of little value. Diavik concluded that "the available data are representative for decision-making purposes", since any "under-prediction by the current models of the scale suggested by MDAG (if that were to be the case) would not alter the water management plan."

Tolerating inaccurate predictions of water quality simply because the company proposes to treat water in any event is not an acceptable approach in other jurisdictions. In terms of assessing environmental risk, it significantly underplays the hazard created on the surface by the mines. We do not get a clear idea of the amount and type of potential contamination that needs to be dealt with.

The result of this is that, first, Diavik's approach thwarts the possibility of having any realistic assessment of consequences during upset conditions, as is required by *CEAA*, such as a break in the collection system and escape of effluent into Lac de Gras.

Second, it places heavy emphasis on treatment plant efficiency and costs which, in turn, have serious implications for bonding the plant's performance.

Questioned further on this, Diavik has since stated,

> "Diavik acknowledges that some of the statistical summaries provided in the report may have not been presented in a way that allows reviewers to

efficiently evaluate the quality of the data set. Diavik intends, in the future, to prepare a 1998-1999 QA/QC report which will take the comments provided by the Dogrib Treaty 11 Council into consideration."

4. High Detection Limits

The detection limits used by Diavik for cadmium, chromium and copper are above CCME thresholds for aquatic life. This means that safe levels could be exceeded without being detected.

5. Poor Match Between Predicted and Observed Metal Leaching Rates

There is a poor match between predicted and measured rates of metal leaching. Diavik compared actual concentrations of metals from its on-site leach pads with predicted concentrations from its kinetic tests. For 4 out of 6 metals the difference between the values was greater than a factor of 10. Predicted calcium also is almost a factor of 4 below the measured value, underestimating calcite dissolution, and thereby rendering predictions of acid neutralization and pH control unreliable.

Diavik also states that there is an "excellent match between predicted and observed sulfate" concentrations, and yet they make a prediction of 29,150 mg/L sulphate for the base-case kimberlite ore stockpile—an impossibly high value as confirmed by examining the charge -balance error. Diavik's response to this was that any error in predictions would not change the requirement for treatment, and that the "excellent match" applied to one test only and should not be taken as a general statement on any other test or on any field verification of any predictions.

6. Duration of Chemical Reactivity

A final uncertainty about predicted duration and intensity of acid generation in the waste rock piles comes from a modeling study based on assumed ideal conditions which are not supported by other studies which have examined real field conditions. Even Diavik's own data invalidated the values used in the model. The early model predicted that oxidation would be exhausted within 2-20 years, even though the kinetic tests showed that after one year the samples were in an "initial rather than an advanced stage of alteration" and "column leaching has not advanced the alteration of sulphides to a perceptible or definitive extent." The revised model now says oxidation will continue for some unknown length of time beyond 200 years. However, Diavik indicates the oxidation may be terminated earlier if a frozen cover is established.

Modeling of the freezing of such covers at Diavik were based on an Australian model applied to only one minesite in Sweden and then improperly adjusted to a Canadian model that did not simulate the same conditions. This provides no

assurance that covers will freeze over the heat-generating rock and kimberlite, and thus there is no reason to expect sulphide oxidation to stop. Even the Geological Survey of Canada has shown that sulphide oxidation can continue for thousands of years in high-arctic regions of continuous permafrost.

7. Total Metal Concentrations not Predicted

Diavik has clearly explained that all geochemical tests were conducted for predictions of dissolved metals. There has been no work presented on predictions of total metals. As total concentrations can significantly exceed dissolved levels when suspended solids (eg. clays) are high, as to be expected at some locations at Diavik, this is a serious deficiency. It raises many uncertainties about the accuracy of water quality predictions for the tailings pond water and ultimate discharge effluent. It may also pose significant challenges to the effectiveness of the proposed water treatment plant. This subject is discussed further under "water treatment plant" below.

8. No Quantitative Predictions for Effects of Blasting Residues

No predictions have been made for nitrogen-species concentrations produced by blasting. Since ammonia, nitrite and nitrates are all toxic to aquatic life under varying conditions, this is a potentially serious impact which has received no proper assessment.

All waste rock and ore mined by Diavik will have a residue of nitrogen species coating the blasted rock. This residue is easily mobilized by water and wind, and will be released into the environment by these forces. Run-off from the waste rock piles will likely carry high levels of ammonia, nitrites, and nitrates. Similarly, rocks used to construct the dikes in Lac de Gras will have coatings of these compounds which will wash into the lake.

At BHP's Ekati mine elevated concentrations of nitrate and ammonia have already had effects in downstream waters from blasting and construction activities. At Slipper Lake, the last in a series of lakes in the Koala watershed downstream from the mine site, and where BHP predicted no discernible environmental effects for the duration of the 25-year project, 1998 surveys documented increased phytoplankton growth, reportedly a result of elevated nitrates.

Diavik states that "there is no practicable method for predicting [nitrogen-species concentrations] prior to full-scale blasting."[9] This is incorrect— empirical approaches have been available for many years. In 1988 Environment Canada released a report which exhaustively investigated the issue and outlined a procedure

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9 *Site Water Quality Predictions*. p.2.

for predicting annual nitrogen loadings and effluent and receiving water concentrations from the use of nitrogen-based explosives.[10]

That study also discusses an issue of particular importance to the Diavik situation. In mines with wet pits, there is a greater use of slurries than ANFO explosives. While slurries have a lower initial nitrogen concentration than ANFO, they release considerably higher portions of it (6% compared to 1% nitrogen release for ANFO). Because of the predicted groundwater inflows to the pits, Diavik will likely be making excessive use of slurries, so that the nitrogen release problem may be even more significant. The study showed that for mines using greater than 20% slurry in their blasting requirements a fairly accurate prediction can be made as to nitrogen release.

Diavik could have provided a better picture of aquatic impacts by predicting nitrogen releases to the lake. Other jurisdictions routinely require such predictions to be made as part of project approval. Indeed, the Environment Canada study cited above was conducted specifically to facilitate regulatory review of nitrogen releases from blasting.

Diavik could also have examined the additive effects of nitrogen releases relative to the predicted exports of phosphorus to the lake (see discussion on phosphorus below). Empirical data (such as that now available from BHP's operation) could have assisted in this evaluation.

9. Data Inconsistencies

The geochemistry work provided a range of predicted concentrations for metals that might result in drainage from the waste rock dumps. Several scenarios were modeled to determine the effects of differently sized waste stockpiles (50 million T vs. 200 million T), varying biotite schist content (0% to 10%), varying grain size distributions (2 alternatives), and differing lengths of exposure (28 days to 308 days). As a result, for each water quality parameter a range of concentrations was identified.

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10 Ferguson, K.D. and S.M. Leask. *The Export of Nutrients from Surface Coal Mines*. Regional Program Report 87-12. Environment Canada, Conservation and Protection, Environmental Protection, Pacific and Yukon Region. March, 1998.

Parameter	Geochemistry Predictions [11]		Water Mgt Plan [12]	
	Lowest Value	*Highest Value*	*Lowest Value*	*Highest Value*
Aluminum	0.00205	109	0.015	4.8
Antimony	.0168	1.58	not mentioned	not mentioned
Arsenic	0.00632	0.657	not mentioned	not mentioned
Chromium	0.0007	0.6	not mentioned	not mentioned
Cobalt	0.132	15.9	0.006	1.0
Copper	0.02	20.1	0.004	1.7
Manganese	0.112	54.5	0.018	4.6
Molybdenum	0.0239	9.14	not mentioned	not mentioned
Nickel	0.469	81.1	0.065	4.0
Uranium	0.073	6.71	0.029	0.25
Zinc	0.471	23	0.005	1.4

TABLE 3. Comparison of Waste Rock Drainage Predictions between Diavik's *Site Water Quality Estimates* and the *Water Management Plan*. Units = mg/L.

Table 3 illustrates the ranges of a selected number of metal concentrations predicted in drainage from the waste rock stockpiles (columns 2 & 3), and compares these with the estimated concentrations (columns 4 & 5) presented in the *Water Management Plan*. The highest values shown in column 3 generally represent the short-term (i.e. 28 days) unequilibrated leaching rate for the 200 million tonne waste rock pile containing 10% biotite schist.

There appears to be a huge discrepancy between the high estimates from the geochemistry testwork, and the high estimates presented in the *Water Management Plan*—both supposedly characterizing the same thing.

When questioned about this discrepancy, Diavik stated the *Water Management Plan* was assembled prior to the completion of the *Site Water Quality Estimates*, necessitating the former's use of data from an earlier, "draft" version of the latter. Diavik noted that,

> "The primary purpose for the water quality numbers was to establish, in the Water Management Plan, that run-off from the country rock stockpile required active collection and treatment."[13]

If the *Water Management Plan* is used as the basis for assessing the demands on the water treatment plant, design requirements will be significantly underestimated if column 3 more accurately reflects resulting country rock run-off.

Another example of underestimating the water quality problem arises in relation to the proportion of biotite schist in the waste rock . A conservative approach would have made predictions for biotite schist concentrations higher than 10%. There is

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11 *Site Water Quality Predictions.* Data from Tables 1-6, Sec.5.

12 *Water Management Plan.* Table 2.4

13 Letter to T. Pearse from Murray Swyripa. May 20, 1999.

some geological evidence that biotite schist occurs up to 20%, and Diavik admits that up to about 17% is expected in the vicinity of the A154N pipe with an average of 11.6 % in that open pit.[14] The average concentration in the north waste rock pile is greater than 10%, while the south waste rock pile apparently has no schist.

Another uncertainty is raised by the conclusion in *Site Water Quality Estimates* that, since the majority of dissolved constituents is derived from biotite schist, the "effects would be magnified if the schist preferentially reports to the fine fraction, as is expected." This is an acknowledgment that metal concentrations in waste rock drainage could be higher than predicted, but by how much we do not know.

Finally, the geochemistry predictions assume that the 28-day kinetic test represents leachate quality of newly deposited country rock, the 154-day leachate a pile which has weathered for less than 10 years, and the 308-day leachate a pile which has weathered for more than 10 years. There is no scientific basis for making this correlation and Diavik has not provided the rationale for using it. Past attempts at using such inappropriate short-term information for making long-term predictions have been rejected by government regulators. Furthermore, since country rock will be placed in piles on an ongoing basis for many years, the 28-day leachate, if it were accurate, would apply until deposition stops permanently.

Given the host of uncertainties presented above with respect to the estimates of drainage that might result from the waste rock piles during operation of the mine, it can be concluded that the concentrations of acids and metals, as well as the oxidation and leaching rates, predicted by Diavik appear to have been consistently underestimated.

Drainage from the waste rock dumps has not been adequately described for the purposes of environmental assessment and approval.

As a result, the predicted water quality in the tailings pond may underestimate overall metal concentrations, and the estimates of water treatment plant feed quality given in the *Water Management Plan* and the *EA Overview* would also be in error proportionately. More importantly, the discharge concentrations used for the assessment of impacts to water quality and aquatic life are questionable, and little reliance can consequently be placed on the assessment.

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14 Dave Blowes quoted in Yellowknife Technical Sessions, January 25, 1999.

PROPOSED MITIGATION & MANAGEMENT

Biotite Schist Management Plan

If the problematic schist occurred as a discrete geologic unit within the granite, it could likely be separated during mining operations and managed on-site so as to prevent net acid generation. However, Diavik's geological work indicates that the schist is scattered throughout granite, with the result that the company does not anticipate being able to easily isolate it. Diavik has therefore proposed not to separate the schist, but to deposit it mixed with the rest of the country rock and collect and treat all drainage from the dumps in a water treatment plant.

During the community technical sessions, the consultant for DIAND Water Resources raised some concern about this. In response Diavik submitted a *Biotite Schist Management Plan* which envisions the segregation of some of the schist and its deposition into Lac de Gras on the external side of the dikes as a way of mitigating acid production and metal leaching.

It is not clear whether this plan will be implemented. At any rate, its feasibility can be questioned. Diavik's calculations show that the oxidation rates of subaqueous disposal of the schist are only reduced by about 50% as explained in the *Biotite Schist Management Plan.* While this does not seem intuitively correct, if true and proportional it would mean that the effluent resulting at the submerged rock surface would generate a pH of 3.0 as opposed to 2.7 under surface conditions, still far too acidic. Thus, disposal of the schist in Lac de Gras does not appear to be much of an improvement and would, in fact, lead to a significant metal leaching problem in the lake.

Additionally, no assessment of water quality and biological effects of this plan has been made. The consequences of its implementation to Lac de Gras are unknown.

Security of Containment

The waste rock dumps will be contained within a perimeter of drainage ditches and collection ponds to capture any surface run-off and seepage from the dumps before it escapes into the lake. Table 3 shows that the range of metal concentrations in this drainage is serious enough that run-off must be controlled and treated.

Diavik assumes that the rock underlying the waste rock piles is impervious due to permafrost. Boreholes have measured permafrost depths on east island to greater than 300 metres, although insufficient drilling has been done to prove the assumption that permafrost forms an impermeable barrier across the footprint of the proposed disposal area. Diavik has presented no evidence to show that permafrost acts as an impermeable barrier to the movement of groundwater. In fact, permafrost contains unfrozen water, and does not have zero hydraulic conductivity. Additionally, the

existence of an active layer which is thawed during summer months, or upon exposure to heat-generating rock, will make impermeability difficult to achieve.

Diavik's geological work suggests that east island bedrock is characterized by extensive sets of fractures and joints, and diabase dykes which may make groundwater movement possible and even rapid. The assumption of perfect groundwater impermeability below the waste rock piles due to permafrost is not conservative. Mitigation of leakage will be extremely difficult to achieve, particularly since it is likely to be discovered only after escape into the environment has occurred.

No upset scenario for escape of waste rock drainage into the groundwater has been assessed. Similarly, no upset scenario for the surficial escape of effluents from the waste rock collection system overland to Lac de Gras has been evaluated.

DIAND Water Resources observed that Diavik had not properly documented the distribution of massive ice in the soils which are common in this environment.[15] Diavik's borehole data reveal surficial ice deposits up to 25%, concentrations which could easily render the perimeters and bottoms of ponds thaw-sensitive and destabilize rock dumps overlying ice-rich soils. As DIAND noted, the perimeter collection system has not been adequately designed to account for surficial ice, and thus its long-term performance is uncertain. Where ditches are excavated in ice-rich ground liners may rupture following loss of support where ground thaws, and effluents escape into the environment.

Regulators are accustomed to treating the detailed design of mine components such as drainage collection systems at the permitting stage. This is not something that should happen here. The circumstances in this case are unusual—the hazard and uncertainty of success are high, flexibility and contingency options are rare, and consequences to lake ecology significant. The drainage collection system, and the water treatment plan, are the key components for environmental management of toxic mine drainage on the site. It is vital that the design of this system, and its ability to handle upset conditions, be carried forward at the environmental review stage in enough detail so that its effectiveness in containing run-off can be demonstrated. A verbal commitment by the proponent to review the design, and to leave the issue to the regulatory stage, is not an acceptable approach to environmental approval.

CLOSURE ISSUES

Diavik recognizes that the geochemical tests have shown that metals and other solutes can be expected to be leached from the waste rock dumps "for decades after closure of the stockpiles." Unless these predictions prove inaccurate, Diavik will have

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15 Technical Review. DIAND Water Resources. March 8, 1999

to collect the run-off and send it through a water treatment plant for some unknown time into the future.

Diavik proposes a possible mitigation measure to improve waste rock drainage at closure—a cap over the dumps composed of crushed rock of low permeability. This would raise the active layer out of the waste rock dump and into the cap, allowing the waste rock to freeze. Precipitation would thereby be prevented from draining down through the underlying waste rock, although Diavik indicates several decades would elapse before this freezing, if it occurs at all. This cap eventually would shed water to the surrounding tundra and drain into the lake.

Alternatively, the water treatment plant would be kept operating and waste rock drainage would be collected and treated until water quality standards were met at some indeterminate point in the future.

Diavik conducted thermal modeling on theoretical granite waste dumps, and the results showed that the piles would eventually freeze by permafrost aggradation. However, there is substantial doubt that this would occur. As Morin notes in his review, when sulphides like those pervasive at Diavik oxidize, they give off heat which can prevent freezing. In the 1970s, the Geological Survey of Canada documented non-frozen conditions in sulphide-bearing deposits within continuous permafrost, and drainages from these deposits reached pH's less than 4. The Survey has stated that permafrost is not an acceptable mitigation measure to control sulphide oxidation. [16]

Two years ago, the Canadian MEND (Mine Environment Neutral Drainage) Program sponsored an international ARD/permafrost literature review, followed by a symposium in Edmonton, which showed that significant metal leaching and/or ARD can and does occur in permafrost regions, for understandable reasons. This work revealed that sulphide-generated heat had not been incorporated into any freezing models up to that time. Interestingly, the Diavik modeling is said to include such heat (*Country Rock Management Plan*, Section 4.3.2), but no details are given on how it was included, nor is there any evidence that the work has been peer reviewed.

We asked Diavik whether convection, a known phenomenon occurring inside waste rock dumps, had been incorporated into their model. Their response was to identify several mechanisms causing oxygen transport that had been incorporated in their

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[16] Cameron, E.M. 1977. "Geochemical dispersion in mineralized soils of a permafrost environment." Journal of Geochemical Exploration. V.7. pp.301-326. See also Cameron, E.M. 1979. "Effect of graphite on the enhancement of surficial geochemical anomalies originating from the oxidation of sulphides." Journal of Geochemical Oxidation. V.12. pp.35-43; and Dawson, R.F., and K.A. Morin. 1996. *Acid Mine Drainage in Permafrost Regions: Issues, Control Strategies and Research Requirements*. Canadian MEND Report 1.61.2.

model, but there was no explicit mention of attempting to simulate convection, which occurs as small-scale differentiated cells throughout a sulphide-bearing rock pile, as one of these.[17] The modeling is, thus, unreliable for this reason.

More recent work has shown that natural oxygen uptake and acid generation in sulphide-rich soils in the high Arctic (Greenland) can be of the same order of magnitude as that found in mine tailings in temperate regions, producing drainage that is strongly influenced by the release of acid and metals.[18]

The onset of heat-generating sulphide oxidation in the biotite schist could happen very quickly according to Diavik's kinetic tests, long before the piles are completed and reclaimed. Capping the rock after heat generation, acid generation and/or metal leaching has commenced will be even less effective if that occurs. In predicting waste drainage from the dumps after closure, Diavik examined only drainage from the cap, and did not include what perhaps will be the more significant component of drainage through the waste rock itself.

Any dependence on freezing for mitigation in the rock piles, based on this thermal modeling, is suspect. Anyway, water treatment will be required for decades after decommissioning even if freezing is eventually successful. More likely, water treatment will be required much longer into the future than this since freezing is unlikely to happen.

KIMBERLITE AND WATER QUALITY ISSUES

Under the proposed project some 26 million tonnes of kimberlite will be brought to the surface and stored in tailings containment area (PKC) located between the two waste rock dumps on east island. [19]

About 40% of the kimberlite will be trucked from the mill to the tailings area as a coarse fraction (>1mm grain size), while the remainder will be pumped as a slurry to the tailings pond. A kimberlite ore stockpile will be located at the mill.

If water balances are correct and no ice accumulates, effluent in the tailings pond will be stored until about the year 11, and then discharged on a continuous basis to the lake after being treated in the water treatment plant. Some intermittent discharges from the treatment plant will occur between start-up and year 11. Diavik has

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17 Letter to Violet Camsell-Blondin from Murray Swyripa. May 14, 1999.

18 Elberling, B. and B.R.Langdahl. "Natural Heavy-metal Release by Sulphide Oxidation in the High Arctic." *Can. Geotech. J.* 35:895-901 (1998).

19 *PKC Management Plan*. September, 1998. p.9. The Plan notes that the impoundment will be designed with a 15% contingency for a total of about 36.7 million tonnes.

committed to having a water treatment plant in place as soon as possible after start-up to handle any needed discharge from the tailings pond.

WATER QUALITY PREDICTIONS

Kimberlite Effluents

The Diavik kimberlites apparently differ from the BHP pipes in that they contain significant quantities of mudstone as inclusions. These have high sulphide content—up to 6 wt % pyrite and an average sulphide content of 0.23% (N=72).

The mudstones appear to occur in a range of forms within the pipes as large blocks on one extreme, to a cemented fine-grained mud paste forming a matrix between chunks of kimberlite on the other extreme.

The exact amounts of the varying types of mudstone are unclear, since discrepancies exist in the descriptions of this rock among Diavik's technical reports. The geochemical reports place the abundance of mudstone at roughly 2-5%, and Diavik's *Environmental Assessment Overview* notes that the material is generally well distributed through the kimberlite as a paste that was assimilated into the kimberlite matrix.

On the other hand, the *Hydrogeological Assessment* identifies the "presence of continuous and discontinuous sub-horizontal layers of the mudstone observed within the kimberlite".[20] These distinct layers of mudstone are sufficiently prominent that they cause groundwater to move horizontally through the kimberlite five times easier than vertically, which is not observed for any other hydrostratigraphic unit at Diavik.

The average sulphide content of the mudstone is approximately 1.8% S (Diavik's *ABA Database*), whereas the kimberlite (containing some mudstone) averages around 0.26%S. Since the geochemical reports imply that kimberlite would be virtually devoid of sulphide without the mudstone, the 0.26% S indicates there is roughly 15% mudstone in the kimberlite, which is higher than stated in the geochemical report but is more consistent with the hydrogeologic study.

During the course of our review, it became clear that some confusion on this topic exists among Diavik's geochemistry and geology experts. The geochemistry consultants, responding to Morin's report [21], stated that there are "two units of mudstone which should not be confused." These comprise a pyrite-bearing Cretaceous mudstone and a non-pyrite-bearing volcaniclastic kimberlite mudstone.

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20 *Hydrogeological Assessment of Mining Operations, Diavik Diamond Project, NWT*. Golder Associates. May, 1998.

21 Morin, Kevin. "Review of Diavik Environmental Geochemistry as Defined in the Environmental Assessment Submission (September 1998)." March 8, 1999.

> "On the basis of additional review with Diavik Geology, it is estimated that the pyrite-bearing, Cretaceous mudstone and siltstone are present only as discontinuous xenoliths that comprise not more than 2% to 5% of any mineable unit of the kimberlite pipes." [22]

When questioned further on mudstone abundance and distribution, Diavik retracted the notion of two types of mudstone, but clarified that mudstone does occur in two of the rock units. There is, first, a defined mudstone unit that occurs as discontinuous xenoliths (large and small chunks) within the kimberlite. There is also a volcaniclastic kimberlite which is subhorizontally bedded, and which contains "variable amounts of inter-dispersed mudstone."[23]

While Diavik has provided estimates ranging from 2 to 8% for the amount of the mudstone unit present, no estimate is provided for the amount of mudstone occurring as "paste" or groundmass in the kimberlite units. This very fine-grained form of occurrence is, as the company readily admits, "difficult to accurately estimate with the naked eye." Since during its emplacement the kimberlite exploded through a sequence of unlithified sulphide-bearing muds, it is conceivable that significant quantities of this material are incorporated into the kimberlite rocks in the forms described by Diavik. No information has been provided on the overall aggregate amount of mudstone that may be present in the kimberlite rock brought to surface. However, Diavik's statement that mudstone unit forms only 2-8 % of each pipe remains at odds with, first, sulphide levels which indicate that total mudstone comprises around 15% of the pipes and, second, the *Hydrogeology Assessment* which discusses "continuous and discontinuous sub-horizontal layers of the mudstone."

Diavik tested only one sample of the mudstone unit kinetically (and mineralogically). They contend that this is sufficient to describe representative behaviour of the mudstones under weathering conditions.

The kinetic and mineralogical work showed that the kimberlite contains abundant fine-grained clays (smectites) produced from alteration of the rock, and that the rock will weather extremely rapidly and produce additional smectite.

Diavik's geochemical reports confirm that if oxidation of processed kimberlite occurs then drainage with high concentrations of dissolved sulphate and metals (nickel, cobalt, copper, zinc, cadmium) will result and will require treatment. Since kimberlite will be exposed to air and moisture (sub-aerial disposal of coarse tailings fraction and beached fines), this prediction will come true.

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22 Logsdon, M. and David Blowes. *Response to Comments: "Review of Diavik Environmental Geochemistry as defined in the Environmental Assessment Submission, September, 1998, by Minesite Drainage Group, dated March 8, 1999.* Technical Memorandum to Mike Baker. April 8, 1999.

23 Letter to Violet Camsell-Blondin from Murray Swyripa. May 14, 1999.

Despite Diavik's current commitment to milling all mudstone, there may be a strong temptation on the part of pit operators, if large volumes of barren mudstone are encountered, to truck this material directly to the tailings disposal area for sub-aerial deposition with the coarse tailings fraction. Even if milled, however, the deposition of large concentrated volumes of mudstone tailings with either the coarse or fine tailings fraction greatly increases the potential for rapid oxidation of pyrite, particularly during the summer months.

The neutralizing ability of the kimberlite is considered by Diavik to be available to neutralize any acid that may form from oxidation of the mudstone sulphides. Given the unlikeliness of a uniform "blended" deposition of mudstone and kimberlite tailings, however, it is uncertain how quickly and thoroughly the mitigation of sulphide oxidation in the tailings area will be achieved. More likely will be a significant increase in the levels of metals and sulphates in the pond, at least in specific locations, above Diavik's predictions.

Water in the PKC will present a greater environmental hazard, and a more challenging prospect for water treatment, than predicted by the company.

Plant Process Water

Diavik proposes to recycle water up to 9 times within the diamond processing plant. Tests were conducted by Golder Associates to identify how the chemical nature of the water might change during the recycling process. This is important in order to know the quality of the process water that will be discharged to the tailings pond at the end of the 9 cycles so that accurate predictions of pond water quality can be made. This, in turn, should inform the design of the water treatment plant.

