few elements of concern in that material, and again, they are at very low concentrations but they are just sightly elevated, is cadmium, molybdenum and nickel, and all other trace metals are at very low concentrations.

We used this data and experience that we have from other diamond mine sites in the North to estimate what we call source concentrations or the concentrations in the water that would percolate through the margins of these piles and appear at the bottom at seepage.

Concentrations, again, for most metals were well below any thresholds of concern, and only a few were above thresholds where -- sorry, only a few are at levels where -- sorry. Most of them are still very low compared to most metal mines. In fact, they are all well below those levels.

We took the source concentrations from the site from each of the mine components and to Pete's water and load balance, and put all of those into a mixing model that lets us calculate what the concentrates in the discharge water from the site would be. And, again, out of that, this is now the concentrations of water -- of metals in the water that will be discharged from the facility. And all of these concentrations are very low compared to most mines. They are low compared to other diamond mines, and they are low compared to other metal mines, but some of them are slightly above receiving water criteria.

So from that work, we predicted that the impacts of the discharge on the receiving environment would be very low, and that was all presented in the NIRB hearing.

And the next part of my talk I'm going to introduce some work that is new since the impact review process. As part of the water license application, Tahera was asked to derive discharge limits for the property that will go into the water license.

VICE-CHAIRMAN: If I can, please take a minute to check and see if there is anybody still on the phone.

DAVE OSMOND: Yeah, we are here.

VICE-CHAIRMAN: Can you please state your names.

DAVE OSMOND: Dave Osmond.

VICE-CHAIRMAN: Just you only, Jim (sic).

DAVE OSMOND: And Shelly Howsen is here as well.

VICE-CHAIRMAN: Okay. Thank you.

Carry on.

KELLY SEXSMITH: Okay. So I will just start again with this slide. The next part of my talk focuses on how we estimated the discharge criteria that will go in the water license for the mine.

And these are the concentrations of the elements that Tahera will be allowed to discharge from the facility, so they are a very important set of numbers to Tahera, and I want to go through a few of the steps that we used to come up with those numbers so that you understand them.

In deriving the limits, we did a thing called dilution modelling to estimate the assimilative capacity of the receiving environment, that is how much discharge -- what concentrations would our discharge concentrations end up at in the receiving environment, and I will explain that a little further shortly.

We also came up with aquatic thresholds which are concentrations in the receiving environment that ensure protection of chronic health of the organisms living there. We also considered the background concentrations that are already present in Carat Lake and used those three things to calculate a provisional discharge criteria for the site. It is just a simple mathematical formula, not important.

Those provisional limits were then compared to the predicted concentrations that I presented earlier to see if we could meet them, and to other diamond mine licenses in the north to see how they stood in comparison to those other licenses, and that was the basic process that I'm going to go through step by step now.

An important concept in this work is the concept of dilution, so I want to spend a minute on this. If you were -- or a lot of us are needing a cup of coffee right now. If you take a sugar in your coffee and you put a teaspoon of sugar in one cup of coffee, most of us would taste the sweetness in that cup of coffee. If we took that same teaspoon of sugar and you had to share it with the entire Tahera team, into ten cups of coffee, chances are the concentration of the sweetness that you would taste would be very low, if even detectable. And what that would be is a 1 in 10 dilution of the sugar that you would normally taste in a cup of coffee. So that's what we call a ten-times dilution.

So dilution is sort of the opposite of concentration. More diluted water has lower concentrations. So high dilutions have low concentrations, that's a pretty important concept in the next few slides.

We used a couple of tools to estimate the dilution capacity of the receiving environment. The first one was a box model which predicts concentrations in the whole Lake C3 and Carat Lake, and in pink on this graph here we were showing the dilutions in Carat Lake, and in blue we are showing the dilutions in Lake C3. The whole lake dilutions we have predicted for a number of scenarios of ratios of discharge flows to receiving water flows. With a typical discharge flow from our site into a typical receiving water flow for an average flow year, the dilutions in Lake C3 would be on the order of 50, so concentrations would be one-fiftyith of that value, of the value that we have in our discharge. The dilutions in Carat Lake would be on the order of 58.

Under a low-flow year, and I'm showing these in two little dips there, we modeled a couple of low-flow years. Under low-flow years, dilutions would be about 41 in Lake C3 and about 53 in Carat Lake. And another point with this is you will see Carat Lake doesn't respond very quickly to some of these other scenarios, and that's because Carat

Lake has quite a large volume compared to the flows going through it, so there is a -- it is quite robust to differences in the discharge flows.

The third scenario we looked at was the release of the contingency case where we would be letting two years worth of water out in one discharge open water season, and in that case we could have minimum dilutions of 27 in Lake C3 and 49 in Carat Lake, so a little bit less dilution under that condition.

