
U.S. ARMY CORPS OF ENGINEERS

Public Hearing

Clean Water Act 401(a)(2) Decision

PolyMet Mining/ NorthMet Mine

DAY 1

May 3, 2022

Black Bear Casino

Carlton, Minnesota

REPORTED BY: Lisa M. Thorsgaard, RPR

INDEX

P-R-O-C-E-E-D-I-N-G-S

MR. JANSEN: All right. Good morning, everyone. My name is Colonel Karl Jansen, and I serve as the Commander of the U.S. Army Corps of Engineers, St. Paul District, and I'll be the presiding officer and facilitator for conducting this public hearing.

I want to welcome you to this hybrid, in-person, and virtual three-day public hearing regarding the Corps' Section 404 permit for the PolyMet NorthMet mine project near Babbitt, Minnesota.

We're conducting this public hearing in response to an objection from the Fond du Lac Band of Lake Superior Chippewa under Section 401(a)(2) of the Clean Water Act and subsequent request by the Band for a hearing on the Fond du Lac Band's reservation.

The Band is a federally-recognized tribe and sovereign nation, and their reservation is downstream of the project.

The Band is also recognized as a state for purposes of Section 401(a)(2) of the Clean Water Act.

I also welcome everyone joining virtually this morning, and thank you for your patience and participation. We're conducting this public hearing for the purpose of collecting information or evidence that we'll consider related to the Project's effects on quality of the Band's waters.

We've decided, in coordination with the Band, to conduct this public hearing primarily virtually with some exception. We're meeting on days 1 and 2 with representatives of the Band, U.S. Environmental Protection Agency, and PolyMet, Incorporated.

During these days, the EPA will provide an overview of its evaluation and recommendations with respect to the Band's objections. And the Band and PolyMet will provide their views on our permit action.

We look forward to hearing verbal public comments on day 3. Public input is just as important to us in a virtual setting as it is in person. And we have a team standing by to ensure this three-day virtual public hearing goes smoothly.

If you do not submit verbal comments, there's also the opportunity to submit written comments

until June 6.

With me today from the Corps are representatives from our regulatory division, office of counsel, public affairs, and our information technology department.

Our regulatory division is responsible for administering the Section 404 Clean Water Act and Section 10 Rivers and Harbors Act regulatory programs. They're committed to making permit decisions that balance protection of important natural resources with appropriate use of those resources for economic development.

Some background on why we're here today:

PolyMet Mining, Incorporated submitted a permit application to the Corps on July 16, 2004, requesting authorization to discharge, dredge, and fill material into waters of the United States under Section 404 of the Clean Water Act in association with the development of a copper, nickel, platinum group element mine and associated facilities.

The Corps and the Minnesota Department of Natural Resources co-led the development of the Environmental Impact Statement with the United States Forest Service serving as a co-lead agency

later on in the process. The Minnesota Pollution Control Agency issued a Clean Water Act Section 401 certification for the project on December 20, 2018.

The Corps completed its record of decision and issued a standard individual permit to PolyMet Mining, Incorporated on March 21, 2019, authorizing the discharge of dredged or fill material into 901 acres of wetlands and an indirect loss of approximately 27 acres of wetlands caused by the regulated activities. The permitted alternative avoided direct impacts to approximately 500 acres of wetlands at the mine site.

The permit included special conditions requiring compensatory mitigation to offset the loss of wetlands, including the purchase of 1,278 wetland bank credits from an approved bank located in the bank service area of the impacts, actions to minimize impacts and monitoring for adverse, indirect effects to wetlands adjacent to the mining pit.

Should monitoring demonstrate the indirect loss of wetlands in connection with the discharge of dredged or fill material authorized by the Corps permit, the Corps will require compensatory mitigation sufficient to offset the loss.

On September 10, 2019, the Band filed suit in the U.S. District Court for the District of Minnesota alleging that EPA and the Corps violated Clean Water Act Section 401(a)(2) due to EPA's failure to issue notice to the Band and the Corps's decision not to hold a hearing on the downstream impacts of the project or take measures to ensure that the project meets the Band's water quality requirements.

On February 16, 2021, the court ruled that EPA had a non-discretionary duty to make a "may effect" determination pursuant to Clean Water Act Section 401(a)(2).

In response, EPA filed a motion on March 4, 2021, requesting a voluntary remand to allow EPA to make the "may affect" determination under Section 401(a)(2).