To conduct the simulation, lake water from Lac de Gras was used as the starting water for testing two kimberlite solutions. The results were that some parameters (alkali metals, conductivity, total dissolved solids, sulphate) increase linearly with each cycle, while trace metals (cadmium, chromium, copper, aluminum, cobalt and zinc) remain low throughout the 9 cycles. No information was provided for suspended solids (clays).

There are two significant uncertainties about the usefulness of these results. First, Diavik proposes to draw the bulk of its plant process water from the tailings pond, not the lake.[24] If this is the case, the process water will clearly be of a different quality than the lake water used in the tests, and it will already have a higher concentrations of metals, dissolved and suspended solids from previous cycles and waste rock drainage. Since data from Golders' simulation were also used to calculate

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24 *Fish and Water Environmental Assessment*. September 1998. p.2-17.

ultimate tailings pond water quality, it is conceivable that Diavik's predictions for PKC slurry and pond water likely significantly under-estimate concentrations of many parameters. DIAND also noted that the potential build-up of contaminants within the water management system, including the recycling of process kimberlite supernatant and mill process water, was not adequately addressed in the environmental assessment.[25]

Second, the bench test preparations of crushed kimberlite "scrape-up" samples do not accurately represent the material that will emerge from the processing plant, as explained below under "kimberlite toxicity". A much higher concentration of ultra-fine-grained clays and increased levels of total metals can be expected to characterize plant process water.

KIMBERLITE TOXICITY

The issue of whether or not effluents from diamond mining in the Ekati region are toxic to aquatic organisms is not yet settled. On a number of fronts, research into this topic is still being conducted. All research to date has demonstrated some toxicity to aquatic life from kimberlite effluents under various conditions.

Diavik's Investigations

In 1996 Golder Associates conducted a series of tests on water samples from various components of Kennecott's (Diavik's predecessor) underground exploration program to determine toxicity to aquatic life.[26] Water samples from the granite country rock, mine face, kimberlite floor, grout, discharge site, ice, processed kimberlite and water treatment plant were tested. With the exception of the kimberlite floor, the tests showed that water arising from natural sources and water associated with mining activity uncontaminated by grout appeared to have "very low toxicity".

The kimberlite floor sample, contaminated by grout and other materials from mining, "is markedly toxic". Water characteristics of the sample were high pH, ammonia-N, total aluminum, and suspended solids. Blasting residues were thought to be the source of the ammonia-N, while the grout contributed the high concentrations of the other variables.

Reducing the pH of the sample was shown to be effective in reducing its toxicity. Curiously, the filtration of suspended solids in the lab appeared to result in increased toxicity to rainbow trout used in the tests, while it had the opposite effect in the field. Golder notes that "the mechanism behind this pattern is currently not known."

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25 DIAND Technical Review. March 8, 1999.

26 *Summary of Toxicity Test Results for Diavik Site.* Golder Associates. July 1996. 9pp plus tables and data.

Overall, it is concluded that the water treatment plant set up for the bulk sampling of A154 and A418 pipes has "been consistently effective at eliminating toxicity of the mine discharge water." Although the "data have also consistently demonstrated the reduction of these potential sources, and toxicity through effective water treatment, both the sources and the reduction of toxicity need to be confirmed with further testing."

The report notes that since sample collection and shipping methods were not followed or documented according to Environment Canada standards, some of the data presented would not meet QA/QC requirements for regulatory compliance. "A series of tests that more rigourously follow accepted protocols would ensure that toxicity data submitted by Kennecott will withstand regulatory scrutiny." Uncertainties arise not just from the administrative tracking procedures described, but also from possible chemical changes that may occur during the handling process. As Mills has previously noted, "sample history, particularly pH and chemical conditioning, and age are critical in testwork involving clays."[27]

More importantly, the report recommends further work to reduce a number of uncertainties arising from the first set of tests. It is notable that the main issues still have not been resolved. Questions posed to guide the new work are:

1. Is the water arising from the mining activities toxic, and likely to have a toxic effect on the receiving environment?
2. If the various water(s) is/are toxic, what are the factors that contribute to this toxicity?
3. Can these factors be effectively controlled at the source, or through treatment?

BHP's Investigations

BHP has recently conducted toxicity tests using simulated kimberlite solutions. The results show that toxicity can vary greatly between different pipes. Panda kimberlite was not toxic to rainbow trout, *Daphnia magna*, or green alga at the highest concentration achievable (200 mg/L). Fox kimberlite was acutely toxic to all species tested at suspended solids concentrations above 660 mg/L.

Tests for longer-term chronic toxicity (exposures of 50 mg/L and 500 mg/L of Fox kimberlite) revealed a build-up of nickel and aluminum on gills of rainbow trout (15-fold and 40-fold, respectively), plus some build-up of these two metals in kidneys, liver and muscle tissue. Arsenic, cadmium, chromium, nickel, lead, selenium and

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27 Chris Mills. *A Critical Technical Review of the Acid Rock Drainage (ARD) and Some Tailings Management Aspects of the BHP Diamonds Inc. Application for a Northwest Territories Class A Water Licence*. October 1996. 19pp.

mercury were observed at or below detection limits in fish muscle following exposure to 500 mg/L Fox kimberlite for 30 days.

BHP concludes that the regulated discharge level of 25 mg/L on its water licence is sufficient to protect the aquatic environment.[28]

The Independent Environmental Monitoring Agency has called into question the accuracy of BHP's toxicity tests since they were conducted with "simulated" tailings (i.e. prepared in a lab by dry crushing and screening kimberlite rock) as opposed to real tailings. The Monitoring Agency noted in its last year's annual report that dry crushing and screening produces minimal break-up and liberation of the clays, and that a comparison of the grain size distribution of this material with actual tailings generated from the bulk sample plant revealed that 40% of the latter was less than 75 micrometres (µm) while only about 20% of the simulated tailings were finer than 75 µm.

The Monitoring Agency concludes that simulated tailings (especially those from Fox-like kimberlites) are inappropriate materials for predictive testwork where sample surface area is likely to be a factor in the interpretation of results. This is particularly true for dissolution or reactivity studies such as geochemical characterization and toxicity analysis.[29]

Notably, now that BHP is discharging tailings into its Long Lake facility, Environment Canada is proposing continuing field work to further describe the toxicological properties of actual kimberlite effluents. Since the project is not yet started, it will be sometime before the results of this are known.

DFO's Investigations

Prior to the BHP work, DFO conducted two studies of kimberlite toxicity in 1995 and 1997 under Jack Klaverkamp. Besides demonstrating the toxicity of some kimberlite effluents (actual tailings from bulk sample plant), the results showed that metals such as cadmium, chromium, iron, nickel and zinc may play an important role in the toxicity of kimberlite. In the 1995 studies, it was demonstrated that fish which die when exposed to kimberlite effluents had very large increases in concentrations of six metals in their gills. When compared to control fish, those exposed to kimberlite effluent had 54 to 115 times the aluminum, 42 to 62 times the barium, 35 to 221 times the chromium, 29 to 46 times the iron, 85 to 168 times the nickel, and 5 to 6 times the cobalt (depending upon whether the kimberlite came from Fox pipe or Misery pipe).

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28 *Environmental Report* for 1998. BHP.

29 Letter to BHP from Independent Environmental Monitoring Agency. April 1, 1998.

In a review of BHP's recently completed toxicity work, Klaverkamp noted that when BHP interpreted its results, it selected the one suite of tests that gave the lowest increases in metal concentrations relative to control effluents. For example, BHP reports metal accumulation 15-fold above control using "RO water" as the control, although other tests using "lab water" as the control reveal increases from 18 to 40-fold higher. Klaverkamp also noted that, while essential, results of chromium and cobalt accumulations on gills of fish exposed to Fox effluents were not reported.

Most importantly, Klaverkamp disagrees with BHP's conclusion that the regulated discharge level of 25 mg/L for total suspended solids (TSS) is sufficient to protect the aquatic environment. "Additional studies on the toxicity of mixtures of aluminum, iron, nickel, chromium, and cobalt to fish would be necessary to validate (BHP's) conclusion that toxicity is entirely due to TSS, and that regulating TSS is all that is required." [30]

The issue of whether metals associated with the clays will play a role in acute or chronic toxicity to aquatic life is unresolved at this time. This may have serious implications for the treatment plant performance and long-term health of aquatic life in Lac de Gras, since a discharge of 25 mg/L total suspended solids (clays) with significant quantities of suspended metals will introduce a much greater hazard to the lake than has been assessed by Diavik.

PROPOSED MITIGATION & MANAGEMENT

Effluent in the tailings pond will consist mostly of run-off from the waste rock dumps, drainage from the coarse fraction of tailings deposited above the water line in the impoundment, mill process water originating from the PKC, and run-off from the plant site and ore stockpile.

Diavik's water management plan is to begin discharging this effluent on a continuous basis after treatment in the proposed water treatment plant, beginning in year 11 or so. Prior to this, intermittent discharges will occur from time to time as may be needed. Diavik commits to installing water treatment facilities as early as year 2 for contingency purposes and to refine the treatment process.

Almost no technical information about the proposed water treatment plant is presented in Diavik's documents. Brief generic descriptions of the two separate treatment circuits (pit inflows and PKC water) are provided. Diavik's position is that information pertaining to the performance of the water treatment plant is

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30 Memo to Julie Dahl from Jack Klaverkamp, dated March 10, 1999. Re: Aquatic Toxicity Associated with Diamond Ore (Kimberlite) Mining.

appropriately addressed at the water license application phase, not before. This is a dubious proposal. I discuss the issue below under "Water Treatment Plant".

Apart from this, other uncertainties exist about the capacity and long-term stability of the tailings impoundment to accommodate the tailings and water volumes that accumulate there by the end of the project. The following concerns are discussed:

- size of the PKC
- stability of the containment
- closure

Size of the Containment

The size of the tailings impoundment is clearly a critical factor in mine design and environmental planning. Unlike BHP's Ekati mine which has a lot of flexibility in terms of contingencies for handling unexpected volumes of tailings, the Diavik site is very limited. In fact, once the site is configured, the only apparently feasible option for increasing tailings storage is to raise the perimeter structures to allow a greater depth of tailings. For the PKC design to be acceptable, Diavik must demonstrate that they have a workable contingency for unexpected increases in tailings volumes.

Diavik states that the impoundment was initially designed for a 15% contingency above what was required for their early estimates of 32 Mt of kimberlite tailings. They have since decreased their projected tailings disposal to 26 Mt, but will be maintaining the original size of the containment. This, they contend, should be ample contingency to handle unpredicted increases in storage capacity.

There are at least 3 reasons why Diavik may have under-estimated the size of the containment. First, tailings deposition may be characterized by massive ice buildup on the beaches. Second, Diavik may have over-estimated the amount by which the tailings will consolidate and reach an acceptable density, so that planned storage volume may not be available. Third, miscalculations in the water balance, particularly with respect to the efficiency of water reclaim for the process plant, may under-estimate storage. These three effects are discussed separately below.

Glaciation

The formation of large masses of ice in tailings slurries as they are deposited during the winter months is a very real and significant problem in this environment. Already, during their first winter season's operations, BHP has experienced tailings ice formation to the point that deposits in cell B were piling up and almost overflowing the cell at its upper end. BHP was forced to into an emergency re-routing of tailings to cell C for a period of time sufficient to install a new deposition point in the lower end of cell B where some open water was located. Discharge under water in a small

remnant of Long Lake that fortuitously lies just upstream of dike B provided an ability to get the tailings discharged without freezing. Surveys are being undertaken this spring to assess the significance of the ice buildup for on-going tailings management.

If ice remains during the summer, then that represents water that cannot be drawn out of the pond, with the result that there is less overall room for tailings. There are several examples in the north (eg. Lupin and Rabbit Lake) where tailings glaciation has occurred and where, as a result of this, water cannot be reclaimed. BHP has lots of contingencies, since it has a number of cells in Long Lake to use if necessary. Diavik's confined configuration on east island appears to offer only one contingency—raising the impoundment dams. Diavik has not demonstrated that this is a feasible contingency in the case at hand (see discussion below on "Stability of Containment"). Given the tight spatial constraints on east island, a viable contingency must be demonstrated for environmental approval.

By the end of its review Environment Canada was still not convinced that the containment facility could do the job. In its submission to the *CSR* the agency recommended that the performance of the proposed tailings facility "be thoroughly monitored" to confirm all processed waste material can be contained within the impoundment, and that burial of ice will not cause a premature filling of the structure.[31] This misses the point about contingency measures. What will Diavik do if ice build-up in the tailings pond becomes a problem? What is the sensitivity of the water balance to such an event?

Tailings Density Estimates

A concern was originally raised by DIAND Water Resources that Diavik may have over-estimated its calculations of settled tailings densities in the impoundment.[32] If tailings did not consolidate to the predicted density values, less storage in the impoundment would be available, and the PKC footprint may have to be increased.

This matter appeared to have been resolved at a January technical meeting in N'Dilo,

> "Diavik verbally reported that ore production levels would be reduced by approximately 30% below original levels, thereby mitigating possible increases in PKC pond volume requirements—and reducing the volume of recycle and make-up water required. Original PKC design pond volumes would be maintained to compensate for possible increased

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31 Environment Canada Post-Technical Session Recommendations. March 31, 1999. See also Interim Report - Environment Canada. February 22, 1999

32 Technical Review. DIAND Water Resources. March 8, 1999

> volume demands required by the application of revised bulk density assumptions." [33]

A reduction in ore production volumes would reduce the rate at which tailings would be emplaced in the impoundment, but it would not necessarily reduce the total storage volume required by the end of the project (unless the mineable reserves were also reduced). Besides, a verbal commitment to reduce production levels, thereby mitigating the storage problem and the associated environmental risk is a rather speculative mitigative measure. More assessment of this issue is required.

Water Balance

Inarguably, the water balance is key to the successful operation of the water management system. During the government's comprehensive study process the Responsible Authorities' (RAs) comments at the end of the technical review stage revealed that a fully rationalized water balance for the project was still not in place.[34]

Diavik did provide a sensitivity analysis for its water balance. It was asked to run the water balance for consecutive "wet" years, and also consecutive "dry" years. To do this, Diavik increased the mean annual precipitation by 10% for 6 consecutive years for the "wet" scenario, and decreased it by 10% for 6 consecutive years for the "dry" scenario. Adjustments of 10%, while perhaps illustrating the sensitivity of the water balance to changes in precipitation, do not fully represent the range of variability that has occurred at the site, much less the variability that might be expected over the next quarter of a century.

For example, BHP reports 1998 annual precipitation at their site almost exactly equal to the mean annual of 373 mm used by Diavik in their water balance. However, for the two previous years annual precipitation was recorded at 519 mm (1995) and 510 mm (1996)—amounts some 37-39% higher. Similarly, a relatively dry year (1994) recorded only 280 mm—some 75% of Diavik's mean annual value.

Environment Canada noted that limited on-site precipitation data results in considerable uncertainty in surface water gains at the mine. Precipitation measurements over the last few years "appear of relatively poor quality for a parameter that is so important to the design and operation of the mine."[35] *(emphasis added)* They also observe that climate change may well be a factor over the lifetime of the mine.

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33 *CSR*. May 4, 1999. p.38.

34 *CSR*. May 4, 1999.

35 Interim Report - Environment Canada. February 22, 1999.

A proper test for sensitivity would have adjusted the environmental inputs to establish the limits of the water management system, and would have included investigation of a "worst case" scenario so as to define the limits of the system. How far can the water balance be perturbed and still operate safely? Instead of a 10% precipitation increase over 6 years, what would, say, a 40% increase over 6 years do to the system?

A final consideration regarding the accuracy of the water balance lies in the high probability that the tailings pond water will have high levels of non-settling clays (See further discussion of smectite clays under "Water Treatment Plant" below). Reclaim water for the process plant may not be a reality, and fresh make-up water from Lac de Gras may be required to meet total needs. What is the effect of this likely situation on the water balance? We simply do not know what the safe operating limits of the containment, and the water treatment plant, will be. There is no consideration of this issue in Diavik's assessment.

Stability of Dams

Government reviewers have called into question the stability of the foundation in areas where Diavik proposes to construct frozen-core dams to contain tailings in the low-lying portions of the impoundment. DIAND, for example, noted that the west tailings dam needed to be reassessed because of the presence of ice-rich foundation materials which could lead to deformation of the dam in the future. [36]

DIAND further noted that there is a "deformation-sensitive" aspect of the dam design which the company admits would make raising the dams very difficult in the future. Raising the dam height is the one theoretical contingency the company has for managing higher-than-expected PKC volumes. Without an effective contingency Diavik's water management system is not environmentally sound.

Security of Containment

As with the country rock piles, Diavik has made the assumption that the tailings impoundment is underlain by permafrost which forms an impermeable barrier to the downward movement of tailings water once the facility is operating. This is not a conservative assumption.

To begin with, we have a substantial environmental hazard in the impoundment—tailings effluents which Diavik has acknowledged must be treated prior to discharge. We also have potentially significant adverse consequences. If effluent should escape into the groundwater system, through unfrozen fractures, faults, or other hydrologically connected zones, then major adverse impacts to Lac de Gras are

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[36] Technical Review. DIAND Water Resources. March 8, 1999

possible. What stands between these two endpoints for environmental protection is an assumption which has not been tested.

Diavik admits they have not fully accounted for the potential for leakage from the impoundment through features in the rock. The company states, rather, that their approach will be to carry out a detailed site investigation, and to address the issue of potential leakage at the construction stage. [37]

More worrisome is that the company's geological information reports the existence of a fault running through the impoundment valley. Diavik notes that it has reviewed the available information on the fault and found that:

- the fault is very old and there is no concern about further movement; and
- future drilling will determine if there is a potential for the fault to provide a means of leakage from the impoundment.[38]

This no great assurance. The company seeks approval to construct a permanent disposal facility for 26 Mt of potentially hazardous material on the assumption that containment will be secure, even given the existence of an uninvestigated fault which conceivably could provide an effective means of escape for tailings effluent.

Diavik reportedly examined 3 alternatives for the construction of the tailings containment, two of which included a low permeability liner under the pond. Indeed, one of the company's consultants on conceptual design of the tailings impoundment automatically assumed that the PKC would have a liner installed. [39]

Even though Diavik determined that the 3 options are technically and economically feasible, the company selected the option that did not include a liner. Selecting a containment option that relies on the assumption that permafrost will prevent seepage, instead of the option that would greatly reduce the risk of this happening, is not conservative.

Freezing of the Tailings Pond

During operations, the tailings pond will remain essentially unfrozen. At closure, Diavik plans to remove all water from the pond and run it through the water treatment plant prior to discharging it into the lake. Similar to the plan for closing the waste rock dump, it is proposed that a cap be placed over the tailings to prevent inflow of precipitation. Over time, Diavik contends, permafrost will aggrade into the pile which will help to reduce geochemical reactions in the tailings pile and, therefore, mitigate post-closure water quality problems.

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37 Les MacPhie. Ndilo Geotechnical Sessions. January 28, 1999.

38 Les MacPhie. Ndilo Geotechnical Sessions. January 28, 1999

39 Klohn-Crippen. Conceptual Design of Processed Kimberlite Disposal Facility. October 22, 1997.

However, the extent of freezing is uncertain. Diavik admits that the unfrozen pond during the operation may thaw the underlying permafrost to a "shallow" depth, particularly in the central part of the basin. The company also agrees that, as permafrost aggrades downward into the pile, increased pore pressure may force unfrozen tailings water to escape the pile. No planning for this contingency has been done at this stage.

The issues regarding the success of freezing, especially in the presence of heat-generating sulphide minerals, as found in the mudstones included with the kimberlite, were discussed above. It is not known whether the mudstone tailings will report to the fine or coarse fraction, but if the high smectite content is any indication, it can be expected that they will deposited in the pond as part of the fines fraction. Hotspots of sulphide content may occur, and thus it is likely that some unfrozen net-acid-generating material will exist within the tailings facility at closure. The probability of this event and its significance for post-closure environmental management have not been assessed.

Natural Resources Canada (NRCan) raised similar concerns about the uncertainty of how freezing would progress through the tailings following abandonment of the site. They noted that 50 years after abandonment the freeze line would only have penetrated 10 m into the kimberlite tailings. Freeze-back could be delayed beyond what is predicted, and there may be potential for excessive pore fluid pressures to expel metal-laden water to the surface of the pile during the freezing process.[40] This could happen long after the site has been abandoned.

PIT INFLOWS

As the pits are dug behind the water-retaining dams in Lac de Gras, groundwater from the wall rock will flow into them. This is water that has been stored in the bedrock for thousands of years. Diavik predicts that this groundwater will contain high levels of chlorides and phosphorus and low but detectable levels of dissolved metals in the groundwater (such as arsenic, cadmium, chromium, lead), and from the leaching of wallrock (aluminum, nickel, copper, cobalt and zinc).

Groundwater flows in the pits and underground workings will be by far the largest component of effluent discharge to Lac de Gras. These flows will be pumped to north inlet for settling before being filtered for total suspended solids in the treatment plant and discharged to the lake. The volume of flows will increase over the lifetime of the mine as the pits are deepened. The total volume of water produced in the

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40 NRCan's January 29, 1999 Comments.

mine workings ranges from 1500 m^3 per day to a maximum (about year 2020) of 34,200 m^3 per day during operations.

As groundwater stored in the bedrock under the lake eventually drains into the pits, it will likely be replaced by lake water which will flow down through the lake bottom sediments and into the bedrock, so that over time, Diavik predicts, infilling pit water quality will come to approximate Lac de Gras water quality.

Two key issues are critical for proper environmental assessment. First, we must have an accurate description of the range of volumes of pit inflow that might occur, since this has obvious implications for the storage capacity of north inlet, and the ability of the treatment plant to process the amounts in a timely fashion.

Second, we must have an accurate description of the likely quality of mine inflows, particularly with respect to metals. Once we have this, predictions can be made about the water quality the treatment plant will have to deal with, and the resulting discharge water quality to the lake.

As it turns out, uncertainties about both these issues are unacceptably high.

Hydraulic Conductivity and Calculation of Pit Inflows

Hydraulic conductivity is a measure of the volume of water that can move through the rock in a given time period—specifically, it is defined as the amount of water that one square metre of rock will pass under a specified pressure in one second. A number of factors control the rate of water movement, but one of the most important is the density and continuity of fractures or joints within the rock.

In order to determine the flow rates of groundwater that could be expected within the pit zones, Diavik drilled a number of boreholes to measure the hydraulic conductivity of the rocks. The boreholes show a wide variation in flow rates in which the fastest rate is 1 million-fold the slowest (6 orders of magnitude). [41] This is a tremendous range in groundwater flow rates. To illustrate, if a snail moving 1 foot per hour represented the slow extreme, a car traveling 190 miles per hour represents the fast extreme.

Fractures in the rock can greatly increase groundwater flow rates. For example, in a one square metre area of pit wall with the lowest measured conductivity, a 1 micron wide fracture would double the inflow using Diavik's range of conductivity.

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41 *Water Retention Dikes Design Report*. Acres International. August, 1998. p.3-16. This report notes that hydraulic conductivities in the bedrock range from 3.00×10^{-8} to 1×10^{-3} cm/s.

To predict the annual volumes that would flow into the pits, Diavik constructed a computer model of the pits at various stages of development, and used the observed hydraulic conductivities to determine total volumes of inflow. In the discussion that follows it will be shown that large uncertainties exist in Diavik's prediction about expected volumes of pit water from groundwater inflow.

Diavik's 1997 investigations of the pipe areas reveal that the underlying bedrock is characterized by several well-developed planar features. There are, first, 5 sets of steeply dipping diabase dike swarms, with individual dikes up to 100 m wide and containing abundant cooling joints (fractures) oriented normal to dike contacts. At least two of these major dikes intersect the proposed open pits and water-retaining dams.

There are, second, a number of shear zones or trends (zones where there has been movement of rock) which intersect the site. In one instance, borehole drilling through one of these zones encountered so much water that it prevented the hole from reaching its proposed final depth.[42] This fault zone is about 200 m wide and runs between the A154N and A154S pipes.

Third, at least 6 joint systems (fractures) have been identified in the country rock, most steeply-dipping.

The picture that develops is that the bedrock in the vicinity of the development is not a massive, low-permeability granite through which groundwater will have a difficult time moving. Instead, it is broken rock with a number of wide and extensive planar breaks that will facilitate the rapid movement of substantial quantities of water, water that will be under substantial hydrostatic pressure from the lake.

The borehole measurements of hydraulic conductivity bear this out. Observations in the upper bedrock ranged from 1.4×10^{-3} cm/s to 2.5×10^{-5} cm/s, with an average of 4.6×10^{-4} cm/s. Deeper drilling and testing indicated that the fracture zones had the highest flow rates, ranging from 1×10^{-2} cm/s to 5×10^{-5} cm/s . Intervening non-fractured rocks had flow rates ranging from 1×10^{-7} to 1×10^{-5} cm/s.

In constructing the model to estimate pit inflows, Diavik classified the granitic bedrock into two categories—fracture zones with an assigned hydraulic conductivity of 1×10^{-6} cm/s; and non-fracture zones with an assigned hydraulic conductivity of 2.74×10^{-7} cm/s. Both these rates are at the low end of the range of values observed as described above.

In reviewing the work done by Diavik, DIAND Water Resources observed,

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42 Interim Design Report - Water Retention Dikes. Acres International. December 1997. p.4-15.