We also looked -- used a second tool to look at how these dilutions were distributed in space and time in Lake C3 in a little more detail, because that's where our discharge will be going out into, and there is a couple of features on here that we should point out. This is a picture of Lake C3 with the processed kimberlite containment area would be down here, and Stream C3 coming in at this point in the system.

The Jericho River catchment is up this way, and the Jericho River comes out at this point and moves through the system and out at this point.

So what this is showing is dilutions again. So close to the mouth of Stream C3 we have the lowest dilutions. We have a reference point here which is 180 metres from the shore of -- the mouth of Stream C3, and we have dilutions at that point of as low as 20, and this is the lowest that we see under typical discharge conditions. And the point in time in which we see that is just prior to ice breakup. We have been discharging for a couple of weeks in this model scenario, and that's the dilution we get under that condition at the edge of what we are calling our mixing zone.

The Jericho River comes in with very high dilutions because it has no effluent in it, and it runs through the system prior to ice breakup. Later on in the summer, in the open water season, this is another snapshot at that later time, wind mixing begins to dominate the dilution process, and we see much higher dilutions on the order of 45 to 50 at that time.

So I am going to talk about this reference point here which is the 180 metres from the mouth of Stream C3, and there is a second reference point up here which is the outlet of Lake C3, and I'm going to show those in the next graph.

This graph shows the changes in dilution over time over the entire open water season at those two points. The blue is showing that location close to the mouth of Stream C3, and the red is showing the dilutions at the outlet of Lake C3. And what I want to show here is that prior to ice breakup, which is right in around here, is when we see the lowest dilutions in the system, and they only persist for about a week.

As soon as the ice goes off the lake, we have the wind mixing takes over and conditions quickly recover to dilutions that are greater than 40 in the system.

At the outlet of Lake C3, in the early part of the spring when the ice is still on the lake, we have fairly high dilutions as the Jericho River goes through the lake. There is a brief period as soon as the ice goes when things are mixing and everything mixes together, and we have slightly lower dilutions on the order of 30, and then those recover again to 40 to 50 range. So that's under typical discharge conditions.

Just in summary, the box model showed us that minimum whole lake dilutions would be on the order of 50 -- in Lake C3 would be on the order of 50 under typical discharge conditions, 41 under low-flow conditions, and 27 for the contingency case where we would be releasing stored flows.

In Carat Lake, they would be on the order of 50 under typical discharge conditions, 53 for low-flow conditions and 49 for contingency release of stored flows.

Local dilutions in Lake C3 from the second type of modeling that I showed you indicated that under typical discharge conditions, dilutions at the edge of the mixing zone would be greater than 20. And during most of the open water season, this would be greater than 40. Under the unusual condition, the contingency release of stored flows, we could have local dilutions as low as 10 for a period of less than one week prior to the break up of ice. This is the case that we conservatively selected for use in deriving the discharge concentrations from the site. This is a very unusual case, and it will only persist for a very short period of time.

Okay. The second part of deriving the concentrations was coming up with aquatic thresholds, these are concentrations in the receiving environment that ensure minimal impacts to aquatic resources. Tahera's goal is to be below these values within 200 metres of the mouth of Stream C3. The basis for the aquatic thresholds are a set of federal water quality guidelines prepared by the Canadian Council for Ministers of the Environment that are called the CCME guidelines. These are widely applied in all waters of Canada and in a number of different jurisdictions across the north and south in Canada. It is a collaboration of all the jurisdictions in Canada.

For a few parameters, we derived what we call site-specific criteria, and these are for aluminum, copper, cadmium and nitrite. We also were asked to derive a site-specific criteria for total dissolved solids or TDS, and that is a parameter that is not included in the Canadian Council for Ministers of the Environment guidelines.

The list of parameters that we have derived guidelines for is comprehensive, and it includes some parameters that may not require regulation at this property, but we included them all so that you could see how they stood with respect to our discharges.

The aquatic thresholds are just shown in this table. The numbers are all in the reports that we have provided. The numbers in blue here are the site-specific objectives that we have derived. Now a couple of other points about the site-specific objectives, we worked with an aquatic toxicologist specialist who is a biologist who understands how metals impact different organisms in the water to come up with those. His name is James Elfic (phonetic), and he works with AMEC which is the company Bruce Ott works for.

He took a very conservative approach in coming up with these numbers, and we are confident that they are still very protective of the aquatic ecosystem.

The next step was calculating the provisional limits, and again, it is just a mathematical formula. We considered the dilution modelling value, the conservative value of 10, a dilution of 10. So concentrations would be about one-tenth of that, the aquatic thresholds. And then background concentrations in the receiving environment which we took from the baseline studies that have been done on the property.