Further, on March 4, 2021, EPA requested the Corps consider suspending the Section 404 Clean Water Act permit if the Corps granted its motion for a voluntary remand.

Subsequently, the court granted EPA's motion on March 8, 2021.

On March 17, 2021, the Corps suspended the Section 404 Clean Water Act permit while the EPA

reconsidered effects from the project under Section 401(a)(2) to water quality downstream in the state of Wisconsin and in the Band's reservation.

To date no work in waters on site as authorized under the Section 404 Clean Water Act permit has begun.

On June 4, 2021, the EPA issued a "may affect" determination to the Band and the State of Wisconsin. Each party had 60 days to determine if the discharge associated with the Clean Water Act 404 permit and certification will affect the quality of its waters so as to violate any water quality requirements, to notify the EPA and the Corps of its objection, and to request a public hearing.

On August 3, 2021, the Band submitted to the Corps an objection to the Section 404 Clean Water Act permit and requested a public hearing on the objection pursuant to Clean Water Act Section 401(a)(2).

The State of Wisconsin did not object to the Clean Water Act Section 404 permit.

The purpose of this hearing is for the Corps to hear verbal comments from the Fond du Lac Band, PolyMet, EPA, and the public about water quality

impacts on the Fond du Lac Reservation from the NorthMet Mine project.

The Band has determined that discharges into waters of the United States associated with the project will affect the quality of the Band's waters so as to violate its water quality requirements in its reservation.

The Corps will utilize the information presented over this three-day hearing in our evaluation of the Project's Section 404 permit which we suspended on March 8, 2021.

We are seeking information on how the current suspended Section 404 Clean Water Act permit, including its conditions, if reinstated, would violate applicable water quality requirements within the Band's downstream waters.

Further, we're seeking information on whether new conditions could be added to a modified Section 404 Clean Water Act permit that would ensure compliance with applicable water quality requirements of the Band.

We'll consider all relevant information presented at the public hearing to inform our final public decision to either revoke the Section 404 permit, reinstate the permit, or modify the permit

with new conditions.

We're recording this hearing via WebX for the administrative record, and we're uploading it for the Corps' St. Paul District YouTube page for public viewing as soon as possible. A court reporter is also here to transcribe all verbal comments and will post the transcript on our PolyMet project web page as well.

We'll also post all presentations and any information submitted during these first two days to the PolyMet project web page as soon as possible.

Day 1, today, will include Fond du Lac's overview of their objection, followed by EPA's evaluation and recommendations to the Corps on our permit action. The remainder of Day 1 is an opportunity for Fond du Lac to present their information, including views and opinions.

Day 2 will open with additional opportunity for Fond du Lac's comment followed by an opportunity for PolyMet to present their information including views and opinions.

Later on Day 2, both Fond du Lac and PolyMet will also have an opportunity for rebuttal of any statements. We determined the time allocation for

each party based on our coordination with the parties and their requests.

Please note the following with respect to the ground rules for this hearing:

The Corps will listen to all oral statements that are provided within the applicable time constraints, but we will not respond to questions or comments during a party's presentation. We'll follow the schedule outlined in our public notice, and we kindly ask that each party be present on time at the start of each session.

The schedule includes time for breaks and lunch recess. If sessions conclude early, we'll extend recess and resume at the scheduled times. No cross-examination of witnesses will be allowed per 33 C.F.R. 327.8(d). However, parties prompting their own witnesses is allowable.

If any witnesses are called, we ask that the name of each witness be spelled out for the record before the witness begins to speak.

We encourage speakers to focus their comments on how the suspended Section 404 Clean Water Act permit, including its conditions, if reinstated, would violate water quality requirements of the Band.

As stated earlier, we're also seeking information on whether new conditions could be added to a modified Section 404 Clean Water Act permit that would ensure compliance with water quality requirements of the Band.

General comments expressing either support or opposition to the project will not be informative to our decision on this matter. We must base our permit decision on substantive evidence related to applicable water quality impacts under the Clean Water Act.

Day 3 will be the opportunity for the public to submit verbal comments via teleconference beginning at 4 p.m. Central time. We'll record these comments for the administrative record and post the recording and transcript to our website as soon as possible. We'll accept written comments until June 6.

First up today we'll hear from chairman Kevin DuPuis, Chairman of the Fond du Lac Band of Lake Superior Chippewa. We'll also hear from Ms. Vanessa Ray-Hodge, outside counsel for the Band. She'll provide a brief overview of the objection to the permit.