> "The range of values for unfractured rock was noted to be much greater than expected and, in fact, even exceeded those for fractured rock. This would indicate that unfractured country rock is more fractured than documented (Golder, 1997c) and that highly permeable fractures are not limited to distinct fracture zones. Accordingly, there is a significant chance that the pit walls will intersect more high permeability fractures than assumed in the numerical model. Flow rates into the mine could be much greater than predicted in the model analyses. Diavik are of the opinion that mine water flow rates could be up 2.5 times greater than those predicted by the model (Golder, 1988b). However, it is contended that in fact these flow rates could possibly be as high as a factor of 10 greater with the possibility of localised high inflows." [43] (*emphasis added*)

The agency also noted that,

> "However, the small range of hydraulic conductivity selected for the sensitivity analyses is inadequate. Golder (1998c) did not justify the range selected and the factor of 2.5 does not correspond to the wide range of hydraulic conductivity values measured in the field. Thus the range in flows and TDS values cited in the report, and used in subsequent surface water quality studies, do not represent the range of potential mine inflows. It is possible that the actual flows that occur in the pit could just as likely be less than those predicted by the model for the base case. However, it is important to assess the environmental implications of the potential range of flows for all analyses and that contingencies be in place should higher volumes of flow or poorer quality water be encountered." (*emphasis added*)

DIAND also concluded that Diavik has,

> "not submitted contingency or counter measure plans to address the potential for localised high mine water inflows that may occur in the pit wall or underground. These would present significant water management and stability issues if these flows entrain and mobilize soil infill materials within the flowing fractures or rock fault structures." [44]

Not only have higher-than-predicted inflows not been considered, Diavik has apparently not even considered dewatering requirements for its predicted flows. An independent reviewer, Kamcot International, noted that Diavik has not:

- demonstrated the technical feasibility of its proposed in-pit sump pumping system in an arctic environment;
- presented any practical plans for dewatering;

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43 Technical Review. DIAND Water Resources. March 8, 1999. p.23.

44 Executive Summary - Technical Review. DIAND Water Resources. March 8, 1999.

- presented contingencies or alternate dewatering systems. [45]

Kamcot summarized the uncertainty:

> "Safe and successful dewatering operations during and after the life of the open pits are important to the viability of the mine operation. The method employed may also affect the quantity and quality of mine water reporting to the north inlet for flow equalisation and treatment. The methodology provided by Diavik estimates average pit inflows rather than estimating actual pumpage requirements to satisfy the objectives of the mining operation which include depressurisation of weaker areas of the pit high-wall and also dewatering of the bottom mining bench. It is considered unlikely that sump-pumping or horizontal drains will achieve either of these mining objectives. It is possible, therefore, that an alternate means of open pit dewatering will be required. While [the environmental assessment] addresses the impact of changes in the average groundwater flow rates, there is no discussion which considers the impact of alternate watering systems."

In its environmental assessment, Diavik stated that they could use grouting in the pits to reduce water flow through the pit walls, even though their studies reveal that grouting will only partially reduce the flows. The use of grout for this purpose in arctic conditions remains untested—substantially increased flows over those predicted could still occur. Once the groundwater taps are turned on, they may be impossible to stop.

More recently Diavik seems more aware of the difficulties in using grout, and states there are no plans to use grouting the open pit operations:

> "While grouting could seal off flow paths, backpressures may build up behind the pit wall, which in turn may increase seepage quantities in other areas. Therefore grouting may be considered in special circumstances only but is not being proposed at this time." [46]

This is probably a good thing. Diavik's preliminary toxicity testwork illustrates that the most toxic mine water component tested was mine floor water with high concentrations of grout. If grout was to be used extensively within the pits, it is unclear what the implications might be for the treatment plant and discharge quality to Lac de Gras of mine water volumes that may range from the predicted maximum of 33,000 cu metres per day to 10 times that.

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45 *Diavik Diamonds Project, Mining Issues Review*. Kamcot International Ltd. March 29, 1999. p.12.

46 Letter to Violet Camsell-Blondin from Murray Swyripa. May 14, 1999.

Even if grout is not widely used in the open pit operations, the company notes that its underground operations will rely on grouting developments within the kimberlite pipes. Will the water treatment plant effectively remove grout? While the company states that the filtration of mine water in the water treatment facility will remove grout (as well as clays), no information is provided on this. If grout is not removed to safe levels, what are the biological implications for Lac de Gras aquatic life? The potential effect has not been addressed in Diavik's environmental assessment.

Our concerns about the deficient assessment of pit inflows are further discussed under "North Inlet" and "Water Treatment Plant" below.

NORTH INLET

The north inlet is a crucial link in the pit inflow water balance as it must be able to handle lake-bottom sediment storage from A418 and A21, all pit groundwater inflows, plus precipitation equal to the maximum daily event. As discussed in the preceding section, groundwater inflow rates may be an order of magnitude, or higher, than predicted by Diavik. The implications of such variability for storage capacity and retention time due to deposition of A418 lake sediments have not been presented.

Additionally, the predicted maximum daily precipitation event is 106,000 cu metres—over 3 times the maximum groundwater inflow. Conceivably a few days of heavy precipitation could pose significant challenges for the pumps in the pits, and perhaps for the storage capacity, or retention time, in north inlet.

The north inlet water management system is an entirely separate system from the PKC. No water balance has been presented to show the sensitivity of the north inlet and the treatment plant to the tremendous variation in volumes of water that may reasonably be expected.

Diavik also has provided no plans for reclaiming and abandoning the north inlet facility—a viable, pre-engineering design should form part of the environmental assessment, along with a description of the volumes and materials that will be deposited there and how they will be stabilized.

DIAND Water Resources also concluded that Diavik's assessment had not justified the use of North Inlet as an alternative to the on-land disposal of sediments, and that the company's conclusions that the proposed change to storing sediment in the Inlet does "not affect the overall results of the environmental assessment" are not supported. DIAND stated that the design of north inlet needed to be updated, along

with updated volumes and quality of effluents, assessment of impacts, and proposed mitigation measures. [47]

WATER QUALITY IN THE PITS

Pit-wall Leaching

Diavik predicted that weathering and leaching of the open-pit walls during operation would produce very low levels of metals in the pit water. These concentrations would mix with the higher concentrations of dissolved solids (phosphates and chloride), and be pumped to the north inlet for subsequent treatment by the water treatment plant. As noted previously, water from the north inlet would be routed through the treatment plant for discharge to the lake, but the only treatment would consist of the filtering of total suspended solids.

The Dogrib's geochemistry consultant notes that Diavik has likely under-estimated the potential for metal leaching on the pits walls and that water draining into the pits could have higher than predicted concentrations of metals. It is therefore conceivable that pit water will require treatment for more than just suspended solids. Diavik has indicated that predictions of pit-water quality were based, at least in part, on the "Minewall" technique developed for Canada's Mine Environment Neutral Drainage (MEND) Program by Morin.

The first step in predicting pit-water concentrations is obtaining valid kinetic rates on the basis of area (per square-metre) of rock surface. Apparently, Diavik used its column-based kinetic tests, which provided rates on a weight (per kg) basis. The exact weights of the kinetic tests were not provided with Diavik's geochemistry studies, so it was not possible during the review to check the accuracy of the reported rates.[48] It is important to note, however, that the kinetic tests were not of the type that fully flushes all rock surfaces, so reported rates could be erroneously low. Also, the conversion from per-kg to per-square-metre rates used by Diavik is based on assumptions that could be a factor of 100 in error. For these reasons, the low predicted metal concentrations by Diavik could actually be much higher.

The next step in predicting pit-water concentrations is estimating reactive rock-surface areas. Minewall studies by Morin have indicated that reactive areas are typically 30-160 times higher than the visible, outer walls of a pit, due to fractures naturally in the rock and induced during blasting and mining. Diavik used the lowest

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47 Technical Review. DIAND Water Resources. March 8, 1999

48 Diavik did, on request, present the information in the May 14 letter to Violet Camsell-Blondin. However, at this stage of the review it has not been possible to carry out the calculations to determine the accuracy of the rate determinations.

factor of 30-fold which they equate to the properties of "massive crystalline country rock". In reality, the reported factors of 130-160 are also from crystalline country rock and could thus apply to Diavik. From the discussion above about the fractured and sheared nature of bedrock in the vicinity of the pits, with accompanying high hydraulic conductivities, this is not a conservative assumption. Actual reactive areas can only be higher if Diavik is inaccurate. This is another reason to expect higher-than-predicted concentrations in the Diavik pits.

It is important in predicting pit-water concentrations to recognize that all metals and acidity are not naturally flushed from the reactive surfaces on a regular basis. Some are flushed only during high flows, like snowmelt, and some are flushed only after flooding. Details on how Diavik incorporated these complications into its predictions are not known. If Diavik assumed, for example, only 5% of annual metal release is flushed into pit waters, then predicted concentrations would be too low since higher percentages are typically flushed.

All the metal release from the reactive surfaces would produce relatively high concentrations that are added to those already in the groundwater entering the pits. As a result, predicted concentrations should be much higher than groundwater and, in later years, lake-water concentrations—but this is not the case for Diavik's predictions.

For all above reasons, it is likely that pit-water metal concentrations in Diavik's pits will be higher than predicted. As a result, additional treatment beyond suspended solids may be necessary. Furthermore, the suspended solids alone which escape treatment, may carry enough total metals to exceed environmentally safe levels. This also would lead to additional treatment requirements, as explained below.

WATER TREATMENT PLANT

The key to environmental protection of the lake from Diavik's project is the proposed water treatment facility. It is the water treatment plant, and its successful management over the next 200 years or so, that stands between maintaining the ecological integrity of Lac de Gras and an environmental disaster. For this reason, the environmental review must be satisfied that the proposed plant can effectively do the job that will be required of it.

A detailed, pre-engineering level description of how the water treatment facility will operate is required. Empirical data from a pilot test plant, or other case studies, would have greatly assisted in obtaining a level of comfort regarding the proposed treatment.

Diavik has provided no detailed information on how this water plant is to work. The company has estimated the feed PKC concentrations which the plant has to handle

on the basis of its predictions of dissolved metals in the tailings pond, although there are discrepancies in reports and significant uncertainties as admitted by Diavik. No assessment is provided about the potential concentrations of suspended solids (i.e. clays) the plant will have to deal with, nor the suspended metals associated with the clays. The company specifies the levels of some metals and suspended solids that will be discharged from the PKC treatment circuit, but is silent on other dissolved metal species (eg. molybdenum, uranium). Nothing is said of total metals.

TOTAL VS. DISSOLVED METAL CONCENTRATIONS

Metals are carried in water draining minesites in two primary ways. First, certain amounts of all metals can be dissolved in the water. Second, certain amounts of all metals can be attached to, or form part of, small particles suspended in the water. Most water quality studies clearly distinguish between "dissolved concentrations" and "total concentrations" which represent the combination of dissolved and suspended values. As a result, (1) total concentrations are often significantly higher than dissolved, (2) total concentrations will be the same as dissolved in perfectly clear water with no suspended particles, and (3) total concentrations cannot be less than dissolved unless there are errors.

Diavik's water quality, geochemistry, and environmental impact reports clearly deal only with dissolved metals—no information is provided on total metals. Consequently it is not known to what extent total concentrations differ from the dissolved values used for the predictions. This situation creates a huge uncertainty in Diavik's predictions, and assessments, of environmental impact in the receiving environment.

This is acknowledged to some extent by Environment Canada, at least for Diavik's predictions of metal concentrations in groundwater. The agency observes that,

> "Diavik reports ground water quality results for dissolved metals which, although required for the purposes of ground water modeling, can underestimate total metal concentration. For the proposed Diavik Diamonds Project, there are instances where the total metal concentrations in ground water may exceed the Canadian Council of Ministers of the Environment Water Quality Guidelines even though the values for dissolved metal concentrations fall below suggested values (eg. cadmium, chromium, copper and nickel). This difference should be kept in mind when developing contingency plans for the management of mine water that may not be suitable for discharge to Lac de Gras."[49]

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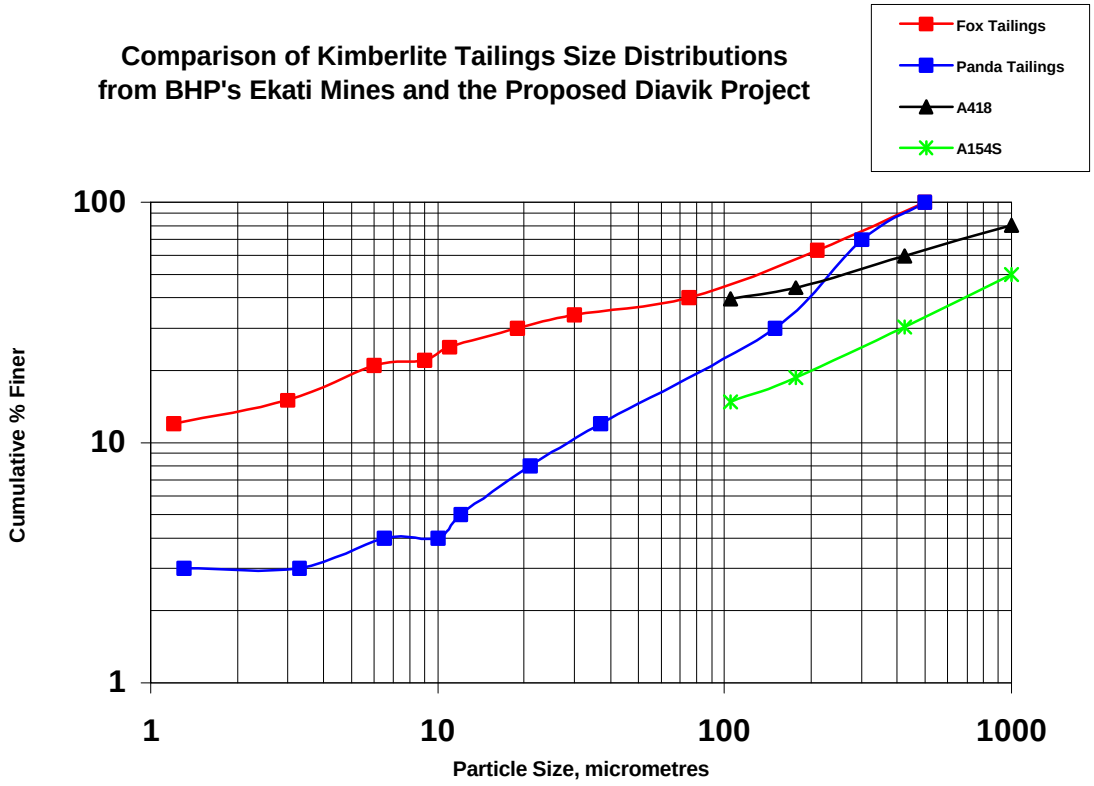
[49] Environment Canada Post-Technical Session Recommendations. March 31, 1999

Diavik may argue that the suspended metal fractions are not bioavailable, and thus only dissolved concentrations are suitable for estimating environmental impacts. While this may be true in some situations, there are others where the assumption does not hold (eg. the ingestion of settled metal-bearing particles by benthic organisms). In the Diavik case, the uniqueness of kimberlite mineralogy requires that total metals must be considered in the environmental assessment.

While varying in proportions from pipe to pipe, kimberlites contain significant quantities of ultra-fine-grained clays called smectites. The smectites range in size downwards from ordinary silts and clays to particles well below 1 micron (which includes colloids). The graph below illustrates the distributions in clay particle size of two kimberlite tailings (A154N and A148) from the Diavik site, and compares these to the curves for two of BHP's kimberlites (Fox and Panda) which have been more extensively investigated.[50] Unfortunately, data for the under-100 micron size fractions of the two kimberlites are not provided by Diavik. However, visually extrapolating the trend set by the A418 curve, it is readily apparent that the abundance of clays in the A418 tailings may approximate the Fox abundances at sizes of 1 micron or less—about 10%.



50 Diavik data from partical size distributions for kinetic column tests. BHP data from EBA Tailings Characterization Study.

Because the particles are so small, and have electrical charges on their surfaces, they do not settle readily in the water column. For example, tests on BHP's simulated tailings from the Fox pipe showed that they would take over 4000 years to settle and consolidate in a 10 metre deep water column, assuming no disturbance. The electrical nature of smectite particles means that they will adsorb significant amounts of metals onto their surfaces. Since the pond will contain high levels of smectite and dissolved metals from the country rock drainage and tailings, significant but unassessed portions of these will attach to the clays as suspended metals, greatly increasing the total metals which will be pumped to the treatment plant when PKC water needs to be discharged. This is also a concern for pit water that will pick up smectite loads during mining of the kimberlite, and will transport them to north inlet prior to filtration.

Any smectite that passes through the filters of the treatment plant at the discharge level of 25 mg/L total suspended solids will contain elevated levels of metals. If the filter size of the water treatment plant is, say, 1 micron, then fully 10% of the smectites could conceivably pass through the treatment plant and still meet the discharge requirements of 25 mg/L TSS.[51] This material will then be dispersed into Lac de Gras. Because the lake water has such remarkably low metals concentrations, the smectites will then release some of their adsorbed metals. In this way, the suspended metals become dissolved metals again, which is another way they will become bioavailable. The size of this effect is unknown, but it is potentially very significant.

This may or may not be mitigable by known technology. However, no discussion of the problems that smectites will pose for water management on site has been provided, nor any acknowledgment that these clays pose a substantial challenge for water treatment design. We have no information in front of us on which to assess the issue or its implications for the ecological integrity of Lac de Gras.

The complete lack of information regarding total metals in the mine effluents (and the role of clays in mobilizing these) is an unacceptable deficiency in the assessment. Diavik's environmental assessment has restricted itself to a discussion about dissolved metals only. The result is that the assessment may have greatly underestimated effects to Lac de Gras water quality and aquatic life.

SULPHATES

Sulphate concentrations in the various mine effluents have been predicted in the range of hundreds to thousands of mg/L at near neutral pH. Final concentrations in

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51 Taiga Laboratories uses 1.02 microns to measure total suspended solids (TSS).

the PKC water are predicted by Diavik to range from 1192 to 1257 mg/L.[52] While sulphate concentrations in Canadian lakes typically range from 3 to 30 mg/L , the baseline condition for Lac de Gras water is about 1 mg/L.

Sulphates have been shown to have toxicological effects to aquatic organisms at various concentrations. A recent review of toxicity studies by the Water Management Branch of the BC Ministry of Environment has led them to recommend an "interim" water quality criterion of 100 mg/L for dissolved sulphate, or 50 mg/L if aquatic mosses are present.[53]

Water treatment plants do not normally remove sulphate at the predicted levels, and there is no indication that Diavik is proposing to do so. Final estimated sulphate concentration of the combined discharge (PKC and mine water) is not provided, but it is clear that elevated levels will be carried into the aquatic environment. There is no assessment of the potential for acute or chronic toxicity impacts to aquatic life. Also missing is an assessment of the cumulative effects of sulphates in conjunction with the nutrients, other dissolved solids, and metals being added to the lake water.

DISCHARGE WATER

Certain concentrations of all metals will pass through the proposed water treatment plant. Even if those levels meet regulatory standards for the metals selected by Diavik for detailed predictions of water quality and environmental impacts, this is not necessarily assurance there will be no ecological effects. Generally speaking, a significant uncertainty arises about the nature and severity of ecological effects if water quality thresholds are exceeded. The possibility of suspended solids carrying additional bioavailable metals into the environment, even though suspended solids limits are achieved, was discussed above.

Another issue is metals other than those targeted for treatment by Diavik (eg. uranium, molybdenum, manganese, etc.). These have not been considered in the water treatment plans.

Diavik has acknowledged that most waters at the minesite would require some form of water treatment to protect the environment. Their position is that even if concentrations of PKC effluent have been underestimated, this is of no consequence since the proposed water treatment facility can be made to treat everything in any event. This means, as noted above, that the treatment plant is of strategic

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52 Table 2-9. Fish and Water Environmental Assessment. September, 1998.

53 Singleton, H. "Draft Interim Ambient Water Quality Criteria for Sulphate - Technical Appendix." Water Management Branch, BC Ministry of Environment. June, 1997.

significance in that it is the last and only line of defense to protect the receiving environment.

Diavik's list of metals for which water quality discharge targets have been set includes only dissolved aluminum, cadmium, copper, iron, nickel and zinc. It should be noted, however, that there are several other metals (eg. uranium, manganese, and molybdenum) which are present at sufficiently high concentrations that they may require treatment before discharge. Diavik notes that a contingency to handle unpredicted metals will be the ability to modify the treatment plant. This may not be so easy, or as economically feasible to do, as implied.

Diavik has already investigated alternatives for water treatment in order to improve its discharge water quality. Additional measures beyond those presently contemplated were considered for the removal of dissolved solids from the pit inflows, nutrients (phosphorus and nitrogen) from both PKC and pit inflows. Two of these (reverse osmosis and ion exchange), which likely would have significantly improved discharge water quality, were rejected without a meaningful assessment of their environmental benefits:

> "Reverse osmosis and ion exchange are not proposed as they are not economically feasible and would create more environmental problems (eg. waste streams and diesel power generation) than potential solutions." [EA Overview, p.4-12]

The point is that there are economic limitations to how far the company is prepared to go to treat water. Without properly assessing the water quality challenges the plant will have to face, Diavik has no idea whether the required plant (including later contingency modifications) is affordable. Clearly, they have already made the decision that the lake can receive untreated volumes of saline solutions and phosphates with demonstrable effects, since this is a cost external to the project. The required water plant may very well turn out to be too expensive to build. At this point, environmental quality will likely be sacrificed.

A proper environmental assessment would have required an evaluation of a pre-engineered[54] design for the treatment facility, including the following issues:

(1) more accurate estimation of feed concentrations of all potential contaminants through all years of operation and all years of closure,

(2) more accurate estimation of achievable discharge concentrations for all years of operation and closure and for all elements and parameters;

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54 The notion here is that design ought to be sufficiently advanced that its effectiveness can be reasonably evaluated. This does not mean having engineered drawings, but it does mean that design has to go beyond the conceptual level.

(3) characterization studies and plans for the handling, disposal, and long-term fate of the treatment wastes ("sludges");

(4) an estimation of capital and operating costs for the plant throughout operation and closure, including capital costs for occasional replacement of the plant;

(5) a description of demonstrably workable contingency plans and safety features to ensure no release of contaminated water during plant upsets; and

(6) a meaningful assessment of residual environmental effects.

Given the absence of such a plan for water treatment, there is a very real concern that the cost of treating water will increase to the point where Diavik may not be able to afford it. Unexpected higher flows which could easily result would produce even greater impacts beyond those predicted by the company. The uncertainties regarding easily assumed contingencies (such as expansion of the treatment plant) are simply too high, and the assurances too pat, with respect to both volumes and contaminants that have to be handled.

LEACHING OF METALS FROM DIKE ROCKS

Diavik has provided estimates of the rates of metals leaching from rocks that will be used to construct the water-retaining dams in Lac de Gras. They then used these predicted fluxes to describe the water quality concentrations at varying distances from the dams.

The predictions are that under ice-free conditions all parameters are predicted to be less than aquatic guideline thresholds at a distance of 60 m from the dam face. Under ice-covered conditions cadmium and phosphorus are predicted to exceed aquatic guidelines. For the more environmentally critical of these, cadmium, Diavik predicts that duration of exceedance at the 60 m boundary would be short-term because the long-term leaching rate is estimated about 1% of short-term leaching rate.

Diavik admits that the level of certainty of these predictions is low. The main source of uncertainty is the prediction of leaching rates from the rocks.

Morin agrees. He points out that the low rates are based on kinetic tests which were not conducted in a way to ensure all cadmium was rinsed from all rock surfaces during the tests. Thus, the leaching rate for cadmium may easily be higher than measured.

Morin also notes that Diavik's assumption that so many weeks of kinetic results can be equated to so many years of leaching under actual field conditions is not valid. Kinetic tests are not accelerated versions of actual field conditions, but often

represent real time. Faulty kinetic tests in the past have, for example, assumed that mineral-reaction rates are accelerated ten times just by adding ten times the amount of precipitation to a column of rock. Diavik is not be able to justify its assumption of using a few weeks as an indicator of many years.

Morin further notes that the predicted fluxes of cadmium from the water-retaining dams are based on assumptions about rates taken from unspecified "literature" that may have little relevance to the Diavik situation. Furthermore, they are based on a process that assumes the adjacent lake water is stagnant—any slight current would invalidate the approach. Diavik's lake studies reveal that shore currents are typical.

Also, if biotite schist is placed outside the proposed dikes it will, according to Diavik, give off sulphate and thus acidity and associated elevated metals at ½ its on-land rate. This will greatly increase concentrations of cadmium and other metals around the dikes.

At the end of the technical review period, DFO acknowledged the high level of uncertainty regarding estimates of leaching rates and the significance of elevated cadmium levels during ice-covered periods. They also recognized the uncertainties associated with identifying biological effects if aquatic thresholds are exceeded. [55]

In response, Diavik attempted to clarify some of the issues in a lengthy letter dated March 25th, 1999. Unfortunately, many issues are unresolved. The company first outlines 5 steps used in the estimation of water quality effects from cadmium leaching, but then only explains 3 of these. One of the omitted steps is crucial in understanding if their predictions are reasonable—an explanation of the "scale-up" from kinetic tests to full-scale rock.

Another deficiency is the lack of justification for correlating a particular period in the kinetic tests to a particular year in the field. Diavik committed to providing this information in the cadmium workshop, but did not do so. In fact, they admit that,

> "The geochemical modeling study did <u>not</u> attempt to convert the 28, 154, and 308 day results to real time (in years). This type of conversion is not straightforward given the large variation in residence times of water within each of the various project facilities. Instead, the approach taken was to <u>assume</u> that (0-28) day leaching rates represented the chemical leaching expected from freshly blasted rock where mineral surfaces are exposed for the first time. Day 154 and 308 represent leaching rates from mineral

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55 Dahl, Julie. *Status of the Department of Fisheries and Oceans' Technical Review of the Proposed Diavik Diamonds Project: Current as of March 5, 1999.*

> surfaces where there has been significant time for reactions to occur and oxidation products and secondary phases to form." [56] (*emphasis added*)

Diavik then calculates a cadmium concentration in drainage from the biotite schist to be 0.0019 mg/L under the short-term leaching rates. However, a check on this number shows the concentration should be 0.0034 mg/L, almost twice what Diavik predicted.[57]

Diavik further minimizes the situation by noting that the longer-term reduction in leach rates supports "the description of effects as short-term." Under the long-term leach rates 1 Mt of granite would still release nearly 2 kg of cadmium per year. Diavik appears to consider this inconsequential simply because the short-term rate yields 10-fold that amount.