And this is a big table full of numbers for 10 o'clock at night. The provisional limits are shown in bold here, and what we are doing here is comparing them to the predicted concentrations in our effluent, and the numbers I want to point out are the parameters shown in blue, we could meet those limits, but we would -- they are very close to what our predicted concentrations are, and that suggests that it could be challenging to meet those limits.

In the case of uranium, we under our highest predicted source concentration, which is an upper-bound estimate of what our uranium concentrations could be, we could exceed what the provisional limits would be. And so we don't feel that we could confidently meet that value.

Okay. This next slides shows how the provisional criteria were compared to other diamond mine licenses in the north, and the other licenses we are comparing them to are Ekati's original license and the license that covers most of Ekati's operations still today, the Diavik mine licence, and a more recent licence issued for Ekati that only applies to their sable operations, which are -- I guess they are not underway yet at this time. The final one is the Snap Lake project which was very recently permitted in the Northwest Territories. So all of these are other diamond mine licenses.

What I want to point out here is that the values shown in black are below all the other licenses. So the numbers we derived are below what other licences have, or they have not been regulated previously. The values in blue are the same as the Ekati and Diavik licenses, but above the license limits proposed for Snap Lake. What our understanding about the Snap Lake license is that Snap Lake is -- their discharge goes into a lake that does not have a big river flowing through it, so they have much lower dilution values than what we have.

The values shown in red, chromium, nickel and zinc, are above what is present in other licenses, but in all cases, these are values that are still fully protective of the environment.

So with all of those comparisons in mind, we come up with our final proposed criteria for Jericho, and these are them. And what I want to point out here is -- sorry, I am ahead of myself.

Okay, the changes highlighted in blue in this slide are total dissolved solids, chloride and copper, we actually adjusted downward from our provisional limits, and the reason we did that was that there was no information on the acute toxicity of total dissolved solids and chloride. And in the case of copper, this was actually the values that we proposed in our submission that we sent to the Water Board in August, but there was some confusion about what the actual background concentrations were in Lake C3, and so rather than adjusting these to the higher number, we felt we should stay with the number we originally proposed.

The values shown in red we increased

slightly, and these are aluminum and uranium. And there are a number of reasons why we increased those, and I will go through them one by one because it is quite important. Aluminum, the provisional limits were considered too restrictive to ensure that we could consistently comply with those values. We believe that the uranium at our site will occur primarily as a particulate, that is as a silicate mineral. And the toxicity of that mineral is expected to be much lower than the type of aluminum that was used in the toxicity testing that they used to derive limits on aquatic thresholds.

Finally, we have used a very conservative estimation of dilution which reflects very short-term conditions, and so we believe that this slight upward adjustment from 2.2 to 3 in the case of the grab criteria, and from 1.2 to 1.50 in the case of the average criteria is still fully protective of the aquatic ecosystem.

In the case of uranium, again we believe that the provisional limits would be too restrictive, but the reason we propose increasing them is that the basis for this threshold is a little different than all the others. The basis for this threshold is protection of drinking water supply, and it is derived using very conservative assumptions, which are that there is regular and ongoing use of that water over long periods of time over the lifetime of a worker living at the Jericho mine, and so the location where that threshold would need to be met would be at the inlet of the water intake in Carat Lake. At that location, the dilutions are much greater than the dilution of ten that we estimated at the edge of our mixing zone in Lake C3.

We will be able to meet those aquatic thresholds anywhere where we have dilutions of greater than 25, and in Carat Lake we will have dilutions of greater than 50 at all times.

Finally, uranium is strongly attenuated in soil. That means it likes to stay with soil and sediment. And concentrations of uranium are expected to decrease much more rapidly than as indicated by the dilution molding that we did. This is a difficult process to quantify, but it is a well-known behavior of uranium in water systems.

So, again, for these reasons, we feel that the uranium criteria are still fully protective of the receptor in this case, which is workers at the camp.

This last slide I'm just comparing the proposed discharge criteria that we have put forward here to a couple of key -- the Lupin water license, which is a recent Nunavut water license, and then the federal Metal Mine Liquid Effluent Regulations. And as you can see, all of the concentrations that we're proposing are much, much lower than the concentrations set out in the federal regulations, and all of the criteria that we are proposing are lower than what is in the Lupin water license, except for nickel, which is just marginally above it.

In conclusion, we have tried to come up with a transparent procedure for estimating discharge criteria that results in protective and fair limits to use at this site, and that's what we are showing here. So thanks for your time.

GREG MISSAL: Thanks very much, Kelly. Mr. Chair, I would like to continue on to our next speaker, if that's all right?

VICE-CHAIRMAN: Greg, we just want to try to find out. It's about 20 after 10 right now, and we just want to give you enough time, and we did say 10:30 we were going to wrap up, let the Elders go home and so forth. Can you tell us roughly -- you have got two or three more to go, roughly what are you looking at in time-wise, please?