Diavik next provides an estimate of cadmium leaching from the waste rock caps after closure. The analysis provided does not consider, first, the ongoing significant "long-term" release from all the waste rock beneath the cap; second, the 10-times-higher short-term rate from granite that persists for (at least) three years when the waste rock is capped; and, third, cadmium released by the treatment plant that will be operating by this time.

The first point is a serious omission. Diavik seems to assume here that 100% of all shallow waste rock being completely and permanently frozen from the moment the mine closes, so that none of the waste rock releases any metals to the overland runoff. This, even though in other documents Diavik recognizes that freezing of the waste rock could take decades after closure, if it occurs at all. As a result, cadmium concentrations in runoff could be much, much higher if there is any contribution from waste rock.

Furthermore, it is inappropriate to predict concentrations in the lake from the runoff, when there will likely be several other contributions such as the treatment-plant discharge and the dikes. Realistic predictions of cadmium in the lake should be based on the total release, not the release from one of several sources.

Diavik also notes that its predicted concentrations of cadmium, using the methods outlined in its environmental assessment, tend to be about 5 times higher than observed in its leach pad. This is true only for an average of measured values. The predicted concentration of 0.0087 mg/L is actually close to the measured maximum of 0.0051. While the maximum concentration may not always persist, it will occur at least some times, so the prediction using 0.0087 will likely be applicable during some

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56 Letter to Julie Dahl and Neil Hutchinson from Murray Swyripa. March 25, 1999.

57 Compare Table 1 with data in Appendix A of Diavik's March 25th letter "Potential Impacts of Cd on Lac de Gras.

periods. However, as pointed out above, additional sources of cadmium will ensure that cumulative amounts will be higher than predicted.

In its calculation of how quickly leached cadmium moves into the lake, Diavik presents an analysis which deals only with winter conditions—this in spite of the fact that they recognize that leaching rates will be higher in summer due to the contribution of unfrozen, sub-aerially exposed material in the dikes. The mass loading rates provided are based on sub-aqueous material only, without the explanation of "scale-up" as noted, and thus underestimate the reality. During summer conditions the mass loading of cadmium would be much higher, and the lake concentrations similarly higher than the predicted 0.31 µg/L for the 100% Transported Case.

Diavik describes its predictions for cadmium release as "worst case," and that they "are upper estimates based on conservative estimates." This is incorrect, as the examples of underestimation and uncertainty described above attest. Diavik is similarly wrong about its predicted cadmium concentration of 0.31 µg/L at 60 m into the lake. Cadmium leaching rates and, thus, cadmium concentrations in the lake can be expected to be higher than predicted by Diavik.

The leaching of metals into the lake is not mitigable—once it starts there is no way of fixing it. Diavik proposes simply to monitor this as part of the aquatic effects monitoring program. We may ultimately learn there is a problem, but there will be no contingency.

The ecological implications of increased fluxes of cadmium into the aquatic ecosystem are described under the relevant heading below.

PART FOUR
IMPACTS TO LAC DE GRAS

WATER QUALITY

The water of Lac de Gras is likely some of the purest natural water on the planet. Its hardness and levels of contained metals, suspended solids, and nutrients are in the range of the lowest concentrations recorded for lake water. These constituents are so low, in fact, the lake has been given a rare ecological classification—"ultra-oligotrophic". Little scientific knowledge exists about this type of lake. Schindler notes that, for instance if total phosphorus concentrations are as low as measured by Diavik, the lake represents a unique system.[58]

DIAND Water Resources noted during the technical review that recent studies of 24 lakes in immediate vicinity show that all were more enriched and less transparent than Lac de Gras. The lake, therefore, appears to be a regionally, and perhaps internationally, rare resource. Nothing is known about its biodiversity in a regional context. In many other jurisdictions, a body of freshwater with the physical, chemical and biological features of Lac de Gras would be a candidate for protected area status. The lake is the largest lake in the headwaters of the Coppermine River which nourished the whole Coppermine system. It is a major influence on the water quality and flow characteristics which regulate the downstream aquatic habitat and fishery resources, including the water utilized by the residents of Kugluktuk. Because of these attributes, proposals to change the quality of the lake water and its aquatic life must be carefully and rigourously evaluated.

It is a serious omission that the Comprehensive Study Report provides no indication of the uniqueness or ecological importance of Lac de Gras.

As demonstrated previously, a number of significant uncertainties arise in Diavik's assessment about potential changes to Lac de Gras from its project. Because of the substantive questions about water quality and flows on the minesite, and the effectiveness of the water treatment plant, water quality predictions about discharges into the lake, dispersion and dilution, and ultimate biological effects are also highly uncertain.

Diavik proposes to meet water quality objectives at a point 60 m from the treatment plant discharge, allowing dilution of the discharge effluent with lake water to bring

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58 Schindler, David. Quoted in "Draft Summary Notes - Nutrients Workshop". March 15, 1999.

concentrations of contaminants to acceptable levels. The company also commits that effluent at the discharge point, without dilution, will not be acutely toxic to aquatic life.

There has been much discussion during the comprehensive study process, for example, about how well the treatment plant discharge will mix with lake water, whether the effluent will spread evenly through lake, or whether concentrations of effluent will spread as discernible "plumes" through the lake and create local effects. Numerous questions have been posed about the company's computer model, the predictions that were made, and what the likely effects on aquatic life from the predicted concentrations might be. Diavik responses tend generally to show that the company's computer model has an acceptable grasp on reality, its predictions are reasonable, and any effects will not be irreversible and/or long-term. The accuracy of these predictions will only be known after the fact.

There are, however, issues still to be concerned about. The input of phosphates through the discharge of pit inflows is one. Phosphorus, like nitrogen, acts as a nutrient to stimulate primary production in aquatic ecosystems—phytoplankton growth, for example. In turn, primary production provides the foundation for whatever assemblage of plant-eaters and other consumers the lake might contain.

In the early stages of the review there was some confusion about Diavik's predictions of phosphorus loading to Lac de Gras. Diavik initially predicted that phosphate input will approximately double the existing baseline concentration in the lake (from 2 µg/L to 4.7 µg/L of total phosphorus at peak discharges of mine water—135% increase). Sufficient phosphorus would enter the lake during operation that effects would be detected lake-wide. Some 20 to 30% of the lake would, according to Diavik, change its trophic status (i.e. shift from ultra-oligotrophic to oligotrophic) for the lifetime of the project, and then will slowly revert to baseline conditions some decades later as phosphorus moves from the water column into the lake bottom sediments. During that time, increased plant growth (algae, mostly) is likely, and shifts in the supported zoological community may occur. Although Diavik believed that biological effects would not be serious or irreversible, no assessment of them has been done, and the significance is not known.

The uncertainties about all this, at least at the start of the review period, were significantly high. There was confusion about what the actual baseline for phosphorus was since some variability had been detected in the measurements from year to year, and the detection limits in the laboratory were close to the baseline levels. There was concern also that the 0% retention level of phosphorus in sediments modeled by Diavik was too low and, as a result, Diavik had overestimated the amount of phosphorus available in the water column. No one was quite sure

how nutrients currently drive the Lac de Gras aquatic ecosystem, and what the ultimate effects of phosphorus loadings would be. DFO noted that the predicted additions may have ecosystem level effects—that is, the processes of internal nutrient cycling and trophic dynamics in the lake may change.

Another concern is the potential for localized increases in phosphorous concentrations in the vicinity of the mine activities. What will be the significance of a 37% increase in total daily loadings to Lac de Gras, especially if it is concentrated in the east end with dilution over the lake likely taking many years? Will localized enrichment attract fish to the area and increase their exposure to metals in the water column, making them more susceptible to the negative impacts of blasting? Will localized enrichment encourage use of these areas by fish for spawning and rearing, increasing the exposure of the more sensitive life stages to the effects of increased metal concentrations and blasting effects. The potential for localized enrichment has not been assessed, nor has the potential to attract fish to this area. How will the lake, and its inhabitants, respond to nutrient enrichment? No one has a definitive picture.

More significant uncertainties lie in how the various individual effects will combine with one another in unpredictable ways. Nutrient additions, for example, can affect Lac de Gras' dissolved oxygen regime. Localized enrichment may also result in an increase in oxygen demand as biological matter degrades, increasing the potential for zones of oxygen depletion. In some parts of the lake, oxygen is naturally depleted. Such areas are sensitive to oxygen consumption, which poses threats for the resident aquatic life. To worsen the situation, there is a positive feedback loop between low oxygen levels and the release of phosphorus from sediment. Diavik looked at how increased primary production might affect oxygen supply, but did so in the context of oxygen-saturated waters, not depleted ones.

Perhaps more important, the cumulative impact of nitrogenous oxygen demand, biological oxygen demand (BOD) in mine water, and oxygen demand predicted from the decomposition of projected increases in algal production appears not to have been evaluated.

Couple this with additions of nitrogen compounds that will be discharged as blasting residues in mine water, and as short-term fluxes washed from the rocks used for the water-retaining dams. These substances, for which we have no rigourous prediction of quantities or concentrations (this information, we are told, is to provided at the Water Board hearings) act as nutrients in some situations, but are toxic to aquatic life in other forms and concentrations. They also can have an effect on pH, increasing the acidity of the water, an effect not fully assessed by the company.

To resolve some of these issues, a technical session on "nutrients" was held on March 15. Experts were present at this session and, while there was general

agreement that changes to the lake were unlikely to be have serious ecological consequences, not all matters were resolved. Biologists were still concerned about the effects of greater than 40% phosphorus concentrations at the east end of Lac de Gras adjacent to the mine site, and the need to have better information about potential impacts. This discussion led to agreement that further investigations in the lake, as well as follow-up monitoring, would be required to achieve a better understanding of what would happen.

There was discussion about the timing of the required studies—whether they had to be done before licensing, or following licensing but before discharge. In the end, it was noted that "the RAs will consider Environment Canada's recommendations for additional research as part of the licensing process."[59] Two weeks later, in their concluding technical review document, Environment Canada, "based on the fact that we know little about how an ultra-oligotrophic lake like Lac de Gras will respond", recommended nutrient studies "to validate predictions regarding the potential environmental effects of nutrient inputs to Lac de Gras."[60]

Whenever the studies are carried out it is clear that, at this point, no one knows precisely how the addition of nutrients will affect the lake. Keep in mind that the predictions of phosphorus loading have been based on the company's predictions of pit inflow volumes—a prediction which DIAND and this report says could easily be underestimated by an order of magnitude.

No mitigation of phosphorus loading has been formally proposed. Phosphorus can be removed from mine water utilizing expensive treatment processes that Diavik has rejected, apparently for cost reasons. In the nutrients workshop Diavik stated that it could reduce the volume of flow by grouting in the pits, or reduce the rate of mining, or even "stop mining if necessary".

TURBIDITY

Turbidity is a measure of how well sunlight penetrates a water column. The clearer the water, the deeper light can penetrate. It is the penetration of sunlight that delivers the energy required for primary production to drive the aquatic foodchain. Increasing the turbidity reduces the depth to which light can go, and therefore diminishes biological growth. Any proposal to increase turbidity in a lake such as Lac de Gras, and possibly downstream in the Coppermine, must be fully assessed as to its biological implications.

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59 "Draft Summary Notes - Nutrients Workshop". March 15, 1999.

60 Environment Canada Post-Technical Session Recommendations. March 31, 1999.

In reviewing the Diavik project, DIAND Water Resources reports that studies in Alaska have shown that an increase of 5-10 turbidity units (NTU) above naturally clear conditions have caused dramatic reductions in light penetration and associated decreases in primary production, decreases in abundance of food organisms and decreased production and abundance of fish.[61]

Diavik's proposed project will increase turbidity in the lake, but we have no meaningful assessment as to the extent of this, or what its implications might be. Diavik proposes to control total suspended solids (TSS) to 25 mg/L or less. While commonly there is a correlation between TSS and turbidity, the relationship will not hold if significant volumes of the solids have a particulate size less than the filter size used for measuring TSS.

The ultra-fine-grained nature of the kimberlitic clays is a case in point. As discussed previously in relation to total metal transport, the limited data we have for Diavik kimberlite grain size distribution suggest that the range of particle sizes may be similar, for some pipes, to BHP's Fox pipe. A significant percentage of clay fines are less than 1.2 microns (the filter size used, for example, by Taiga Laboratories to measure TSS). These will escape being measured as part of TSS, but will contribute to turbidity.

This concern is borne out by the 1995 studies Sego undertook for BHP's tailings characterization work. Sego reports that Fox pipe tailings subjected to freeze-thaw clarification gave turbidities of 125 to 470 NTU even though TSS was reported as zero mg/L.[62] The Independent Environmental Monitoring Agency has previously raised this point with BHP, expressing concern that while TSS is regulated, turbidity is not. This may have environmental implications for BHP's eventual discharges from the Long Lake impoundment.[63]

In response to a question from the Dogrib Working Group about water treatment plant efficiency in removing fine clay particles, Diavik cited a study to support their claim that their proposed plant will remove clays. This study reports the results of a pilot plant set up to test the feasibility of using direct filtration for treatment of turbid water from the Greater Vancouver Water District reservoirs. While the results are partially encouraging in the situation cited, the applicability of the technology to the Diavik situation is not so readily apparent.

Both naturally turbid and "spiked" water with turbidities ranging from about 20 to 60 NTU were tested, resulting in turbidities as low as 0.1 NTU. Particle size distribution

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61 Technical Review. DIAND Water Resources. March 8, 1999.

62 Sego, D. *Geotechnical Properties of New Fox and Panda Tailings.* 1995. 59pp.

63 Letter to BHP from Independent Environmental Monitoring Agency. January 16, 1998.

ranged from 99% of particles less than 2 µm in spiked water to 88% less than 1 µm in naturally turbid water. While the filters were repeatedly able to reduce turbidities by 99% over periods of 10-20 hours, runs longer than this were terminated because of "head loss" or "turbidity breakthrough". The implications of this for full-scale operation is not explained. Moreover, it is clear that the application of correct doses of a chemical pre-treatment (alum, cationic and nonionic polymers) were,

> "a key factor in attaining the direct filtration performance criteria. Dosages that were too low resulted in high turbidity and short filter runs terminated by turbidity breakthrough. Excessive filter aid dosages resulted in filter runs with satisfactory filtered-water turbidity, but the runs were short because of excessive rates of head loss accumulation." [64]

Also, better performance was achieved with lower flow-through rates. As raw water turbidity increased, filter performance declined, water productivity (volume per unit time) declined, and alum doses increased. We have no data on turbidity values of PKC pond water, but if the kimberlite tailings slurries approximate Sego's results for the Fox kimberlites, NTU values could be significantly higher than those tested.

The role of chemical pre-treatment is not well described in Diavik's *Water Management Plan*. There appears also to be some discrepancy about the types of filter that will be employed in the treatment process. The process flow diagrams in the *Water Management Plan* describe "multimedia gravity" filters, while Diavik's response to the Dogribs describes "deep-bed monomedium" filters, such as those used in the GVWD tests described above.

While there may exist a history of industry success for the filtration of suspended solids, as Diavik contends, not much evidence is presented in the company's material of a working system dealing with the volumes and clay concentrations that might reasonably be expected. Because of the somewhat experimental nature of dealing with kimberlitic clays, and because we have neither case studies nor lab tests, nor other data, to support the contention that treatment will be straightforward, it is far from certain that this will be the case. While the engineering details of a viable water treatment system may be the topic for consideration at the water licensing stage, the lack of a plausible, performance-demonstrated design remains an environmental assessment deficiency. Diavik's request that the Dogribs approve the project now and wait for the details of how its treatment plant is going to work places the Dogribs in a high-risk and untenable position. What is the recourse for the Dogribs if Diavik cannot design, or afford to build, the plant that ultimately will be necessary?

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64 Logsdon, G.S., D.G.Neden, A.Mark, D.Ferguson, and S.D.Labonde. "Testing Direct Filtration for the Treatment of High-Turbidity Water." Jour. Amer. Water Works Assoc. December, 1993. pp.39-46.

FISH

Diavik investigated a number of potential impacts from its proposed project to fish and fish habitat. The following concerns were examined:

- effect of recreational fishing on lake fish populations;
- effect of blasting on fish and fish habitat;
- effect of re-suspended and re-deposited lake sediments from dike construction on fish and fish habitat;
- loss of habitat from dikes and open pit construction;
- effects of sediment pore water release from dredging
- contamination of fish from heavy metals.

The company made reasonable predictions about most of these effects, and their assessment showed generally that effects to fish would be short-term, or low magnitude, and reversible. Some significant uncertainties remain, however.

LOSSES & GAINS OF HABITAT DUE TO DIKES

With respect to fish habitat losses and alterations from the project, Diavik concluded the following:

- the magnitude of the lake-wide effect of habitat loss will be negligible for all species and habitat types;
- footprint of dikes would result in permanent habitat loss, as will use of north inlet;
- at closure dikes would be breached and new rearing and foraging habitat along the shorelines would be created
- during construction and operation phases losses would amount to maximum of 1% of available habitat under baseline conditions
- following closure the use engineered shoals on the inside and outside of the water-retaining dams would result in net gain of habitat;
- no streams on east island have significant spawning or rearing habitat, although 80% of potentially available migration habitat (high rainfall years only) on the island would be lost during construction and operation.

UNCERTAINTIES ABOUT HABITAT IMPACTS

During construction of the water-retaining dams, and particularly during dredging of lake bottom sediments prior to dam construction, significant volumes of sediment will be dispersed through the lake's water column to settle elsewhere. Dredging will

occur for approximately 3 months in open water conditions, while dam construction will last about 1 year for each pit.

Additionally, pore water, currently trapped in the bottom sediments and having high levels of metals and nutrients, will be released into the lake. Diavik predicts that guidelines for the protection of aquatic life will be met at a distance of 60 m from the dike alignment—its proposed target boundary for all contaminants except manganese, phosphorus, copper, and aluminum. High concentrations of aluminum will not decline to background until about the 1 km boundary, while the others will not reach background levels until at or beyond the 5 km boundary. Diavik concludes that, while these levels are high, they will last only for a short time (construction periods), and therefore are not "high magnitude" impacts. However, the ecological significance of these high, short-term releases is not known. Nor have they been evaluated in conjunction with other sources such as dike leaching or mine water discharge.

Re-suspended sediments will move as a plume through the water, influenced by currents in the lake. The deposition of re-suspended sediments cannot be mitigated, and impacts on benthic community have not been assessed. DFO has observed that Diavik's predicted suspended solids concentrations are based on daily, depth-averaged values, thereby masking effects in regions and periods when sediment plumes may be present. DFO is also skeptical about the effectiveness of Diavik's proposal to deploy sediment curtains to control the sediment plumes.[65] The agency requests sediment cores before, during and after construction to monitor changes in sedimentation rates.

Turbidity from re-suspended sediments will have uncertain impacts on phytoplankton growth (in presence of increased nutrient load). Again, this is likely to be a short-term and relatively localized impact, although its significance is not known. Despite the lack of certainty about impacts, DFO recommends after-the fact collection of water samples for phytoplankton biomass and taxonomy, chlorophyll, suspended solids and nutrients.

Fish eggs deposited during the fall of each construction year, as well as young fish of that year, may be impacted by deposited sediments. The significance of this has yet to be determined, although it is reasonable to conclude that the effects will be localized and short-lived.

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65 Plenary Technical Sessions transcripts.

AIR POLLUTION IMPACTS TO WATER

Diavik acknowledges that airborne emissions will deposit on Lac de Gras water and could result in increased sedimentation in water column and on lake bottom. However, they say that the maximum annual potential increase in suspended solids in lake water is not expected to exceed the ambient threshold for protection of aquatic life (an increase of 10 mg/L) in any lake water.

Diavik predicts no significant adverse effects for ambient air quality, and that any residual environmental effects would be localized. It concludes that effects would be negligible at the regional level, even with the inclusion of other sources such as the Misery pit.

Diavik did examine the potential for its emissions to result in acid rain, and concluded that the acid deposition rates are not a significant environmental concern. The company also stated that the greenhouse gas emissions from the proposed project are very small as a fraction of national emissions. This has not been independently verified. The long-term cumulative effects of contaminant loading also have not been addressed.

DFO agrees with Diavik's prediction that dust deposition on the lake will result in concentrations in the water column below 10 mg/L, which is not expected to result in adverse sediment deposition. DFO also notes that the primary path into the lake for nitrogen compounds from blasting will be through run-off and mine water discharge as opposed to airborne deposition.[66] This is not a conservative conclusion, given the proximity of the pits to the lake. There are already data at the BHP site which tend to indicate that airborne transport of blasting residues is increasing the concentration of nitrogen compounds in nearby lakes. It is conceivable the airborne transport of these materials will be significantly additive to waterborne sources at Diavik—neither has been quantitatively assessed with respect to resultant lake water quality.

UNCERTAINTIES ABOUT IMPACTS TO FISH

Two potential effects to fish need to be considered. First, is the increase in nutrients to the lake. Diavik's contention that increases in nutrients will result in fatter and healthier fish will only hold true under several conditions. To start, there must be an increase in the kind of algae eaten by local fish. This is not known. One possibility is that the nutrient increase will stimulate less desirable bluegreen algae that do well under conditions of low nitrogen but high phosphorous.

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66 March 17, 1999, letter to Peter McCart from Julie Dahl.

Assuming the desirable species of algae is stimulated, there then must be an increase in edible zooplankton species for larval fish to eat. If these conditions do not prevail, the resulting production of unutilized plant biomass may contribute to depletion of dissolved oxygen as organisms die, sink and degrade during the ice-covered period. The ultimate effect is unknown, although the experts at the mid-March nutrient workshop seemed to agree that major negative effects to fish appeared unlikely.

Second, and perhaps more critical, is the potential for metal concentration in Lac de Gras fish from mine effluents. Diavik used its predicted lake water quality as a basis for predicting the concentration of metals in fish tissues. The rationale for this, according to Diavik is that "under baseline conditions, uptake of metals by fish occurs according to a fixed relationship between the baseline concentration of each metal present in the water and the baseline concentration in fish tissue."[67]

Diavik concludes that increases in Lac de Gras water quality of arsenic, cadmium, copper, and mercury from effluent which, when fully mixed with all of Lac de Gras, will result in no metal concentrations in fish flesh which would exceed consumption guidelines.

The uncertainties associated with this prediction are very high. First, the method used to make the predictions is apparently flawed. In commenting on BHP's kimberlite toxicity studies where test fish were exposed to kimberlite effluents, Klaverkamp (*cited above*) notes that most of the contaminants discharged into Lac de Gras will go to the sediments where they will be incorporated into the food web for fish and, further:

> "This dietary route of uptake will be, by far, the most ecologically relevant. Furthermore, metal distribution in affected fish cannot be predicted from the lab studies which simply examined fish exposed to water-borne chemicals." (*emphasis in original*)

Second, as explained earlier, Diavik may have greatly underestimated the concentrations and loading of bioavailable metals attached to ultra-fine-grained clays that, as is not yet clear, may escape removal in the water treatment plant.

Third, as DFO has observed, the methodology used to assess bioaccumulation potential is simplistic and does not take into account the effects of increased productivity.

> "The inferred contaminant concentrations are based on a fully mixed lake and do not take account of the elevated concentrations that might be expected in areas close to the mine site for much of the mine life. It is difficult to determine the expected distribution of contaminant levels

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67 Fish and Water - Environmental Assessment. p.6-169.

> within the populations of fish, given a variable exposure to the localized affects. A determination as to the significance of effects in Lac de Gras has yet to be made."[68] (*emphasis added*)

A number of metals are predicted to be above water quality thresholds as well as above ambient concentrations in Lac de Gras. As noted previously, one of the more critical is cadmium. There are three sources of cadmium to be considered. First is leaching from the rock used to construct the water-retaining dams. Diavik predicts that there will be an initial short-term flush of elevated cadmium, followed by a slowing leach rate over the long-term. Second is surface run-off from the granite waste rock dumps in the post-closure stage—a situation which could last indefinitely. Third is loading of low concentrations as part of the mine water discharge.

Diavik predicted that leaching from the dike rocks would, during the ice-covered season, produce cadmium concentrations exceeding water quality thresholds of 0.16 µg/L by two-fold. Since the lake is ice-covered for 8 months, these concentrations are of concern. Diavik noted that uncertainties in predicting leaching rates were high, as they were for ascertaining biological effects if thresholds were exceeded. This issue has been extensively discussed under "Leaching of Metals from Dike Rocks".

Closure of the project envisions the placement of an impermeable cap over the waste rock dumps which will enable a frozen layer to be established in the underlying granite waste, and which will shed run-off to surface flows on east island, draining into the small creeks and lakes or directly into Lac de Gras. As discussed above, Diavik's predictions for cadmium concentrations are not conservative, and actual concentrations are likely to be significantly higher than the company estimates. As Morin further notes, the assumption of a frozen waste rock dump following closure is not a safe one. Conservative predictions would have considered the entire 254 Mt of waste rock pile, as opposed to only a thin 3 m shell of finely crushed rock, contributing cadmium (and other metals) to surface run-off.

The quality of the post-closure surface run-off from the mine site that will end up in Lac de Gras is predicted by Diavik to remain above thresholds for the protection of aquatic life indefinitely, and the effect would not be reversible. Thresholds for the protection of aquatic life will be exceeded at the 60 m mixing zone boundary for phosphorus, aluminum, cadmium, and chromium. Cadmium will remain above thresholds at the 1 sq km boundary, but is predicted to be negligible at the 5 sq km boundary. The company acknowledges that there are significant uncertainties with respect to their estimates of run-off water quality, and the level of effects that might result if thresholds were exceeded.

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[68] February 15 letter to Elaine McIvor from Julie Dahl. Technical Review Comments on Diavik's Environmental Assessment Report.

Some of the small lakes on east island are also predicted to have elevated concentrations of cadmium, as well as other metals (such as mercury, aluminum, chromium, copper, lead, nickel, silver, and zinc). The ultimate movement and fate of these elevated dissolved metals in the small lakes is not described.

During operation, the discharge of water from the treatment plant will release cadmium at the rate of 0.5 kg per year (year 2001 discharge of 1500 m^3/d) to 19 kg per year (year 2020 discharge of 34,200 m^3 mine water plus 2500 m^3 PKC water). DFO and DIAND noted that, while these discharges are rapidly diluted by lake water, "loadings of a toxic, bioaccumulating contaminant must be addressed." [69]

The agencies further observed that Diavik had made no assessment of the significance of the impacts, nor of the uncertainties behind their predictions. The following points were identified:

- while experiments have shown that over 90% of cadmium added to lake waters was quickly lost to the sediments, cadmium can be re-mobilized into the foodchain and the water column. Cadmium levels in fish continued to increase after the supply was cut off.
- cadmium bioaccumulates in aquatic organisms and may move up the foodchain. Experiments have shown that 17-fold and 9-fold increases of cadmium in amphipods and mussels occurred at average metal concentrations below guidelines;
- Diavik's predictions for cadmium concentrations in fish tissue were determined using a lake-wide average and therefore do not account for localized, elevated levels of waterborne cadmium near the mine. Not all sources of cadmium were accounted for (eg. foodchain sources).
- Diavik predicted cadmium concentrations on fish muscle only, not for organs such as fish liver which are eaten by aboriginal people in some cases.
- Negative ecological impacts due to cadmium exposure may be expected within 1km of the dikes;
- The high uncertainties respecting predictions of leaching rates and the ecological significance of cadmium must be considered. Significance of effects near the dikes, when combined with resuspension and deposition of sediments and blasting effects, increases uncertainty.

DFO and DIAND concluded that the impacts are significant and that mitigation is doubtful. With respect to mine water discharges, they note that the average cadmium concentration of 1 µg/L is less than the treatment target of 40 µg/L so that other measures may be required. Alternatives suggested include reducing the pit inflows by

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69 March 19, 1999, letter to Murray Swyripa from Julie Dahl and Neil Hutchinson.

grouting and even, as a last resort, dredging and disposal of cadmium-enriched sediments in the vicinity of the discharge.[70]

The March 5th status report by DFO expressed less concern for the effects of cadmium concentrating in fish muscle, since the experiments referred to were based on lake water concentrations from 3 to 12-fold stronger than those predicted for Lac de Gras. However, since cadmium accumulates in fish organs (kidneys and liver), there remains a concern for consumption where these are eaten by aboriginal people (eg. burbot). Additionally, the potential impacts on developing fish eggs near the dikes have not been assessed. DFO summed up the situation at this point:

> "The issue of effects of predicted levels of cadmium on fish in Lac De Gras has been partially resolved, provided the predictions prove not to be an underestimation. There is still uncertainty as to the effectiveness of Diavik's current management plan for runoff from waste rock piles." [71]

Because of DFO's concerns, Diavik provided additional information following the March 23rd meeting regarding the potential for bioaccumulation of cadmium in fish constantly occupying the 200 m zone adjacent to the dikes. Their estimates show that average fish concentrations would be approximately one-tenth below consumption guidelines. Based on the assumption that only a portion of the lake fish community will utilize the area around the dikes, and that elevated cadmium levels are likely to be confined to a relatively small area for a short duration, DFO concluded that the potential for effect on lake fish is considered low. All this, of course, hinges on the accuracy of Diavik's predictions for leaching rates of cadmium, predictions which Morin has observed are characterized by a high degree of uncertainty.

A final point should be made about biological impacts to the lake. For all metals that will be discharged into Lac de Gras, their toxic properties are inversely proportional to the hardness of the lake water. As hardness increases, metal toxicity declines. For unusually soft water such as the case here, metal toxicity will occur at lower than normal concentrations. Diavik made some adjustments for this in their determination of cadmium thresholds, but not for the other metals. This phenomenon gives rise to another significant uncertainty with respect to the increased sensitivity of aquatic organisms to low levels of metals that will be discharged.

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70 March 19, 1999, letter to Murray Swyripa from Julie Dahl and Neil Hutchinson

71 Status of the Department of Fisheries and Oceans' Technical Review of the Proposed Diavik Diamonds Project: Current as of March 5, 1999. Prepared by Julie Dahl.

CUMULATIVE EFFECTS

With respect to the assessment of cumulative water quality and aquatic effects in the Coppermine system, BHP's Ekati project is the only project at this point having foreseeable interactions with the Diavik project. In this regard, Diavik utilized BHP's predictions for their assessment, these predicting such low metal loadings from Lac de Gras relative to the baseline that Diavik concluded water quality in Lac de Gras would not be appreciably changed and, therefore, no cumulative aquatic effects are predicted.

While on the face of it this appears a reasonable conclusion, it should be pointed out that BHP's downstream water quality predictions have not been entirely accurate. Slipper Lake, the last point of entry for Koala drainage prior to entering Lac de Gras, is already showing evidence of increased phytoplankton growth, even though BHP predicted no detectable effects to this lake over the lifetime of the project. Since the waste management and water treatment needs have not yet been established for the Misery operation, it is not clear what discharge effluents will be like. However, it now appears that drainage from the Misery operation will be directed north into Lac du Sauvage which will result in greatly diluted water by the time it mixes with Lac de Gras. Diavik's determination of insignificant cumulative aquatic effects is reasonable given the available data, but must be considered somewhat speculative until real monitoring data from Lac de Gras discharges are obtained.

Of more significance, perhaps, to the lake are the additive and interactive effects of the various discharges that will result from Diavik's activities. While effort has gone into predicting concentrations of individual sources or loadings of potential contaminants, the combined effects of all discharges and releases have not been predicted or assessed for overall cumulative environmental impact. Over the course of construction, operations, and post-closure, a long list of metals and nutrients will be deposited in the lake through waterborne and airborne means.

Phosphorus loadings from pit inflows have received much attention, although the predictions were predicated on Diavik's assessment of flow rates without a sensitivity analysis or worst-case situation being explored. But other source of nutrients (especially airborne and waterborne blasting residues) have not been evaluated in conjunction with phosphorus effects. There is no evaluation of the combined and interacting effects of nutrient enrichment, suspended and dissolved solids, and elevated bioavailable metals from all the relevant sources. There is no overall predicted situation, and no determination as to the ecological significance of all this.

As noted previously, significant uncertainties lie in how the various individual effects will combine with one another. Nutrient additions, for example, can affect Lac de Gras' dissolved oxygen regime. Localized enrichment may also result in an increase

in oxygen demand and resulting zones of oxygen depletion, which poses threats for resident aquatic life. To worsen the situation, there is a positive feedback loop between low oxygen levels and the release of phosphorus from sediment. Diavik looked at how increased primary production might affect oxygen supply, but did so in the context of oxygen-saturated waters, not depleted ones.

Perhaps more important, the cumulative impact of nitrogenous oxygen demand, biological oxygen demand (BOD) in mine water, and oxygen demand predicted from the decomposition of projected increases in algal production appears not to have been evaluated.

Couple this with additions of nitrogen compounds that will be discharged as blasting residues in mine water, and as short-term fluxes washed from the rocks used for the water-retaining dams. These can also have an effect on pH, increasing the acidity of the water which can, in turn, affect the mobilization and/or toxicity of certain metals.

The evaluation of all this is admittedly a complex task. However, the potential for long-term impacts to the lake is a serious concern that ought to be fully evaluated before making a decision that might turn out to have irreversible consequences. The review to date has not provided enough clarity on the potential combined effect to provide a reasonable level of comfort that the changes will be acceptable. The reality is that locating this project within Lac de Gras constitutes an experiment whose results, possibly irreversible, will only be known at some distant point in the future.

CONCLUSIONS ABOUT WATER

With respect to water and fish issues, a substantial list of concerns pertaining to the predicted chemistry of mine drainage, security of containment, effectiveness of water treatment, and the potential impacts to water quality and aquatic ecology of Lac de Gras have been identified. Sufficient deficiencies throughout Diavik's technical work are evident that an overall pattern emerges of consistently underestimating results, or significance. Natural variability in the hydrology and geochemical parameters characterizing the site has not been folded into the predictive work. In many cases, methods or conclusions said to be conservative were not.

Outstanding geochemistry and geotechnical deficiencies are as follows:

1. Predictive work on mine drainage geochemistry was not uniformly conservative; on a number of fronts there was a consistent bias toward underestimating potential environmental concerns or impacts.
2. Water quality from various mine components may be significantly worse in terms of contained metals and other contaminants than predicted.
3. Water volumes from mine components, particularly pit inflows, could easily be significantly greater than predicted.

4. The safe operating limits for the water balances of both the PKC and north inlet have not been identified.
5. The presence and effects of high volumes of ultra-fine-grained clays found in the kimberlites appears not to have been considered in any of the water quality testwork or water management planning.
6. The capacity of water treatment facility to handle flows an order magnitude or more higher than predicted, high volumes of clays, higher-than-predicted concentrations of metals, has not been documented. No meaningful information has been presented on water treatment.
7. The effects of total metals attached to suspended solids in discharge water were not assessed.
8. The safe containment of mine drainage from the waste rock dumps and the tailings facility is based on assumptions about permafrost impermeability; no mitigation or contingencies have been proposed for seepage into groundwater.
9. Proposed mitigation at closure of sulphide oxidation and metals leaching in waste rock and tailings through aggradation of permafrost and capping is unlikely to be successful; water treatment will almost certainly be necessary, and is estimated to extend for a century or more after closure.
10. Leaching of cadmium and other metals from rocks used to construct the water-retaining dikes in Lac de Gras is likely to occur at higher rates and concentrations than predicted. This is an irreversible, unmitigable effect in which the uncertainties are high and the biological consequences unknown.
11. The issue of kimberlite toxicity is not yet fully resolved. Diavik's preliminary study outlined further work required to determine whether water arising from mining activities is toxic, what the causes of toxicity might be, and whether toxicity can be effectively mitigated.
12. A number of factors indicate that the PKC may have insufficient storage. It is not clear that the size of the containment dams can be increased, or what further contingencies are available.
13. The mining of a "wet" open pit in the arctic environment is not a proven technology. Diavik's proposal to do this will require some innovation and experimentation. Diavik has not demonstrated the technical feasibility of its proposed in-pit pumping system under arctic conditions; has not presented practical plans for dewatering; and has not presented contingency plans that may be necessary for dewatering.
14. The combined, interactive effects of nutrients, heavy metals, dissolved solids, sulphates discharged from the site have not been examined in a technically rigourous way. Overall ecological impacts in the lake from the combined sources are unknown. Uncertainties are high. Consequences could range from insignificant to very significant.

PART FIVE
ALTERNATIVES TO THE PROJECT

MINING APPROACH

Diavik identified three different approaches to mining its pipes at Lac de Gras. In brief, these options are:

Alternative 1 - all underground
Mining would be from underground only. Declines or shafts would be sunk to gain access to underground workings. A layer of kimberlite (referred to as a crown pillar) would be left in the top of the kimberlite pipe (around 100 m thick) to separate the underground workings from the water of Lac de Gras, which would be immediately above. Water-retention dikes are not part of this alternative.

Alternative 2 - underground with open-pit crown pillar
Underground mining would be the same as in the all underground alternative. Additionally, open-pit mining would be used to mine to a depth of 100 m. Three water-retention dikes would be constructed in Lac de Gras, and water removed from the open-pit areas.

Alternative 3 - open-pit and underground (preferred option)
For this option open-pit mining would be used to mine the kimberlite pipes to an elevation of 190 m (A418), 130 m for A154S, 265 m for A154N and 220 m for A21, below which underground mining would be done. Three larger water-retention dikes would be constructed and water removed from the open-pit areas.

By way of assessment of its three options, Diavik has provided only a cursory "checklist" comparison based on economic, technical, community and environmental concerns—as summarized in the table below.

Construction in Lac de Gras	Alternative 1 has clear advantage since construction of water-retaining dams in Lac de Gras not required
Dike alignment	No environmentally significant difference between Alternatives 2 & 3
Mine safety	Alternative 1 would be cost prohibitive and may not be technically possible to achieve satisfactory level of safety for integrity of crown pillar

Communities perspective	Communities requested that if east island is to be disturbed, then maximal recovery of resource occur—Alternative 3 comes closest to this.
Employment	Alternative 1 provides least employment for communities; Alternative 3 is best for employment & training

TABLE 4. Diavik's Comparison of Mining Alternatives.

The table above is hardly meaningful as a tool to make choices between the 3 options. With reference to the "communities perspective" comment, Diavik does a serious injustice to the aboriginal peoples by implying that maximization of diamond recovery can justify environmental degradation of the east island. This is a trade-off that the Dogribs, and likely the other aboriginal groups, have certainly never agreed to.

The right concept is to minimize potential environmental impacts to the point where the project is environmentally acceptable, and then to determine any economic benefits that might be attached to it. And so the question is, first, which alternative creates least environmental harm or risk to east island? Given the answer to that, how can diamond recovery be maximized under that option?.

In its *EA Overview*, Diavik concluded that,

> "Based on estimated capital, operating costs and value of diamonds produced, the proposed Project would not be economically viable without water retention dikes and removal of water from above the crown pillar. With the removal of water, the most attractive method of mining is a larger open-pit followed by underground mining in the later years. From an economic perspective Alternative 3 is preferred as it results in the lowest overall operating cost per carat recovered and therefore the most financially robust project." (EAO, p.4-12)

It is important to note, therefore, that Diavik conducted no meaningful environmental assessment of Alternatives 1 or 2 as part of its impact evaluation work.

This deficiency was challenged by a number of reviewers during the technical community sessions. In response, Diavik distributed a discussion paper dealing with the issue of mining with, or without, water-retaining dams in Lac de Gras, and justifying their decision that a "no dike" option was not feasible. [72] The paper concludes that the all-underground option can be rejected, for the following reasons:

- the high value crown pillar between the underground working and lake bottom cannot be mined;

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72 *Discussion of Mining With Dikes versus Mining With No Dikes*. Diavik. February 26, 1999.

- development time for underground option would be 3 years compared to 2 years for an open pit, and investors would experience an extra year's delay in receiving a return on their investment;
- the unit mining cost for an underground operation would be approximately twice that of open pit;
- underground-only option reduces estimated ore reserve from 26 million tonnes to 14 million tonnes (5 Mt from loss of pipes A154N and A21; 7 Mt from loss of crown pillar). Diamond production would be decreased from 102 million carats to about 60 million carats, for an estimated reduction in revenue of US$2.3 billion from approximately $5.8 billion (@ US$56/carat);
- underground option would reduce mine life to 14 years from 20;
- increased risks to work health and safety from mining weak rock beneath large lake.

This paper reiterates Diavik's earlier conclusion that, after a survey of all the factors affecting the mining approach,

> "Diavik has determined that the only economically viable way to mine the pipes is by combined open-pit and underground mining methods. This will also provide optimum returns to investors, to government, and to the Canadian public."

In fact, no credible economic feasibility assessment was ever provided by Diavik to justify this position.

This is a key deficiency. On all other issues under consideration in the environmental assessment the company was obligated to be transparent in its justification of conclusions reached and plans proposed. Diavik's positions were tested on a number of occasions by independent expert reviews commissioned by government. There is no reason why economic feasibility of the alternatives should not be subject to same level of scrutiny and transparency as the other issues.

DIAND Water Resources did commission an independent study by Kamcot International. This study focused on posing questions about alternative mining approaches, and suggested new alternatives for Diavik to consider. Economic feasibility of the options was not examined, and Kamcot did not question Diavik's assertion that the all-underground option was uneconomic.

The Kamcot report makes it clear that Diavik did not disclose the technical and economic details of the proposed mining plan that would have enabled a proper assessment of the feasible alternatives. Additionally, environmental considerations were not a part of Kamcot's report.

How these issues were treated by the comprehensive study process is discussed in Part Five.

In its response to the Kamcot report, Diavik reaffirmed that the decision for its preferred mining approach (Alternative 3) was because it "provides a higher return and less risk." [73] Even though no proper environmental assessment had been undertaken of any alternative to the proposed project, the company observed that its preferred choice presents no significant adverse environmental effects. Further, the environmental impacts of Alternative 2, even given a smaller waste rock pile, are "basically the same" as Alternative 3.

At a subsequent workshop on April 23, Diavik presented a table which consisted of a checklist comparison of environmental impacts that might be expected for Alternatives 2 and 3. It also identified, but did not evaluate the significance of, two important environmental benefits of the all-underground option—no water-retaining dams in Lac de Gras, and no country rock piles.

Diavik's assertion that the environmental differences between the options are generally negligible is extremely misleading, since the relative environmental risk posed by the options must be considered in proper assessment. This is a major deficiency of the entire environmental assessment. While Diavik has apparently evaluated the technical and economic merits of its project from a risk assessment perspective, its environmental work has not been done this way.

Table 5 illustrates the dramatic difference in footprints of the various options.

The proposed alternative would create a 250 Mt waste rock pile which will produce toxic drainage for possibly centuries after mine closure. It will similarly leave behind some 30 Mt of tailings and other wastes that will have to be permanently secured. It will also create 6.5 km of water-retaining dams which will leach metals into the waters of Lac de Gras, with unknown effects to lake ecology.

Alternative 3, the selected option, creates an immense geochemical hazard which will have serious ecological implications for the Coppermine system if it is not managed perfectly for well beyond the life of the mine. This is a dubious assumption given the track record of the mining industry in the north.

Contrast this with the impacts of Alternative 1. The all-underground option would not have any water-retaining dikes in Lac de Gras. Dike construction impacts and long-term leaching effects from dike rocks would be entirely eliminated. Except for water discharges from the smaller water treatment plant, the lake would remain unaffected by development.

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73 Response to Kamcot International Report. Diavik. April 16, 1999.

A comparison of the three mining approaches is provided below.

	Units	*Alternative 3 Preferred Option*	*Alternative 2 UG w/ OP Crown*	*Alternative 1 All UG*
Dike Length	m	7900	4950	0
Volume of Rock in lake	M cu m	6.5	5.0	0
Lake sediments removed	cu m	900,000	600,000	0
Quarry	M cu m	1.9	0.6	0.1 (?)
OP Ore	Mt	20	10	0
UG Ore	Mt	6	16	14
Tot Ore	Mt	26	26	14
Diamond Recovery	%	98	96	78 *
Biotite Schist	Mt	28	5	0
Country Rock Pile	Mt	250	64	0
PKC to UG Backfill	Mt	4	10	9
PKC Surface Pile	Mt	22	18	5
Total Terrestrial Footprint	sq km	8.3	7.9	3 **

TABLE 5 Comparison of Footprints for 3 Mining Alternatives.
Data from *Discussion of Mining With Dikes versus Mining With No Dikes*, Kamcot International (p.20), *Alternative Means Mine Plan* (May 3, 1999), and *EA Overview*, Table 4-1. Data provided by Diavik regarding the mineable ore reserves and estimated diamond recovery are somewhat inconsistent. Table 4-1 in the *EA Overview* cites a total of 38 million tonnes of mineable kimberlite, with an estimated recovery of 130 million carats. More recent information supplied by Diavik shows these values to be 26 Mt and 102 million carats.[74]
* based on total recovery of 102 m carats.
** likely an over-estimate since PKC and quarry areas should be much less.

The huge 250 Mt waste rock piles, and the hazard posed by 25 Mt or more of acid-producing biotite schist contained in them, would not exist. The tailings impoundment would be much smaller—5 Mt instead of 26 Mt, since much of the tailings would be used as backfill for underground mining. The quarry would be much smaller and could easily be reclaimed at closure to resemble the natural landscape.

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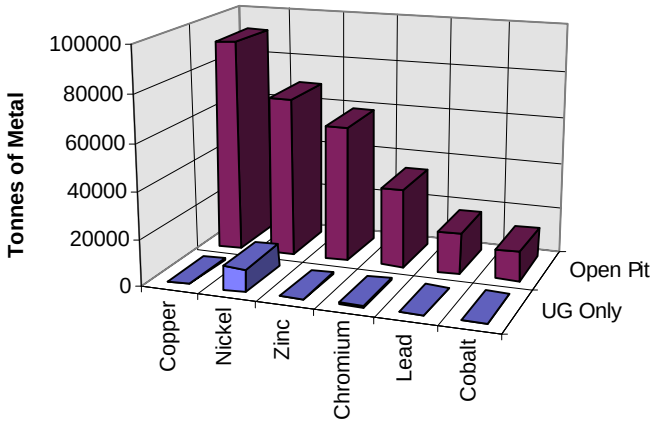
74 *Discussion of Mining With Dikes versus Mining With No Dikes*. Diavik. Feb. 26, 1999. Table 1.

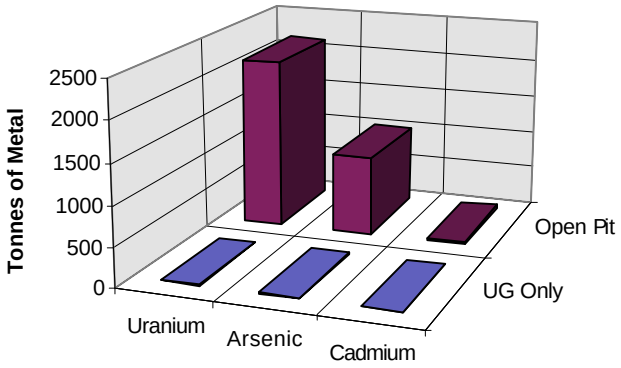
There is also a radical difference in environmental risk, since the inventory of hazardous metals that would be permanently left on the surface at the end of the project would be drastically reduced under the all-underground option. The two charts on this page compare the amounts of toxic metals that will be left on surface at the end of mining for Diavik's preferred mining approach and an all-underground option. The relative environmental benefits of the underground-only option are profound.



The overall differences in relative footprints between Diavik's proposal and an all-underground approach are better displayed in colour plates overleaf.

Diavik did not describe the role of the north inlet in Alternative 1, but given that mine water inflows to the underground workings would likely be significantly less than the other alternatives, it may be that use of the north inlet could be avoided altogether. One of the small interior lakes, for example, might be drained and used as a flow equalisation and settling pond to handle mine inflows.

In total, the Alternative 1 footprint would be dramatically reduced, with consequent benefits for caribou using east island during the summer and fall migration and, especially, for the inventory of hazardous materials that would be brought to the surface through mining.



The remaining significant environmental problem would be the storage and treatment of waste water from the tailings and mine workings. However, water volumes would be greatly reduced from those currently predicted and the challenges posed for designing an effective water treatment facility would likely be substantially less. Overall, the potential environmental benefit of Alternative 1 relative to the others options is of staggering proportions. The reduced risk for aquatic impacts to Lac de Gras alone

are significant to the point that they must not be as readily discounted as they have been to date.

The question then hinges on the economic feasibility of Alternative 1. Diavik has raised a number of issues that may make this alternative more technically challenging than the alternatives. However, the company has provided no analysis to support the claims that they would not have a profitable venture with an underground-only project. Neither has government.

There is no independent appraisal of the economic viability of the underground-only option.

One is required. The environmental trade-offs between the options are so pronounced that selection of the preferred option, with its attendant substantial environmental risk, must be justified.

ECONOMIC FEASIBILITY OF AN UNDERGROUND ALTERNATIVE

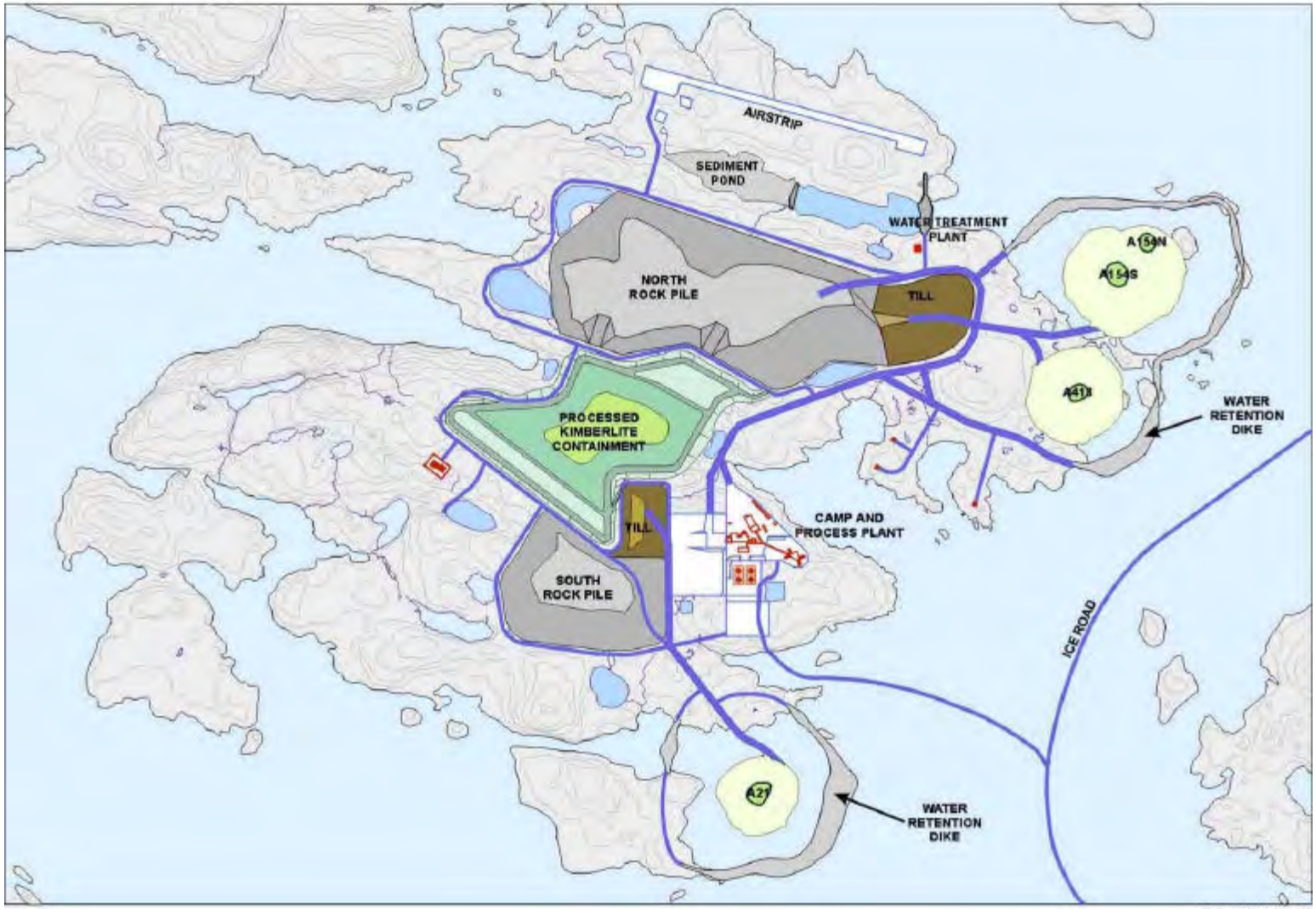
Contrary to Diavik's assertion that an underground-only alternative is uneconomic, I provide here an analysis which suggests that such an approach would be a profitable venture. The numbers employed here come largely from Diavik's material, as well as other publicly available sources. The calculations are standard mining feasibility methods and have been generated by computer using software conventionally employed in the industry. The analysis has been peer reviewed. Appendix 3 provides some further data and assumptions used.