GREG MISSAL: I think we could probably wrap this up by 11 for sure.

VICE-CHAIRMAN: Then I think we should stop right now, Mr. Chair. We have got a lot of tired people here, and you are looking at another -- you have got people doing translation, you have got people typing. That has been going for an hour and a half, if we took a back for five, ten minutes, give everybody a rest and stretch, it is still going to come back, it is going to be 11, 11:15 before we are done, and I think perhaps maybe we should -- what do you think, Greg? Do you think we should take a break and then come back, or maybe the staff can answer us too? I know I can -- this last presentation was quite lengthy and quite in-depth, and a lot of figures we had to deal with. Thank you.

GREG MISSAL: I think the last presentation, I think you are right. I think there was a lot of information there. The next three shorter presentations are not as complex as this presentation was that Kelly just gave. Kelly's presentation is extremely important, but the next three are probably a little less complex. And I guess from my perspective, I wouldn't mind being able to wrap up this evening, but I certainly understand your perspective, and ultimately it is certainly your decision.

VICE-CHAIRMAN: What we are just talking about here is maybe we will take a break until 10:30, and come back in roughly five minutes, about seven minutes, a quick break, do whatever you have to do, come right back, and we will stop at 11 whether you are done or not.

(BRIEF ADJOURNMENT)

VICE-CHAIRMAN: If we can come back into regular session. Greg, do you want to carry on with your presentation?

GREG MISSAL: Thank you very much, Mr. Chair. We will work through this, and certainly if we get to 11 o'clock and we are not finished we will just stop there for this evening, but thanks for the opportunity to get a little more of this in tonight. I think it will be helpful to our time line tomorrow.

I will just ask Rick Pattenden to present his portion of the presentation.

RICK PATTENDEN: Mr. Chair, Board members, my name is Rick Pattenden. I'm with Mainstream Aquatic, and I have been assisting Tahera on the Jericho project in regard to fish and aquatic issues since 1995.

On my talk, I will focus on fish and fish habitat, and I will restrict my discussion to issues that remain following the NIRB hearings, specifically issues that have been raised by Fisheries and Oceans Canada, DFO. My talk will look at the steps taken to resolve those issues. I will follow that with an overview of the fish habitat no net loss plan that's been developed for DFO, and I will finish with a quick summary of my presentation.

So to briefly go through the DFO issues that have been raised, the first deals with the water intake and causeway into Carat Lake. The second deals with mine pit blast zone and its potential effect on fish and fish eggs. The third is the Stream C1 diversion and water flow in the lower section of Stream C1. The fourth is the formation of the PKCA and what that will do to Long Lake and its fish. And the last is the PKCA discharge and its influence on Stream C3.

The first issue raised by DFO on water intake and causeway, their specific concerns on the first was the causeway location may affect fish habitat in Carat Lake. The next concern was the causeway may alter shoreline processes, and the third is water intake may impact fish fry and fish eggs.

The issue has been resolved by first relocating the causeway away from sensitive fish habitat. Tahera has agreed to monitor potential sedimentation near the causeway, and finally they have redesigned the water intake to meet DFO criteria or guidelines.

The next slide shows some of the adjustments made by Tahera. The first you will see this represents the causeway. We have got lake C3, Stream C1 and the mine pit, and of course Carat Lake to the north.

The first step taken by Tahera is simply to move the causeway to the west, further away from Stream C1, which has been known as sensitive fish habitat. And it also illustrates the location of the sediment deposition and monitoring sites that will be used.

This presents a schematic design of the revised water intake. We can see the end of the causeway, the water intake well extending down into the causeway. Originally Tahera had proposed putting a perforated pipe at the base of the well as their intake source. They have now decided not to perforate the well and extend an intake pipe out into Carat Lake off the end of the causeway, and to screen the end of the intake pipe which meets DFO requirements.

The next issue is the mine pit blast zone. The specific concern was in regards to blasting may harm fish and fish eggs in Stream C1 and Carat Lake. The issue has been resolved by restricting blasting in locations closest to water bodies during summer, and it is specific to summer because blasting effects are specific only to fish eggs, not fish. And I will show you that on the following slide.

And the next point is the blast zone is going to shift away from the water body as the mine pit deepens.

This figure is a little noisy. It represents the blast zone during the further years of operation, years one and two. We have the Carat Lake shoreline, we have got Stream C1 going through the proposed mine pit location. And this yellow section is the fish-bearing portion of Stream C1 that we have established by baseline studies. We haven't found fish further upstream.

The red circles represent the perimeters of the blast effect. The outer circle represents something called the peak particle velocity impact perimeter or PPV, and that is a criteria or a threshold used by DFO to protect fish eggs. So if