Proving economic feasibility typically requires an accurate understanding of projected cash flow from the operation, and a calculation of the internal rate of return. This would be a challenging exercise if the data were available. However, complete data are yet to be made available by Diavik, since the company has announced that the results of their feasibility work will not be available until after the Minister makes a decision on the project's environmental acceptability. The fact that the economic feasibility is not yet completed calls into question their assertion that the underground alternative is non-economic.

The approach utilized here adopts a rule-of-thumb commonly used by the industry as a good indicator of economic attractiveness. This is the determination of the capital payback period. Given a certain capital investment in a project, what is the period of time necessary to recoup the capital costs? The rule-of-thumb is that a capital payback period of less than 2.5 - 3 years will always result in an economically attractive project.

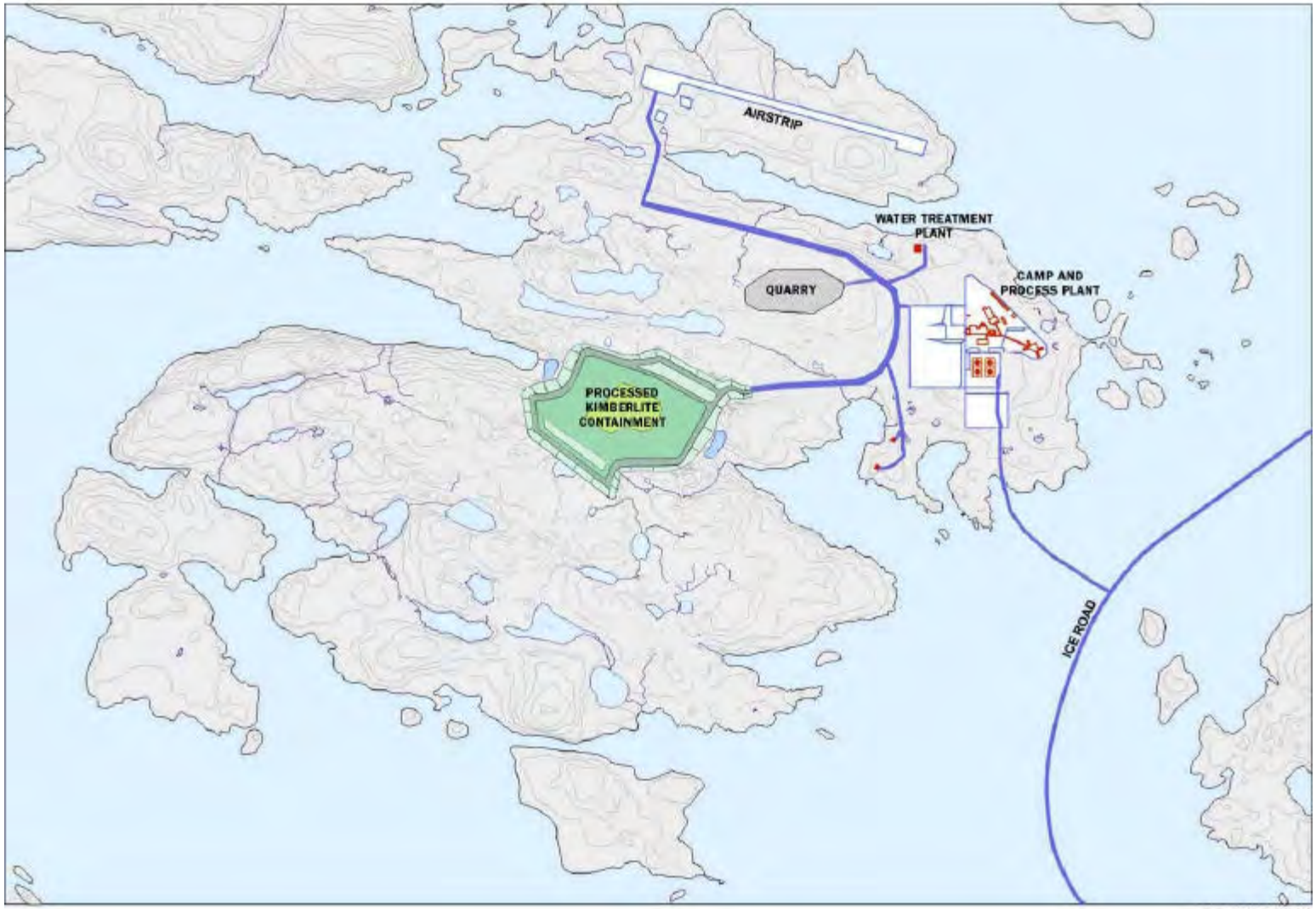
Diavik has not provided consistent or clear information about its proposed mining rates, diamond values, or operating costs. At one point the company states that the

Alternative 3



May 3, 1999

Alternative 1



May 3, 1999

information is "proprietary", while elsewhere they state that costs cannot be finalized until environmental approval is obtained. And, as noted previously, the DIAND contractor, Kamcot International, stated that Diavik would not provide the technical and economic information required to conduct a proper evaluation of the options.

Where information is provided in Diavik's material it typically is spread over a number of pages or documents, and has gaps that need to be filled by back-calculating the values. Diamond value is one example. Diavik provides information on only two pipes and the overall value, leaving the reader to estimate and back-calculate the values of the other two pipes. Similar deductions have to be made about the mining rate and operating costs.

STEP 1 - DETERMINATION OF THE MINING RATE

The first step is to determine the rate of production. The total mineable reserves for Alternative 3 have been stated to be 26 million tonnes. The mining rate is not explicitly stated by Diavik, but can be deduced from the following:

(a) As shown in Diavik's mine plan schedule (Schedule 4-7) the reserves are mined over a period of 22 years giving a mining rate of 1.18 Mt/year, or 3,371 t/d;

(b) The *Environmental Assessment Overview* notes that the kimberlite will be loaded from the pit at a rate of 1.5 to 1.9 Mt per year, which is equivalent to 4,300 to 5,500 t/d;

(c) The part of the plant processing the heavy fraction from the DMS circuit is noted in *Environmental Assessment Overview* to be designed for a throughput of 10 t/hr. It is further noted that this fraction is less than 5% of the incoming feed from the pit. Assuming the fraction is actually 4% of the original feed, the plant must be designed to handle 250 t/hr and with an operating day of 22 hours (allowing for down time) the mining rate would be 5,500 t/d;

(d) The underground mining rate is noted to be a maximum of 1 Mt/year from 2 pipes, or 2,860 t/d with 1,430 t/d from one pipe.

From the above it would appear that Alternative 3 mining rate varies from a low of 3,371 t/d to a high of 5,500 t/d, which is inferred to be the proposed rated capacity of the plant. It might be concluded from this that Diavik has costed a plant with excess capacity and used a lower rate of production to develop operating costs. If this is true, it can be suspected that the company's estimates of both operating and capital costs will be on the high side, making the project appear less attractive than it otherwise would be.

STEP 2 - DETERMINATION OF VALUE

The next step is to determine the value of the mineable resource for Alternatives 3 and 1. The following table describes the resources and mineable reserves for Diavik's preferred scenario by pipe and total. A number of attached notes describe the assumptions that were made to complete the table.

	Total Resources [6]			**Diluted Mineable Reserves of the Preferred Scenario in Mt**				
Pipe	*Millions of tns*	*Grade in cts/tn*	*Value in US$/ct*	*Open Pit*	*U.G.*	*Total*	*Waste*	*Strip Ratio*
A418	8.9[1]	3.8[2]	60	5	4	9	76	15.2
A154S	11.4	4.6	63	10	2	12	134	13.4
A154N	11.5	1.9	63[5]	1	-	1	0	-
A21	5.5	2.7	12[4]	4	-	4	40	10
Totals & Wt Averages	**37.3**	**3.3**	**56.0**	**20**	**6**	**26[3]**	**250**	**12.5**

TABLE 6. Determination of Total Resources and Reserves for Alternative 3.

Notes:

1. The crown pillar is stated to consist of 1.4 Mt having a grade of 5.6 cts/t and the same value/ct as the rest of the pipe.
2. The grade under the crown pillar can be calculated to be 3.5 cts/t.
3. The average grade is stated (and can be calculated) to be 3.93 cts/t with a calculated value of US$56.6/ct (C$84.48/ct).
4. This value has been calculated by difference and is C$17.90/ct.
5. Diamond value assumed to be the same as A154S.
6. Stated not to include inferred resources which should amount to at least 10% of the total resource.

Table 7 provides estimated mineable reserves when there is no recovery of the crown pillars. This latter table has been subtotaled to exclude the A21 pipe whose value both Diavik and this review found to be uneconomic when mined by underground methods. It has been inferred from the calculated value of the diamonds in this latter pipe that they are all of industrial quality. The remainder of the pipes appear to consist of one third gems and two thirds industrial diamonds. It is understood that the quality of some of the gem stones are better than those from the Ekati mine.

Pipe	*Millions of tns*[1]	*Grade - cts/tn*	*Value - US$/ct*
A418	6.7	3.5	60
A154S	8.2	4.6	63
A154N	8.2	1.9	63[3]
Subtotal	23.1	3.32	62.1
A21	4.0	2.7	12[2]
Totals & Avs	**27.1**	**3.23**	**55.9**

TABLE 7. Estimated Resources and Reserves for Alternative 1.

Notes:

1. quantity based on 75% of the total resource in Table 6.
2. can be assumed to be 100% industrial quality
3. can be calculated to be 63% industrial and 37% gems with an average value for gems of US$150/ct

From Tables 6 and 7 the reserves, grades and values for Alternatives 1 and 3 can be summarized and compared.

Type of Estimate	*Millions of tns*	*Grade - cts/tn*	*Value - US$/ct*
Total Resource	37.3	3.30	56.0
Mineable Reserves for Alternative 3	26.0	3.93	56.6
Mineable Reserve for Alternative 1	23.1	3.32	62.1

TABLE 8. Summary of Reserves, Grades and Values for Alternatives 1 and 3.

STEP 3 - DETERMINATION OF OPERATING COSTS

The next step is to determine the operating cost of the two options. This has been done using a computer program which applies a number of assumptions for the Diavik project which are identified in Appendix 3.

The analysis examines the economic attractiveness of an all-underground operation assuming poor rock competence that requires extensive ground control, with no reclamation of the crown pillars. It has been assumed that under these conditions the only feasible mining method will be underhand cut and fill. In addition, since only three pipes will be available for mining, it is further assumed that the mining rate must be reduced to 4,100 t/day, which is consistent with Diavik's statements as to a feasible underground mining rate.

This "pessimistic" scenario, because of the reduced economies of scale, appears to be economically attractive when using the estimated and reduced capital cost of C$376 million, for there is no necessity to construct the water-retaining dikes.

The following table shows an estimated operating cost of $49.48/t for the proposed open pit operation (Alternative 3) at a mining rate of 5443 t/d with a 12.5:1 strip ratio.

For a "pessimistic" underground-only option (Alternative 1) the unit operating cost is $100.02/t. Since only 3 pipes are mined, the rate is cut to 4082 t/d, and the mining is by overhand cut and fill with 20-foot panels. Several other, more "optimistic" underground scenarios were also examined which yielded unit operating costs from $47.80 to $98.40 per t.[75] The highest unit cost of the "pessimistic" scenario was chosen to be conservative in the estimate.

	Alternative 3 - Open Pit		*Alternative 1 - Underground*	
Cost Center	*Unit Costs in C$/t*	*Manpower*	*Unit Costs in C$/t*	*Manpower*
Mining	20.68	232	46.48	496
Milling	8.85	84	9.95	73
Power	5.81	8	10.70	8
Administration	6.28	62	14.62	109
Travel	1.58	-	3.65	-
Freight	6.28	-	14.62	-
Totals	**49.48**	**386**	**100.02**	**686**

TABLE 9. Estimated Operating Costs for Alternatives 3 and 1.

The ratio of the unit operating costs (Table 9) to the diamond values (Table 8) establishes the economic cut-off grade for each of the alternatives.[76] The difference between annual revenues and annual operating costs represents the gross annual margin available to pay back capital investment. Table 10 shows the results.

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75 Two scenarios for blast-hole mining were calculated (50-foot wide panels having unit operating cost = $47.80; 16-foot wide panels with unit operating cost = $63.50), and two scenarios for cut and fill mining (30-foot wide panels with unit operating cost = $68.69; 10-foot wide panels having unit operating cost = $98.40).

76 Determination of cut-off grade for the underground-only option uses the cost/t rock ($49.48), while the open pit option uses the cost/t ore ($30.33).

Parameter	*Alternative 3 Open Pit*	*Alternative 1 Underground*
Cut-off Grade (cts/t)	0.40	1.20
Annual Operating Cost (Million C$)	94.26	142.9
Annual Gross Revenue (Million C$)	569.24	395.71
Annual Gross Margin (Million C$)	475	252.8

TABLE 10. Comparison of Cut-off Grades, Annual Operating Costs and Gross Annual Margins for Two Alternatives.

STEP 4 - DETERMINATION OF CAPITAL COSTS

The next step is to determine the capital investment required by the project. Knowing this, we can determine the capital payback period by calculating the time required to repay the investment out of the gross annual margin.

The table below presents the capital costs of the two alternatives, with explanation of the numbers following.

Cost Centre	*Alternative 3 Cost Millions C$*	*Alternative 1 Cost Millions C$*
Mine	85.9[3]	64.3
Mill	177.3[1]	152.0[1]
Surface	71.5[2]	78.8[2]
Subtotal Direct Costs	334.7	295.1
Indirect costs	49.2	44.1
Working Capital	24.2	36.8
Total	**408.1**	**376.4**

TABLE 11. Comparison of Capital Costs.

Notes:

1. Includes tailings disposal at double normal cost.
2. Includes cost of airstrip.
3. Does not include any underground development.

The estimated $408 M capital cost of Alternative 3 is significantly lower than Diavik's stated $675 M (excluding $200 M for water-retaining dikes). The validity of the estimated amount can be confirmed by reducing the capital cost of BHP's Ekati project by an amount proportional to the smaller plant and reduced economies of scale (See Appendix C - Table 13). This would generate $436 M as the capital cost of the

Diavik project, which is reasonably close to the estimated $408 M. The discrepancy can likely be attributed to the following factors:

(1) Conservative estimating: this possibility tends to be supported by Diavik stating that 240 t trucks will be used in the open pits. A more normal and much cheaper (per t) choice of truck size would be 100 to 120 t. This is consistent with the apparent high estimates for design and cost of the plant.

(2) Some unmentioned and site specific additional requirement for the plant: such as a special water treatment plant, which might account for an additional C$50 to 100 million.

(3) The capitalization of future development and installation costs: such as the underground mine development, which would account for another C$50 to 100 million. This type of expenditure is irrelevant when calculating the economic attractiveness of the project by the capital payback period. This possibility seems to be real since Ekati had reported capital costs of C$1.2 billion, which is the lifetime capital investment and includes the cost of a major proposed expansion.

The estimated operating cost of C$50/t tends to be validated also by the estimate of a required crew of 386, which compares reasonably well to Diavik's estimate of 350 men. The average economic cut-off grade has been estimated at 0.4 cts/t. More importantly, the cut-off for the low value A21 pipe is estimated to be 1.9 cts/t, which indicates that mining of this pipe by open pit method could, on the face of it, add a small amount to the overall profitability. However, it also indicates that when the cost of the necessary dike is taken into account, mining A21 would be marginal. Even under the “pessimistic” underground option, the other three pipes are still economically attractive.

STEP 5 - DETERMINATION OF CAPITAL PAYBACK PERIOD

Comparisons of payback periods can be made using both sets of capital costs. The results illustrate the economic viability of both alternatives under both assumptions about the capital investment required.

	Alternative 3	*Alternative 1*
Gross Annual Margin (Million C$)	475	252.8
Estimated Capital Costs (Million C$)	608.1[1]	376.4
Capital Payback Period using Estimated Costs (yr)	1.28	1.49
Capital Payback Period using Diavik Costs (yr)	1.84	2.67

TABLE 12. Capital Payback Period for Two Options. Note 1: cost includes C$200 M for water-retaining dikes.

The conclusion here is that using the estimated capital cost of C$408 million, plus the C$200 million for the dikes, the capital payback period is a little over a year indicating that the project is extremely attractive. Even if the Diavik high cost of C$875 million is used the payback period only increases to 1.8 years. Similarly attractive, Alternative 1 (a "pessimistic" underground-only option) is seen to have an economic payback of 1.5 years, or 2.6 years when Diavik's high estimate of capital cost is used. While at the end of the day some reduction in total diamond recovery will result, an underground-only project will remain attractive to investors since its capital payback period is under three years.

It should also be noted that, contrary to Diavik's information, mine life is increased by one year for an all-underground option, so that it betters satisfies the company's stated criteria of maximizing mine life. Further, this analysis shows that A154N pipe can also be economically mined by underground methods, a possibility rejected by Diavik.

It must be emphasized that the above calculations do not purport to be the definitive assessment of economic feasibility for Diavik's mining options. Likely, however, they are the best determination of profitability we have to date given the data publicly available. They are used here to illustrate the point that the non-viability of Alternative 1 has <u>not</u> been proven.

CONCLUSIONS

The primary conclusion is that Diavik's assertion that the underground-only option is not economically viable is wrong. This analysis shows that it is, and that three of the four pipes could be profitably mined. The analysis also shows the underground-only operation will extend mine life by approximately one year (Appendix C).

Clearly, Diavik must either demonstrate why an underground-only option is not economically viable or, alternatively, they must conduct a proper environmental

assessment of its potential impacts. One of these exercises is required to fulfill the requirements of the assessment under the *Canadian Environmental Assessment Act*. Neither has been done.

Given all the uncertainties identified in this assessment about Diavik's proposed project, wrought with serious implications for the continuing environmental quality of Lac de Gras water and the Bathurst caribou herd, it is imperative that alternatives to project design which reduce potential environmental significance be properly assessed. They have not been.

PART SIX
COMPREHENSIVE STUDY REPORT

INTRODUCTION

The Working Group requested a review of the *Comprehensive Study Report* prepared for the project by government under the *Canadian Environmental Assessment Act*. The review was to have two objectives. The Working Group wanted to know, first, whether the concerns identified during the Dogrib review were identified and resolved in the government's review. Second, they wanted to know whether the *CSR* would make recommendations to the Minister that would meaningfully deal with the identified Dogrib concerns.

The reason for the Working Group's interest in the *CSR* stems from the Dogribs' experience with other mining projects in their territory. When the government's environmental review of the Diavik proposal commenced, the Dogrib Treaty 11 Council was invited to join the government-designed comprehensive study process. The Council declined, however, primarily because all available resources at that time were committed to completing the negotiation of the Dogribs' land claim and self-government agreement-in-principle.

A secondary reason was that there remained a high level of skepticism about government's commitment to meaningfully address Dogrib needs through the *CSR* process. The Dogribs perceived there were organizational and structural problems inherent in what was being proposed. It was clear to them that the process would be directed by government officials and that there were unlikely to be opportunities for meaningful input by the Dogribs. The aboriginal organizations were to participate through the workings of a Steering Committee that was not well funded, had no capacity to undertake independent technical review of the issues, and had no substantive role in the authorship of the *CSR* and the determination of recommendations.

For these reasons, the annual assembly of the Dogrib First Nation mandated the establishment of a Diavik Working Group to undertake an independent review on behalf of the Dogrib people. The findings of this review form the bulk of this report. The following section fulfills the Working Group's request to evaluate how well the *CSR* fulfilled its task of reviewing those issues of concern to the Dogribs. It is not intended to be a comprehensive analysis of how effective the *CSR* was in treating all the issues under its mandate.

The government's review was managed, as required by the *CEAA*, by the federal agencies having regulatory powers over the project. In this case there were three—DIAND, Department of Fisheries & Oceans (DFO), and Natural Resources Canada (NRCan). These three agencies together comprised the Responsible Authorities (RAs) having the responsibility for conducting the environmental assessment and producing the comprehensive study report (*CSR*). The RAs decided how the environmental review was to be conducted, and designed the details of the comprehensive study process. While the Dogribs did not officially participate in this process, they kept abreast of the review by sending observers to most of the public technical sessions and acquiring documents available through the public registry.

At the conclusion of several rounds of public meetings and workshops dealing with technical issues, an initial draft of the *CSR* was prepared by Diavik about the end of March. Editing by the RAs then occurred so that, over the months of April and May, several iterations of the draft *CSR* were made available on the public registry for comment. Various portions of the drafts appeared on the registry at different times, so that by the time the final official version appeared on June 21, some 4 or 5 drafts of the document had been produced. Comments on these were sought from the participants and public during the drafting period.

As the text in the drafts evolved from one version to the next, the wording invariably changed, although no explanations were provided about why changes were made, or who authored them. Similarly, the extent of Diavik's involvement in the drafting process is not obvious, although an edited version (with line-by-line edits and substantive comments) by the company of the penultimate draft did eventually appear on the public registry. This lack of transparency in the evolution of the final *CSR* text creates problems in a number of areas where findings and recommendations need to be rigourously justified, as will be shown in the following discussion.

CARIBOU

Issues relating to caribou were assessed in the comprehensive study by the GNWT which has the responsibility and expertise for wildlife resources in the territory. In the CSR the GNWT provides an assessment that echoes in many respects the findings of the Dogrib review. The GNWT found that the approach used by Diavik,

> "limited its ability to determine whether the distribution or abundance of caribou would be limited by the project."[77]

77 Final CSR, p.113.

The GNWT noted the numerous shortcomings in the company's methodology:

- too much reliance on computer models without adequate scientific validation or consideration of their strengths and weaknesses;
- only partial consideration of ecological variation;
- effect classification system could not distinguish between common, innocuous events and rare catastrophic occurrences.;
- uncritical use of scientific literature;
- computer model was exported from the Porcupine caribou herd to the Bathurst herd without consideration of the effect of ecological differences between them;
- computer model was not validated by observation;
- effect of variability in fall migration not accounted for in the model;
- only limited acknowledgment of uncertainties in the assessment;
- underestimated the proportion of the herd (1/3 according to GNWT) that may be exposed to the site in any given year;
- insufficient detail about existing movement pathways and how caribou can be prevented from reaching the east island;
- no empirical information or case studies used in prediction of effects; and,
- effects on caribou will depend on successful mitigation and monitoring.

At this point the *CSR* is contradictory and confusing. Having identified the above list of deficiencies and GNWT's finding that Diavik's assessment approach limited its ability to determine the effects on distribution or abundance, the *CSR* then states,

> "the GNWT generally concurred with Diavik's conclusion that the proposed project will not change the abundance or distribution of the Bathurst caribou herd."[78]

Despite this list of deficiencies the *CSR* also states that the GNWT "concluded that there will not likely be significant adverse environmental impacts as a result of the project". But GNWT was also clear that there are significant uncertainties associated with this conclusion for, in addition to the above list, GNWT stated that,

> "Diavik should have considered additive cumulative effects of airborne pollution, particularly dust deposition, its linkage to caribou habitat, and the potential effects of global warming on freeze-up and consequent changes in the energetics of fall migration."

78 Final CSR, p.114.

The deficiencies and uncertainties identified in GNWT's comments are significant, especially in the aggregate. How these are resolved, and how the conclusions of unlikely effects can be justified, are never explained in the *CSR*.

The conclusions simply do not fit the evidence presented.

The *CSR* discusses briefly the report made by the Dogrib's caribou expert. It notes that the Dogrib expert review raised many of the same questions as the GNWT but expressed greater overall uncertainty in the project assessment. The *CSR* identifies the Dogrib report's findings that the ecology of the Bathurst herd is complex and not well understood, and that this leads to uncertainties which limit the ability to predict impacts from this and other projects. The *CSR* does not acknowledge the report's overall finding that Diavik's claim of no changes to the overall abundance and distribution of the Bathurst herd comes with so much uncertainty that the claim is invalid.

The *CSR* summarizes the specific recommendations made by the Dogrib expert. It notes that one recommendation (an examination of potential sources of contaminants in the mine area for caribou) has been followed up by the company, and that the company reports no unacceptable health risks for local wildlife populations. As for the rest of the recommendations, which deal with actions required pre- and post-approval for refining caribou management, the *CSR* notes merely that these have been addressed in previous Diavik responses or commitments in this or other sections of the *CSR*. No further treatment of these is provided.

In their conclusion, the RAs find that Diavik's project and cumulative effects on the herd and its habitat "would not likely significantly adversely affect the herd." And while the RAs "note" GNWT's concerns regarding the scientific uncertainty in Diavik's predictions, but they maintain that Diavik's methods were "adequate" in predicting potential effects to the herd. How they determined this, and what technical expertise was applied by the RAs in arriving at this conclusion, is not explained. Scientific expertise on caribou resides with the GNWT, so it is puzzling that the federal authors of the *CSR* could, and would, re-evaluate the scientific methods used in Diavik's assessment.

It is more puzzling since, in the May 10th draft *CSR,* the RAs "concur with the GNWT concern over ecological and technical uncertainty of both project and cumulative effects on caribou. The RAs accept the scientific uncertainty inherent in predicting potential environmental effects of the proposed project on the Bathurst herd and its ecology." *(emphasis added)*

An even more perplexing finding in the *CSR* is the RAs' conclusion that "caribou migration corridors and caribou energetics would not be affected by global warming

because the mine life is relatively short in terms of ecological change that may result from global warming."

With respect to cumulative impacts on caribou from other developments, the *CSR* identifies the concern raised by most of the participants in the comprehensive study process, including the GNWT, that numerous other projects and activities are underway or imminent in the Bathurst caribou range, and that the additive effects of these with the Diavik project have not been assessed. Despite this concern (raised also in this report), the RAs conclude that "there would be no direct project-related or cumulative effects if the project were to proceed." How this conclusion was reached, particularly in the face of consistent evidence that such effects have not been properly examined, is not explained.

It is an indefensible and unacceptable conclusion.

Similarly, with respect to the boundaries used for cumulative effects assessment, the RAs conclude that the spatial boundaries used by Diavik are acceptable. This, despite numerous concerns raised during the review, including the Dogrib caribou report, that there is no ecological or scientific basis to the boundaries selected. The RAs' conclusion comes with no explanation or justification.

To deal with cumulative effects, the RAs simply "encourage" the GNWT to address these concerns to be worked out later "in the context of the regional cumulative effects management framework and a Bathurst caribou management plan." Such a framework, the *CSR* states, will not be a condition of project approval.

In the original draft of the *CSR* the RAs correctly recognize the vagueness and uncertainties attached to the company's proposed mitigation measures:

> "Diavik's prediction of minimal project effects on caribou is therefore dependent on as yet unspecified mitigation and management techniques. Uncertainties in their effectiveness, absence of a specific regulatory instrument to ensure compliance and need expressed by aboriginal organizations, territorial government and the general public for co-operative development, implementation and reporting of these follow up programs must all be addressed as a condition of project approval in order to maintain public confidence in the long-term health and safety of wildlife."[79] (*emphasis added*)

This recognition has vanished in the final *CSR*. Here the RAs acknowledge only that Diavik's prediction of minimal project effects on caribou is dependent on "detailed mitigation and management techniques." And yet they never acknowledge that these techniques, as noted by both GNWT and the Dogrib caribou report, are unproven.

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79 *CSR*. April 11th draft. Sec.8.4.3.

The RAs conclude that the proposed mitigation techniques, as long as they are "adaptive and flexible", whatever this might mean, are satisfactory.

What line of thinking occurred between the initial and final versions of the *CSR* to justify this opinion is not described.

Despite *CEAA's* policy statement that,

> "RAs should give particular attention to the selection of future projects where certain and reasonably foreseeable projects may have an effect on the same valued ecosystem components as the project under assessment, where rapid development of the project area is anticipated, or where particular environmental sensitivities or risks are involved."[80] (*emphasis added*)

and the CSR's explicit recognition that,

> "The purpose of assessing cumulative effects is to determine if the combination and interaction of the environmental effects from past, present, and likely future projects and activities will create aggregate effects..."[p.221] (*emphasis added*)

the RAs then go to significant lengths to rationalize why a number of foreseeable developments have not been, and should not be, included in Diavik's cumulative effects assessment.

One of these activities is mining exploration. Mining exploration in the Lac de Gras area and elsewhere in the range of the Bathurst herd has been so intensive that there is evidence to suggest that caribou movements have been affected by aircraft activity (discussed elsewhere in this report). The Dogrib caribou report also pointed out that there is evidence in the Yukon where the intensity of aircraft overflights appears to be affecting caribou behaviour. The RAs rationalize the exclusion of exploration activity (both on Diavik's property and other mineral properties) from the cumulative effects assessment on the basis that such activity is temporary, occurs mostly in winter (untrue) when effects on habitat and wildlife are negligible, and that mitigation measures specified in land use permits ensure adequate protection. From this they conclude that,

> "the residual effects of exploration are negligible and the potential for cumulative effects with the proposed Diavik Diamonds Project are unlikely. This applies to exploration occurring within the cumulative wildlife study area and beyond to such projects as the Monopros diamond and BHP Boston gold exploration sites."

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80 Quoted in final *CSR*, p.221.

This conclusion seems to fly in the face of biological evidence and empirical observation to the contrary, and the technical basis for the RAs' finding is not provided.

The same holds true for the planned expansion of BHP's mining operations at the Ekati site. BHP's plans for developing the Sable and Pigeon open pit mines were known in the early fall of 1998, and applications were submitted to government during the winter. The planned project will extend the road network some 20 km to the north of the existing development, intersect two prominent esker systems, and create additional mining operations in the heart of the summer foraging grounds for the Bathurst herd. The RAs exempt this project from Diavik's assessment on the basis that,

> "an environmental assessment of the proposed expansion has not yet been completed by BHP. Diavik is not responsible for assessing the cumulative effects of its project and the proposed BHP expansion since the design details and environmental effects of the BHP expansion have not yet been determined and a cumulative effects assessment of the two projects would only be speculative at this time."

This is circuitous thinking. The implication here is that <u>any</u> future project does not have to be included in a cumulative effects assessment <u>until its design details are known and its environmental effects assessed</u>. It is hard to rationalize this position with the *CEAA* policy statement cited above, and begs the question as to the purpose of including future projects in any assessment project.

In the final *CSR* the RAs acknowledge that a follow-up program is required to ensure that no significant environmental effects to caribou are realized, and that Diavik will be required to modify its wildlife management monitoring program in accordance with the environmental agreement and/or land lease.

The conclusion from all this is that the *CSR* failed to deal effectively with the concerns of the Dogribs relating to caribou, and failed to deliver a rigourous and independent assessment of the issues.

Numerous deficiencies in the approach used by Diavik, and resulting high uncertainties in the conclusions drawn, identified by both the Dogrib expert and the government expert (GNWT biologists), were not resolved by the RAs in forming their conclusions. Indeed, in forming their conclusions there is no evidence they wrestled with the identified difficulties. No explanation is provided. The RAs are satisfied with Diavik's assessment and they concur with the company's findings that no significant adverse effects to the caribou will result. This is not a conservative position.

Further, the RAs recommendations to the Minister regarding conditions for approval and follow-up action are so unspecific and misdirected that they fail to provide the Dogribs with any meaningful assurance that the resource will be protected if the project proceeds. Unspecified monitoring programs are yet to be worked out, and unproven mitigation measures are to be relied upon. All has been left to be worked out in the context of unspecified post-project monitoring, the environmental agreement, a proposed regional "framework" for land use planning and management of the herd, and the details of the company's wildlife management programs. This package could have been formulated entirely without the environmental review. If all can be resolved at permitting, or with the striking of an environmental agreement, what, one might reasonably ask, is the purpose of an environmental assessment?

WATER

GEOCHEMISTRY PREDICTIONS

At the end of the community technical sessions DIAND Water Resources produced a summary of some 70 water-related environmental issues.[81] This document was prepared prior to the technical plenary sessions that occurred in the last week of January and early February, and notes that "some of the issues outlined may have been resolved through discussions with Diavik's technical experts during the Working Group meetings and the subsequent Technical Plenary sessions."

At this point in the review DIAND had identified the following issues with respect to mine drainage quality predictions conducted by Diavik:

1. metal leaching characteristics of tailings was for bulk tailings samples while the tailings management plan calls for segregation and separate disposal of fine and coarse fractions;
2. predictions do not explain why the company could assume neutral drainage from the waste rock dump when there is no apparent neutralizing capability in the granite;
3. the influence of size and distribution of biotite schist xenoliths on the formation of "hotspots" within the waste rock dumps was not addressed;
4. alternative methods of dealing with the biotite schist had not been addressed;
5. acidity calculations needed to be clarified;
6. potential build-up of contaminants in mill process water and tailings supernatant had not been adequately addressed;

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81 Water Resources Technical Review. March 8, 1999.

7. the basis for projected nutrient loadings from blasting residues is not clearly presented.

Items 2, 3, 4, 6, and 7 had been identified in the Dogrib review. Many other concerns were not identified by the Water Resources' review, including, for example:

1. over-estimation of neutralizing potential;
2. under-estimation of acid generation and metal leaching potential;
3. quality control problems in geochemistry lab work;
4. data inconsistencies between documents;
5. total metal concentrations in mine effluents not predicted;
6. poor match between predicted and observed metal leaching rates;
7. high analytical detection limits;
8. deficiencies in thermal modeling of waste piles.

The *CSR* notes that the Dogrib submitted its consultant's evaluation of Diavik's geochemistry work to the public registry, and that this report "raised many of the same concerns that were previously described by the RAs and discussed during the technical sessions." The *CSR* notes that Diavik subsequently responded directly to the Dogribs, and that these responses "provided additional information to address the concerns raised." The *CSR* then concludes that the concerns raised by the Dogribs' consultant on geochemistry issues have been addressed in Diavik's response, and that the concerns are more appropriately considered at the regulatory phase. There is no indication that the RAs independently considered the issues raised by the Dogribs' consultant, or had the report reviewed by an expert. The basis for their conclusion that the issues had been addressed in Diavik's response is not provided. In fact, most of the issues have not been satisfactorily addressed, as discussed previously in Parts 3 and 4 of this report.

During the plenary technical sessions at the end of February, these issues listed above were discussed. The DIAND geochemistry expert noted that the ability of the granite waste rock to neutralize acid drainage generated by the schist had <u>not</u> been adequately demonstrated, and that he disagreed with Diavik's contention that drainage from the waste rock will not be acidic.

A plan for the segregation and management of the biotite schist was requested from Diavik. Diavik agreed to do this, but maintained they did not have the data at this point to demonstrate that the schist could be segregated. Diavik also admitted during this meeting that capping the waste dumps at closure may reduce the volumes of water flowing through the dump, but will have no effect on the quality of drainage since oxidation will already have started, and capping does not stop the process. The DIAND expert agreed with this notion.

DIAND then took the position that the issue of acidic drainage could be handled at the licensing stage, so the issue was resolved in the plenary by noting that the *CSR* should specify that Diavik must implement a collection and treatment system and develop plans for segregating schist for specific management and for capping or other equivalent engineering techniques. Also, the security posted for the project should be sufficient to allow mitigation by any of these techniques in perpetuity.

The *CSR* is very confusing on this topic, and there is no apparent technical resolution of this issue at the end of the day. First, Water Resources acknowledges early in the drafting phase that the waste rock piles represent the largest potential sources of impact due to the potentially acid-generating biotite schist, and that "there is potential for widespread acid seepage from country rock produced during the early years of mining the A541 pit."[82] In other words, long before capping the dump (one of the proposed mitigation measures) could be executed, oxidation within the waste rock will be well underway and the internal temperature will be rising. Water Resources states that while Diavik has "committed" to segregate the schist, it elsewhere notes that the company has contradicted the plan rationale by verbally stating that segregation is probably impractical. This contradiction is never resolved.

Further, since the environmental impacts of sub-aqueous disposal of schist have not yet been evaluated, Diavik would be required to do this before implementation. In other words, without knowing the potential impacts, Water Resources attempts to secure Diavik's commitment that lake disposal will be implemented. What the alternative for handling segregated schist might be, in the event that the assessment is unfavourable, Water Resources does not describe.

The issue of how to handle the biotite schist, during operations and post-closure, is still not resolved in the final *CSR*. Despite the fact that the RAs acknowledge that Diavik's plan for disposal of biotite schist addresses only occurrences of large, manageable "units", and that the company has concluded that there are no such units and, further that there are no geochemical benefits of segregating schist, the RAs take the position that Diavik must implement the *Biotite Schist Management Plan* "to the fullest extent possible using currently available technologies." [83] This apparently means disposal of large blocks of schist in Lac de Gras. The rationale for this position, especially with respect to its unproven environmental consequences and Diavik's conclusions that it is unworkable, is not provided. Unlike the initial draft of the *CSR*, the requirement for Diavik to assess the environmental impacts of implementing its alternate disposal options for the schist has been removed.

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82 CSR. April 11th draft. p.8-27

83 Final *CSR*.. p.144.

This is not conservative management.

In terms of closure options for the waste rock piles, the final *CSR* notes that Diavik identified two: continue to collect and treat water prior to discharge for as long as it takes; or cap the country rock with a low permeability cover. With respect to the first option, the *CSR* states that Environment Canada, DFO, DIAND, and aboriginal organizations "did not believe that treatment in perpetuity or some other unspecified future time was technically or economically feasible."

With respect to the second option, evidence discussed above shows that capping is unlikely to be an effective mitigation for acid generation, since there will be a lag time between the onset of oxidation at the beginning of waste rock disposal and the opportunity to cap the rock at the end of waste rock disposal. The unlikely success of capping the waste rock was recognized previously by DIAND's geochemistry expert, yet now the RAs inexplicably conclude that acid rock drainage can by mitigated capping, or some other unspecified "equivalent engineering technique".

Neither strategy was acceptable to the participants, and the matter of post-closure management of acid drainage is never properly resolved by the RAs.

In the final *CSR* the RAs acknowledge Diavik's predictions for "high magnitude, long-term" residual effects from increases in phosphorus, cadmium and chromium in surface run-off. But then they conclude that, on the basis of a "revised model" supplied by Diavik showing smaller changes due to phosphorus than originally predicted, these changes will not be detrimental to the overall water quality of Lac de Gras. The shift from a situation of potentially high magnitude, long-term potential impacts to none has not been explained here. Neither is it justified, especially if solely on the basis of a model supplied by the proponent. As explained previously in relation to caribou, models as stand-alone tools for predicting impacts are not acceptable—they need to be corroborated with empirical data. Moreover, the RAs say nothing here about their position on the cadmium and chromium problems. It must be stated that the RAs' conclusion that post-closure surface run-off will not be detrimental is not conservative given the potential risk at hand (as described above) and the possible irreversibility of the effects.

Finally, the RAs state that, in addition to Diavik's mitigation measures,

> "Diavik shall undertake the additional mitigation measures identified by RAs in order to ensure that significant adverse environmental effects would not occur."

This statement is presumably to lend some level of comfort that any residual effects, while not identified, will ultimately be taken care of by the RAs' additional mitigation measures, whatever these may be. This is an irresponsible and arrogant approach to

environmental assessment—we may not know what the effects will be, but rest assured that we can come up with ways of mitigating them!

Again, it begs the question—why have an environmental review stage? Why not send project applications directly to permitting where, even if the potential impacts have not been assessed, permits can be issued with conditions to trigger mitigation and monitoring where and when needed. While this is the net effect of the RAs' position on many of these issues, it is practice that should not be condoned. Without a proper understanding and resolution of these serious issues at the environmental review stage, the project should not be referred for licensing.

WATER BALANCE

The viability of the company's operating water balance was still in question by the time the public technical sessions were concluded, and it was still in question during the development of the *CSR*. An early draft has the RAs noting that "a number of surface water management components of the proposed project will not be fully available from Diavik until the regulatory stage." The RAs state that while Diavik has addressed the environmental assessment components of the east island, they "expect that Diavik will substantiate its position regarding design-related effects at the regulatory stage", concluding that it is

> "appropriate and acceptable to address these components at that time. The following items will require substantiation by Diavik:
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> - overall water balance - Diavik must substantiate the basis for the PKC facility water balance. A comprehensive explanation is required of all input variables, the impact of climate change and a model sensitivity analysis including scenarios of successive years of unusually low or high amounts of precipitation.
> - North Inlet - implications of reduced storage capacity in North Inlet and the required capacity of the water treatment facility (February 1999 concept), must be fully addressed by Diavik. The ultimate mitigation and abandonment of the delta-beach at the west end of the North Inlet must also be described."[84]

These two issues represent substantive deficiencies that ought to be addressed at the environmental review stage—<u>not</u> at permitting. Surely the effectiveness of the PKC to safely contain tailings, waste rock drainage, and other mine site effluents, and the ability of the north inlet to handle pit inflows that may be 10-fold higher than predictions, are strategic and critical issues for environmental approval. Is the system

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84 *CSR*. May 4th draft.

going to work, or isn't it? The RAs do not explain the basis for suggesting these potentially significant issues can be dealt with at the regulatory level.

The final *CSR* does not identify that these substantive issues are still unresolved. The RAs comment only that, "Diavik would however be expected to provide more detailed information on overall water balance and the use of the North Inlet at the regulatory stage."[85]

CONTAINMENT

During the technical review stage Environment Canada noted that Diavik's assumption that permafrost will be an effective barrier between the tailings pond and groundwater needs to be proven.*(emphasis added)* The agency recommended more detailed analysis, as well as follow-up field monitoring of ground temperatures.[86] This was required, they said,

> "in order to validate the assumption that permafrost surrounding the process kimberlite containment facility will provide an impermeable barrier between the facility and the East Island ground water." [87]

The final *CSR* is silent on the requirement for more up-front work, without explanation, and notes only that the RAs support Environment Canada's recommendation that,

> "Diavik develop a monitoring program to validate its prediction that permafrost surrounding the PKC facility will form an impermeable barrier between the facility and East Island shallow groundwaters."

This is not an acceptable treatment by the RAs of the uncertainties regarding safe containment of PKC effluents. Critical, pre-approval work to test the assumption that permafrost would be an effective barrier—DOE's original position—has been jettisoned. No contingency plans have been asked for. No evidence has been presented to demonstrate that permafrost can be considered an impermeable barrier and an effective mitigation technique for preventing groundwater contamination. The acceptance of Diavik's assumption that there will be no escape of effluents from the containment, recommending only follow-up monitoring to test the prediction, is not sound environmental assessment or management.

Diavik reportedly examined 3 alternatives for the construction of the tailings containment, two of which included a low permeability liner under the pond. Diavik rejected the options with liners. In reviewing the options, the RAs noted that,

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85 Final *CSR*. p.141

86 Interim Report - Environment Canada. February 22, 1999.

87 Environment Canada Post-Technical Session Recommendations. March 31, 1999

> "in the long-term there is always a risk of seepage due to puncturing of the liner material. Alternative #3 is therefore the preferred alternative from environmental and economic perspectives."[88]

On that basis the RAs agree that Diavik's preferred option is acceptable. No technically defensible explanation is offered. Indeed, an explanation would be challenging to muster. To be sure, there are always risks to the use of liners from punctures that develop during installation or settling of the foundation during use, but that is no reason not to employ them in high-risk situations to further reduce risk. Are the RAs taking the position that, because of the risk of puncture, liners should never be used? This would be nonsensical, but it appears to be the only reason why they agreed to Diavik's choice of not using liners. Even though it is accepted that liners have risks of failure, they are routinely employed in mining operations around the world in order to enhance mitigation and further reduce risks posed by using unlined impoundments.

PIT INFLOWS

The issues relating to the potentially high variability in pit inflows have not been resolved in the *CSR*. As late as May 4th both DIAND and Environment Canada felt that <u>further study</u> <u>was required</u> on the quantity and quality of groundwater being pumped from the open pits and underground workings since,

> "...<u>minewater represents a major potential contaminant</u> and volume source to surface water"[89] *(emphasis added)*

In the final *CSR*, the requirement for further investigation of pit inflows has been dropped, without explanation. Instead it is stated that,

> "The RAs recognize that some information will not be available until detailed engineering design is finalized, however certain items raised during the technical review are highlighted for attention during the regulatory stage:
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> - a presentation of the open pit and underground mine design to show how Diavik will effectively manage the potential for groundwater ingress that exceeds predicted rates during the mine life. Additional components and planning measures should be presented that can address the probability of mine inflows up to 2 times higher than Diavik's averaged "base case" (40% probability), up to 5 times higher (30% probability), and up to 10 times higher than the "base case" (18% probability);

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88 Final *CSR*.

89 *CSR* - May 4th draft. p.8-47.

- the need for detailed plans to adequately address year-round water and ice removal from the open pit and water removal from underground mine areas, and
- given the possibility that averaged mine inflow rates could be consistently higher than predicted, Diavik should describe the reserve capabilities of the North Inlet and treatment equipment to mitigate higher volumes of potentially poor water quality, (e.g. phosphorus and TDS loads)."

The RAs' position is unacceptable since this is an issue with huge ramifications for the treatment plant and lake water quality, and it has not been properly addressed. DIAND correctly identified earlier that pit inflows may be 10-fold higher. It is readily conceivable that they may be even higher than this.

The RAs have taken the position, without justifying it, that these issues are merely regulatory ones, that monitoring and contingency plans will mitigate the impacts, and that the fine-tuning of a water licence will be adequate to protect the environment. But what are the implications for the storage capacity of north inlet if averaged pit inflows are 330,000 cu metres per day instead of 33,000 as predicted by the company? What does this mean for the water treatment plant? What are the implications for the predicted dissolved solids, nutrients, and metals used in Diavik's water quality and biological assessments? We do not know.

Monitoring is not a mitigation measure. It cannot be used as a means of justifying acceptance of an unevaluated impact. Monitoring will tell us only after-the-fact if we have a problem or not—mitigation at that point may or may not be possible.

The same holds for contingency plans. In this case, the proposed contingency is highly speculative. Diavik has stated that they might use grouting in the pits to reduce water flow through the pit walls. Diavik's studies reveal that grouting will only partially reduce the flows. Its true feasibility in arctic conditions remains untested—substantially increased flows over those predicted could still occur. Once the groundwater taps are turned on, they may be impossible to stop. Mitigation may not be possible, and, if mitigation with grout is used, the increased groundwater pressures behind the pit walls could make the pit walls unstable and unsafe.

More important, Diavik's toxicity testwork illustrates that the most toxic mine water component tested was mine floor water with high concentrations of grout. What are the implications for the water treatment plant and discharge quality to Lac de Gras of volumes of groundwater that may range from the predicted maximum of 33,000 cu metres per day to 10 times that? Will the water treatment plant effectively remove grout? If not, what are the biological implications for aquatic life in the Coppermine

system? Other than Diavik's assurance to the Working Group that the plant will be able to handle grout, we have no information.[90]

CADMIUM

Diavik's *EA Overview* characterized the company's initially predicted rates of cadmium leaching from dike rocks as having high uncertainty. In the March 23rd cadmium workshop, Diavik presented new information claiming to show that the leach rates are unlikely to be as high as first indicated. The deficiencies with respect to the company's re-assessment of this issue are discussed earlier in this report.

The *CSR* states that the company's predictions of cadmium losses from the dikes are conservative, and that the likelihood of detectable increases in concentration is low. No justification for this conclusion is present. DIAND's expert on geochemical processes was not present at the March 23rd meeting, and it is not known if the RAs subjected Diavik's revised calculations on cadmium mobilization to any expert review. Given the serious concerns raised earlier in the process by the RAs on cadmium, as well as lack of any means of mitigating cadmium release, it is imperative that this issue be independently assessed and the RAs' position justified.

The RAs did review the potential biological effects of cadmium and concluded that direct effects on adult fish would be unlikely, as fish would not spend extended periods in the zone of effect. The case studies examined involved higher cadmium concentrations than expected for Diavik, and showed that approximately 95% of cadmium added to a lake was lost to the sediments. Information was not available to assess the potential effects to fry, although cadmium exposure to lake trout eggs revealed no effects. Although reproduction of some species of zooplankton may be impaired, the potential effect was not considered significant. The RAs conclude that releases of cadmium into Lac de Gras will have no significant adverse effects. On the assumption that Diavik has accurately estimated cadmium releases into the lake, this conclusion may be reasonable. Not provided is the rationale for assigning significance, or how the determination was reached that impairing the reproduction of lower trophic animal species is not considered significant and is acceptable. The range of uncertainty surrounding this position is also not identified.

Follow-up monitoring is recommended by the RAs for determining cadmium concentrations in lake water, sediments, biota, and interstitial water in the dikes.

WATER TREATMENT TECHNOLOGY

Since the proposed water treatment is the single most critical variable in the protection of the aquatic environment from the project, examination of proposed

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90 Letter to Violet Camsell-Blondin from Murray Swyripa, May 14, 1999.

water treatment plant, as well as viable alternatives for water treatment, should have been a priority goal for both Diavik and the government. It wasn't. The issue of whether the proposed treatment process was up to the task facing it was not addressed in the comprehensive study process. The RAs have assumed that the generic water treatment process proposed by Diavik will do the required job, and that the details of what performance it is to achieve can be worked out at the regulatory stage. The challenges facing the water treatment plant, many of which were not identified by Diavik in its *EA Overview*, are complex. An independent review of water treatment processes available to handle the array of substances that need to be removed should have been undertaken by government.

Establishing the viability of the proposed treatment, given what is at risk, is an environmental assessment task, not a regulatory one.

Furthermore, potential alternatives (reverse osmosis and ion exchange) that could have significantly reduced the input of contaminants to Lac de Gras were rejected by the company prior to the environmental assessment on grounds of economic costs. No substantive analysis was presented by the proponent to demonstrate the environmental benefits of the alternatives, nor their economic unfeasibility. Nor did the government request these. The RAs simply concur with the proponent's decision about what treatment options are acceptable. There is no discussion, and no evidence that an independent appraisal of alternatives was undertaken.

ECOLOGICAL IMPACTS

Since Diavik has committed to treat all effluent from the proposed mine to achieve ambient thresholds for aquatic life and drinking water within the 60 m mixing zone, with the exception of phosphorus, the RAs conclude in the *CSR* that no significant adverse environmental effects are likely. Since there was no substantive description of water treatment system by Diavik, nor any independent review of the proposed mitigation measures by the RAs, this conclusion is unfounded. The RAs have simply accepted Diavik's word that the job can be done, and that the means of doing it can be determined at the water licensing stage.

One of the more acknowledged significant issues affecting Lac de Gras water quality is the discharge of phosphorus from the pit inflows. During the technical sessions there was much discussion about whether the baseline conditions for phosphorus levels in the lake had been properly determined, and whether the concentrations of phosphorus predicted in the lake water over the project's lifetime were accurate.

To resolve some of these, the RAs sponsored a nutrients workshop utilizing their experts pool. The workshop appeared to resolve a number of issues, including the fact that Diavik's revised phosphorus model showed that likely levels of phosphorus

in the lake would be lower than earlier estimated. Significant adverse environmental effects over the long-term were considered by the RAs to be unlikely. Nonetheless, since it was recognized that uncertainties about all this still existed, the need for additional studies was acknowledged and recommended.

The initial draft of the *CSR* rightly acknowledged the uncertainties regarding the effects of changing the trophic conditions in the lake:

> "Effects of increased trophic status cannot be predicted with any certainty..."[91]

The final *CSR* omits any reference to the uncertainties in predicting effects to changes in trophic status. It does state that, in regard to phosphorus, "although lake-wide enrichment can be expected, increases beyond 40% tend to be confined to 20% of the surface area of Lac de Gras adjacent to the mine site." There is no discussion about the significance of greater than 40% increases in this area.

The RAs note that, on the basis of a "revised" model for predicting phosphorus concentrations, there will be smaller changes to the lake water quality than originally predicted by Diavik, and that such changes will not be "detrimental". What this means, and how the determination was made, is not explained.

As a result of "revised phosphorus modeling and assumptions", the RAs conclude that there would be no significant adverse residual effects of nutrient enrichment on Lac de Gras during operations and post-closure. As mentioned earlier, simply revising models and assumptions is hardly a credible technique for mitigating impacts—more rigourous and independent investigation of the issues was required. A worst case scenario would have examined the effects of phosphorus (and metal) loadings from an order of magnitude higher inflows than utilized in the assessment, for DIAND recognized that such flows are a distinct possibility.

In reaching their determination of insignificant effects, the RAs are at variance with what the experts at the nutrients workshop told them. The experts disagreed with Diavik's use of threshold levels for phosphorus, stating that there is a linear relation between loadings and effects, and that the concept of thresholds for phosphorus was not valid. Moreover, the RAs do not explain the basis for stating that no significant adverse effects will occur simply because the phosphorus levels are met at a totally arbitrary threshold at an ecologically irrelevant mixing zone boundary. Again, the definition of significance is not provided. The determination of impacts is left to post-approval monitoring and *in situ* studies.

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91 *CSR* April 11th draft.

CONCLUSIONS

The *CSR* does not treat substantively the water issues associated with the Diavik project. There is a consistent pattern of reaching conclusions that significant adverse effects are unlikely without a meaningful explanation of how the conclusions were reached. For many of their findings the RAs did not make consistent use of independent expert review to justify their positions, and any use of experts during the evolution of the *CSR* has not been transparent.

The *CSR* missed a number of critical aspects of Diavik's work identified by the Dogrib review, including a general pattern of underestimating adverse water quality conditions during operations. The RAs made no independent assessment of the Dogrib issues.

The combined, interactive effects of all releases of contaminants and nutrients to Lac de Gras have not been assessed, so that at the end of the review we have no reliable picture of the potential changes to the aquatic ecosystem of the upper Coppermine. It could turn out to be as insignificant as the RAs conclude or, given the high levels of uncertainty about many aspects of the predictions (including biological effects), it could turn out to much worse. As is the case for caribou, we will only have the answers for water some years into the future.

The recommendations put forward to the Minister by the RAs follow a pattern of stating that more details, usually unspecified, will need to be brought forward at the water licensing stage, and that a number of monitoring programs will need to be implemented following project approval to test the accuracy of Diavik's predictions and inform possible mitigation needs. In the end, the *CSR* does not deliver a high level of comfort that the Dogrib interests in maintaining the quality of water at Lac de Gras will be achieved.

MINING APPROACHES

The *CSR* states that "alternative means of carrying out the proposed project were considered by Diavik and by the RAs through independent analysis." This is extremely misleading. In reality, there was no independent assessment which rigourously evaluated the alternative means of developing the project.

An independent study was commissioned by DIAND, but the product was restricted to a technical examination of alternate approaches to conducting open pit mining while reducing the mine footprint in the lake. It did not address the key issues. The study's stated purpose was to assist the agency in determining if there are alternate ways to mine which could reduce the footprint and potential environmental impact; specifically to,

a] review mine design criteria in order to assess the technical feasibility of the proposed and any alternative mining methods; and,

b] to prepare a report to provide information on the proposed methods and any alternative methods considered for inclusion in the CSR." [92]

Note that while preamble here implies that environmental viability is going to be examined, the specific objective restricts the investigation to technical feasibility. Too bad, because a properly framed independent evaluation would have addressed the economic and environmental aspects of alternative approaches—a task crucial to the environmental review. In this case, the terms of reference resulted in the independent study examining only the technical feasibility of various combinations of open pit and underground.

As explained previously, the economic and technical feasibility of an all-underground option was not examined. This option was rejected early by the proponent as being uneconomic, this position was never questioned by the RAs.

The RAs' position on this is perplexing given that Diavik, its independent expert (Kamcot) and the RAs all agree that an all-underground option has, by all appearances, the least potential environmental effect. However, the RAs concurrence with Diavik's position meant that a proper environmental assessment of it was never carried out.

It is even more perplexing since Diavik's pronouncement of economic nonfeasibility was suspect from the start. The *CSR* even acknowledged that one of the findings of the independent study was that "the decisions made by Diavik for the purposes of environmental assessment are made on pre-feasibility level designs and are limited by the availability of information."(*emphasis added)* In other words, the decision to drop the all-underground option was made prior to proper feasibility work being undertaken which would have demonstrated its economic viability one way or the other.

The concurrence of the RAs with Diavik's early decision to drop the all-underground option is inexcusable, and has had a profound detrimental effect on the effectiveness of the environmental review.

In summarizing Diavik's rationale for selecting its preferred option, the *CSR* contains the following incongruous statement:

"Alternative 3 was selected by Diavik as the preferred alternative since it would best achieve its objectives for the project, in that the design would

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92 Kamcot International Ltd. Diavik Diamonds Project Mining Issues Review - Summary Report. March 29, 1999.

> minimize environmental effects while maximizing employment and business opportunities for northerners and would provide an optimum return to investors, to government and to the Canadian public."*(emphasis added)*

This is hardly a credible statement. Alternative 3 maximizes potential environmental impacts. Moreover, since the needed economic work has apparently not been conducted, the conclusions about maximizing economic benefits are unsubstantiated—at no time did the comprehensive study process seriously investigate these issues and draw defensible conclusions about them.

In drawing their conclusions, the RAs simply concur with the proponent that:

1. Diavik has considered reasonable alternative means of mining;
2. Alternative 1 is not economically feasible;
3. Alternative 3 is the preferred mining method;
4. Diavik's "proposal" to maximize mine life as well as return on investment is to be "supported";
5. Diavik's policy of continuous improvement is to be "supported";
6. Diavik is required to "consider" mine plan improvements on an on-going basis.

These conclusions are listed without any discussion or justification by the RAs. Conclusions 5 and 6 are so vague as to be meaningless and unenforceable. Conclusion 4 is potentially contradictory and therefore ineffective since the proponent will resolve this in their favour. (Besides, as identified in Appendix C, the underground-only option extends mine life beyond Alternative 3 by one year.) Conclusion 3 is undoubtedly true for the proponent, but how is this determined from the perspective of government? Are the RAs stating here that they prefer this mining method, even when it has by far the most significant environmental risk attached? How is this position reconciled with their mandate for environment review? Where is the RAs analysis to come up with this determination? Conclusion 2 has not been demonstrated, and my analysis in Part 5 suggests the opposite is true.

My conclusion is that the treatment of alternative mining approaches in the final *CSR* is an intellectual void. The RAs have not dealt with this issue of mining alternatives in a technically rigourous manner, and their conclusions are not defensible. For the most part, they have accepted Diavik's analysis of the economic, technical and environmental aspects of the three alternatives, and its choice of mining approach, without any substantive independent analysis.

USE OF EXPERTS

The role of the experts pool was defined at the outset of the comprehensive study process. Among other things, the terms of reference for this group were to review and comment on the proponent's environmental assessment documents, and to review drafts of the *CSR*..[93]

DIAND Water Resources contracted about seven outside experts to assist in their technical review of Diavik's material. The only visible role these experts had was their involvement in the relevant technical sessions in the communities in the early stages of the review. Here, it is clear from the transcripts of the meetings, they played an extremely valuable role in raising important concerns and identifying issues requiring resolution.

Beyond this it is not clear what subsequent involvement they had, particularly once the drafting of the *CSR* was underway. As far as I can ascertain, there were no technical reports or analyses prepared by the experts, at least which were explicitly identified as such, that were made available on the public registry. At the end of the technical sessions we have no idea what the independent experts were thinking and what they concluded on the balance of evidence. This would have been most helpful. Whatever technical material they did provide seems to have been assimilated, in an unattributed and unidentifiable fashion, into other documents prepared by the agency. The independent voice becomes lost, and the participation, if any, of the experts in the various drafts of the *CSR* and in reaching conclusions is not evident. Thus, when compromises on issues are made from one draft to the next, it is not clear whether the experts agreed to the decisions or recommendations ultimately made.

This is unfortunate. The role of independent and specialized expertise is invaluable to a review such as this because the proposed project will demand an engineering sophistication that is not common to the Canadian experience. Independent expert review is critical not only because it makes the assessment more technically robust, but also because independent critical thinking can be seen to have been brought to bear on substantive issues in a consistent and thorough way. The first objective may have been achieved, but because the second objective was lost half way through the review, all becomes obscured.

At the conclusion of the assessment we have no idea what the contribution of the various experts was to the final conclusions drawn in the *CSR*.

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93 Comprehensive Study Management Structure. September 30, 1998. Issued by DIAND, DFO, and NRCan.

CONCLUDING REMARKS

This short review of the *CSR*, far from comprehensive, is sufficient to demonstrate that in a number of critical areas for the Dogrib the process conducted by government failed to deliver technically defensible conclusions and recommendations.

For caribou the RAs agreed with the company that significant adverse effects from Diavik's project, and other projects in the herd's range, were unlikely. This conclusion was reached with an unproven and unreliable methodology applied to too few data, particularly with respect to the complexity of the caribou ecosystem and the high variability which characterizes it. Given the substantive deficiencies and uncertainties in Diavik's caribou work, the RAs findings are not conservative, and err on the side of increasing the risk to the herd.

The same holds true for the water and aquatic resources of Lac de Gras. The overall picture of the combined, interactive effects of Diavik's various effluent releases to Lac de Gras has not been fully described or comprehensively assessed in the *CSR*. The assessment has been done on a piecemeal basis, and we do not have an integrated picture of what is likely to happen to the lake in the long-term. Much uncertainty characterizes the picture we do have.

Despite the fact that there is no apparent precedent for mining a wet open pit in an arctic environment, that Lac de Gras is a rare resource with extremely pure water and sensitive aquatic components, that Diavik has consistently underestimated water quality and volumes to be managed, that closure issues with respect to treating drainage from the waste rock and tailings have not been resolved, that we do not have an integrated or reliable picture of what will happen to Lac de Gras over time, and that the environmentally worst alternative has been selected by the proponent, the RAs concur with essentially all of Diavik's findings and recommend the project as suitable for licensing.

This is not conservative, not sound environmental decision-making, and not acceptable.

At one point the *CSR* acknowledges that the study participants, including the RAs, agree that a permanent water treatment plant is not technically or economically feasible, and yet it does not then wrestle with the evidence put forward by the experts that any other mitigative measure for controlling post-closure drainage are unlikely to be effective. If Diavik has underestimated the quantity and quality of its various discharges and releases, then the entire suite of impact predictions is called into question. The RAs' position of unlikely significant adverse effects rests entirely on Diavik being accurate with its predictions—something this report suggests is not plausible. Despite having recognized, for example, that pit inflows may easily be ten-

fold higher than predicted by the company, no consideration of this has been made in the impact assessment.

In the end, the RAs deal with these unresolved environmental assessment issues by simply shifting their resolution to the regulatory stage. The formula for resolving these at licensing is to require the proponent to produce more information, and to conduct monitoring and studies after the project has been licensed.

From the perspective of Dogribs who, at the end of the project, will be living with the environmental costs it ultimately has imposed, the *CSR* does not deliver a package that properly considers, or will protect, their interests.

PART SEVEN
CONCLUSIONS

The goal of environmental assessment is to demonstrate that the potential effects of a project are reasonably well predicted and that, where required, effective mitigation is available and practical. It should also address uncertainty by ensuring that appropriate mitigation, monitoring, and adaptive management can be undertaken so as to deal effectively with the uncertainties. This goal has not been reached for the project at hand.

It is the view of the proponent, and the RAs, that the issues discussed in my report are more appropriately dealt with at the regulatory stage than at the environmental review stage. However, this misconstrues the purpose of an environmental review. Licensing and regulatory approval have a different task. The objective there is to establish the specific terms and conditions under which the project can safely and responsibly operate. Proving environmental viability must precede this step. In the case at hand there is a sufficient collective weight to the matters raised with respect to caribou and water that the overall environmental acceptability of the project is far from demonstrated, and that cumulative risks and uncertainties are very significant. This is certainly true from the Dogrib perspective.

If the project were to proceed to permitting on the basis of what we now know with any certainty about the project, it can reasonably be stated that the ultimate effects to the caribou and the water of the upper Coppermine are almost completely unknown, and any plans to deal with potential effects are mainly speculative.

The importance of this concern with respect to the Daivik project is very clearly shown by the fact that the regulatory regime in NWT has proved itself incapable of dealing effectively with substantive environmental issues. Recent history here is all too clear on this point.

An environmental disaster is in the making at the Giant Mine, a typical underground gold operation, because of huge volumes of arsenic trioxide stored underground—an action permitted by government when the project was first licensed. Cleanup is currently estimated at about ¼billion dollars, although no solution for permanent, secure disposal has yet been identified. Since the owner has now gone into receivership, it is the Canadian public who will bear the costs of cleanup, and the residents of the north who will bear the environmental costs if reclamation fails. Clearly, proper environmental assessment did not occur in this case.

Clearly, too, the regulatory regime was not competent to accurately determine the environmental hazard created and to identify appropriate, workable closure options.

It still isn't. The solution then was simply put off consideration of the problems until closure.

Another disaster is in the making at the recently closed Colomac mine. In this case, incompetent management and poor enforcement has thwarted sound environmental operation and effective decommissioning of the property. It has, instead, resulted in an emergency situation where rising cyanide-laden tailings effluent had to be pumped to an abandoned pit to avoid over-topping the tailings pond and contaminating the Snare River system.

At a recent Water Board hearing on this project, DIAND regulators described a long list of examples where the company had not complied with regulations, had not listened to its consultants, had not responded to directives from the government, and had left a mess behind. Bad construction practices, ignoring construction schedules, ignoring advice of geotechnical engineers, not filing as-built drawings following construction, no expert supervision during construction, were prevailing patterns at the mine's operation.

The regulators had relied too long on the company to do the right thing. DIAND finally responded to environmental issues by commissioning independent reviews of the tailings management problems. These revealed that cyanide levels in the pond were greater than stated by the company, that cyanide would take longer to degrade than predicted, that the predicted water balance and rates of inflow to the pond had been miscalculated, and that the liner was some 10 ft below the elevation needed. Further, emergency handling of the tailings by means of a water treatment plant was not feasible, partly for the reason that the temperature of the water would not allow treatment of cyanide at fast enough flow rates to match the water balance—an aspect of water treatment that suggests closer scrutiny of Diavik's proposal than has been made to date.

The chairman of the Water Board was moved on several occasions during the hearing to express his inability to understand how so much could go so wrong, and why nothing was ever done about it along the way. At one point he asked, "what does it take to get charged up here?" In response, DIAND described their policy of attempting to negotiate with operators to get them to do the right thing, since taking the issues to court requires too much time and effort. The chairman admonished the enforcement people by stating, "For God's sake don't let this happen again. We have

already got enough mini-disasters running around the north and we know better nowadays!"[94]

Do we know better nowadays, or is history about to repeat itself? The Colomac example is extremely relevant to the Diavik project, since it exemplifies why environmental issues should not be postponed to the regulatory stage. Luckily, Colomac had flexibility in the emergency described by diverting tailings effluent to an empty pit—Diavik has no such contingency. The long-term situation at Colomac, however, is still not resolved, and the costs of closure will be borne by the Canadian public. The environmental costs will be borne by the Dogrib people in whose lands the receiving waters flow.

An independent assessment of government's ability to properly and independently address the necessary issues at the regulatory level was conducted for the BHP approval process. This evaluation revealed fundamental weaknesses in government's approach and its positions, and concluded that third party interventions, such as that conducted by the Dogrib Treaty 11 Council at the Water Board hearings, were likely to do a more rigourous job of reviewing the project.[95]

For the Diavik project the RAs are placing great reliance on regulatory instruments, such as the water licence, to do the required job of protecting the environment. It is the terms and conditions in the licences and permits, they contend, that will ensure that the company meets certain environmental protection standards. But when it turns out that compliance is not possible, or not consistently achieved, the government response is to negotiate with the operator, and <u>not</u> enforce the law. DIAND's policy is explicit on this approach, and the Colomac example illustrates well its dismal failure. Why should the Dogribs place any trust in the regulatory and enforcement processes to deliver the environmental protection they need? There is <u>no</u> evidence to show that it will work.

It must be stressed that the RAs who are here recommending approval of the Diavik project are some of the same agencies which permitted and allowed Colomac and Giant to operate, even in the face of evidence that sound environmental management was not being achieved. These mines were allowed to operate with little effective enforcement and no approved plans for closure and reclamation. The agencies are still doing it—a new water licence is about to be issued for the Colomac operation, even though an approved *Abandonment & Restoration Plan* is not in place.

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94 Gordon Wray. NWT Water Board Public Hearing into the Application for Renewal and Amendment of Licence N1L2-1563, Water Use and Waste Disposal in a Mining and Milling Undertaking by Royal Oak Mines Inc.-Colomac Mine. March 2, 199.

95 Canadian Institute of Resources Law entitled "Independent Review of the BHP Diamond Mine Process". June 30, 1997.

Regarding Diavik, it cannot be unequivocally stated that an environmental disaster is in the making or, conversely, that the project will blend into history with little significant lasting effect upon the landscape. But it can be said the environmental risk posed by Diavik's proposal is substantial, and that this risk could be greatly reduced by pursuing an all-underground approach to mining. It can also be said that the range of uncertainty with the present assessment of potential effects is so high that we simply cannot predict the outcome.

The purpose of the *Canadian Environmental Assessment Act* will be thwarted if the project is allowed to proceed to licensing with so many fundamental questions unanswered. The proper course of action is to ensure that the critical unresolved issues and uncertainties are resolved at the environmental assessment stage. The *Act* provides a mechanism for doing this. The work not completed by the *CSR* should be moved to further review under an independent environmental assessment panel.

Appendix A

Dogrib Diavik Working Group

BECHOKO

Violet Camsell-Blondin (Co-Chair)
Joe Migwi

GAMETI

Fred Mantla
Harry Simpson

WEKWETI

Alexi Arrowmaker
Adeline Judas

WHATI

Alphonse Nitsiza (Co-Chair)
Philip Nitsiza

RESOURCE PEOPLE

Ted Blondin - Coordinator
Zabey Nevitt - Dogrib Environmental Coordinator
Tony Pearse - Technical Advisor

Appendix B

Diavik Working Group - Schedule

Aug 18 1998	Diavik Working Group mandated by resolution at Eighth Annual Dogrib General Assembly in Whati.
Oct 16 1998	DWG Meeting No.1 at Behcho ko First workshop to review Diavik project, CEAA process, and develop workplan. Technical resource team begins review/collection of documents
Oct 30 1998	Working Group tour of Lac de Gras site; including presentation by Doug Willy on project description.
Nov 5 1998	Letter from Diavik requesting round of community visits.
Nov 9 1998	Letter to Diavik postponing suggested community tour. Letter from Lorne Tricoteux inviting Dogribs to sit on the government's steering committee for the comprehensive study.
Nov 24 1998	DWG Meeting No.2 at Wekweti. Workplan reviewed; draft protocol agreement reviewed. Meeting w/ Diavik on Nov.25 to discuss draft protocol agreement. Meeting w/ DIAND on Nov.26 to inform them that Dogribs would be undertaking independent assessment and would not be involved in comprehensive study process.
Feb 3 1999	DWG Meeting No.3 at Behcho ko. Protocol agreement signed with Diavik. Review of technical work and TK research. Identification of technical experts completed; materials being distributed. Schedule review and workplan updated.
Feb 5 1999	Letter to Diavik suggesting schedule for Diavik's community meetings.
Feb 16 1999	Memo from Diavik suggesting shortening of community consultation sessions & requesting technical experts discussion.
Mar 5 1999	DWG Meeting No.4 at Gameti. Technical review and workplan update.
Mar 15 1999	Dogrib expert reports on caribou, geochemistry, and geotechnical issues submitted to Diavik and DIAND, and placed on the Public Registry.
Mar 8– Mar 31	Diavik Community Visits Round #1; Wekweti, Gameti, Whati & Behcho ko.
Apr 8 1999	Diavik response to Dogrib expert reports.
Apr 12– Apr 16	DWG Meeting No.5 as part of regional meeting at Behcho ko. All technical issues reviewed, including TK research.

Apr 23 1999	Letter to Diavik regarding confirmation of Regional Meeting #2 to replace community tour #2.
May 3–7 1999	Regional Meeting No.2 (DWG Meeting No.6) at Behcho ko. Complete update on status of Dogrib environmental assessment. *In camera* technical discussion with Dogrib and Diavik technical experts. Presentations by Diavik on project, including employment, training and related issues.
May 6 1999	Letter to David Livingstone re government attendance at Dogrib/Diavik meeting and *in camera* session.
May 26–27	DWG Meeting No.7 at Behcho ko. Review Dogrib environmental assessment report. Discuss options. Update workplan.
June 16 1999	DWG Meeting No.8 at Yellowknife (final session). To review completed Dogrib report and formulate recommendations to the Minister regarding the Diavik project.

Appendix C

Background Economic Information for Feasibility Analysis

PART 1. COMPARISON OF EKATI AND DIAVIK ECONOMIC PARAMETERS

The table below compares the proposed Diavik project with BHP's Ekati mines since there are marked similarities in terms of anticipated mine life, diamond values, and economics. Interestingly, the Diavik projected capital cost is anomalous in that, considering the differences in throughput and economies of scale, it should be less than 2/3 the Ekati cost.

Parameter	*Diavik*[1]	*Ekati*
Tot Mineable Reserves (Mt)	26.0	65.9
Grade of Reserves (cts/t)	3.93	1.09
Contained Diamonds (Millions of cts)	102.2	71.8
Value of Diamonds (US$/ct)	56.60[8]	84
Avg Value of Rock/tn	C$332	C$136[3]
Mining Rate (tns/d)	5443[7]	9,000[6]
Mining Life (yrs)	17	16
Capital Cost (Millions of C$)	875[5]	680
Work Force	350	650
Production (Millions of cts/yr)	6.74[2]	4.0
Gross Revenue (Millions of C$/yr)	569	400 - 500
Variation in value of rocks in pipes (C$/tn ore)	A154 - $432 A21 - $163	Panda - $206 Misery - $165
Est. Operating Costs (Millions of C$/yr)	94	80[4]
Gross Margin (Millions of C$/yr)	475	370
Capital Payback Period (yrs)	1.84	2.0

TABLE 13. Comparison of Ekati and Diavik Economics.

Notes:

1. data based on preferred scenario (Alternative 3)
2. calculated with 90% recovery of the contained diamonds
3. the initial production was reported to be 0.88 cts/t and the value of the gems was C$216/ct.
4. from estimates of operating costs
5. cost includes C$200 million for dike construction; subtract C$200 M to compare with Ekati
6. planned to be increased to 18,000 t/d in tenth year of operation.
7. this is the lowest rate quoted for the mining of the kimberlite
8. exchange rate used for calculating revenue is 1C$ = 0.67US$.

PART 2. FACTORS FOR ESTIMATING COSTS

- Far north Canadian location with winter road
- Average wage C$26.00/hr
- Climate of severe cold and snow
- High Environmental Sensitivity
- Medium grinding and crushing hardness
- New mill and mine equipment
- Rock Competence:
    - Open Pit Case- good with normal mining
    - Optimistic Underground case- reasonable
    - Pessimistic Underground case- poor with extensive ground control necessary
- Cost equivalent of a gravity mill
- Mining by both open pit and underground
- Underground methods:
    - Optimistic case- blast hole with delayed rock fill Pessimistic case- overhand cut and fill Diesel Power Plant
    - Cost equivalent to bunkhouses needed
- Company supplied air transport
- Surface water available
- 1700ft vertical shaft access required in underground cases
- Diluted Ore Reserves:
    - Open Pit Case - 28.5 Mt with a strip ratio of 12.5
    - All Underground Case - 23.1 Mt
- Average grade:
    - Open Pit Case - 3.93 cts/tn with a value of US$56.6/ct
    - All Underground case - 3.32 cts/tn with a value of US$62.1/ct
- Exchange rate 1C$ = 0.67US$
- Cost equivalent to 15 miles of roads required, plus an airstrip
- Required Power Lines - 5 miles
- Required water lines- 3 miles
- Mining Rates:
    - Open Pit Case - 5443 tns/day (6000stpd)
    - All Underground Case - 4082 tns/day (4500 stpd)
- Calculated mine life: Open Pit - 15 years Underground - 16 years
- Underground Mining widths:
    - Blast Hole: Optimistic - 15m (50ft) Diavik-5m (16ft)
    - Cut & Fill: Optimistic - 9.1m (30ft) Diavik-3 m (10ft)
      Pessimistic -6.1 m (20ft)
- Recommended major open pit mining equipment:
    - 5- 12 yd shovels
    - 14-125 short ton trucks

Appendix D

Caribou Behaviour in the Ekati Area

A Report by the

Dogrib Treaty 11 Council

Traditional Knowledge Research Team