We'll then hear from Tera Fong with EPA who's

joining us virtually to present EPA's evaluation and recommendations.

Of note, EPA has prepared and provided to us several documents related to their findings of recommendations. We're uploading the Corps' PolyMet project page shortly.

We ask that each speaker begin by first introducing themselves and keep to the time allowed. Lunch recess will be from 12 to 1 p.m., and short recesses are scheduled throughout the day.

So with that, Chairman DuPuis and Vanessa, I'd like to turn it over to you.

CHAIRMAN KEVIN DUPUIS: Good morning. Good morning, Colonel Jansen. My name is Kevin DuPuis, Sr. I serve as the chairman of the Fond du Lac Band of Lake Superior Chippewa.

I also proudly serve in the United States Marine Corps. And after my service to this country, I return home here to Fond du Lac Reservation to proudly serve my people.

We are raised on these lands and taught what it is -- what it means to be Anishinaabe. Our grandfathers, through our grandfathers we learned the importance of humility, dabaadendiziwin;

bravery, aakwa'ode'ewin; honesty gwekwaadziwin; wisdom, nibwaakaawin; respect, minwaadendamowin; and truth, debwewin.

Through these teachings, we have learned to respect what it means to be Anishinaabe and to protect our culture and values not for ourselves but for our children and all Anishinaabe children and grandchildren.

Our ancestors had wisdom and foresight to protect our lands for future generations notwithstanding the hardships and the outright racism they endured under federal government's oppressive policies of the past.

Our traditional way of life was protected and guaranteed to the Band under the 1854 Treaty of LaPointe because of these difficult choices our ancestors had to make to survive and provide us with a future.

Through the 1854 Treaty, the United States government promised us, the Reservation you are sitting in with today, would provide a permanent homeland for our people forever.

We were also promised the ability to exercise traditional hunting, fishing, and gathering rights within our aboriginal lands that were ceded under

the 1854 Treaty. These lands are known as the ceded territory. Despite these solemn promises by the United States, our reservation and our ceded territories have been under attack for decades.

As someone who practices our traditional ways of life, I, we understand firsthand what mining and other industrial and commercial development has done to our lands, waters, and other natural resources not just in our ceded territory but within our reservation.

As you will hear today, our lands and our people are already facing environmental injustices. Our fisheries have been degraded and destroyed. We must caution our people on their consumption of fish due to increased levels of mercury, methylmercury in our waters and the food web. Many of our wild rice beds suffer from increased sulfate due to mining and development. Our four-legged animals like the moose have decreased in populations over the years --

These lands and resources are part of us. It is our birthright. It is a part of the natural world. If we don't have the woods, we don't have the fish, the wildlife, the wild rice, we cease to exist as a human being, as Anishinaabe. It is

about our culture and our identity. It is hard for people to understand that, but where our rice beds are, the plants, the animals, the medicines and the trees themselves, that is us as a people, Anishinaabe. If we don't use what the creator gave us -- I'm talking about our trees, natural resources -- they will go away. If we stop using ash trees, the ash will go away.

As a Band, we invest a lot of time, money, and resources to take care of our lands, our waters, and natural resources of our reservation in ceded territory. But we can't assume that we manage our forest and trees because we don't. We're in a relationship with them, and we must respect that relationship.

But our work is made more and more difficult as federal agencies continue to ignore the impacts the new developments have on our treaty rights throughout the ceded territory and downstream within our reservation. We continue to lose land and resources in the ceded territory due to things like federal land exchange and 404 permits that allow irreplaceable, pristine wetlands to be destroyed. These impacts ultimately reach our reservation downstream. Each federal action chips

away at our treaty rights. And more often than not, federal agencies wrongfully view their actions as discreet and limited impact. But the reality is that every action results in a large impact on the connected ecosystems that support our Treaty's resources in the ceded territory and ultimately downstream on our reservation.

Our cultural identification is so intertwined with the natural resources which we rely, when those resources are threatened, we as a people are threatened. And the impacts we see by current mining development are already being exacerbated by, among other things, non-native species that are entering the region due to climate change.

For example, opossums. They're 30 miles away from the reservation, which are not native to our area but have been found not too far. And due to climate change, affecting of these habitats. These non-native animals can negatively affect bird populations by feeding on their eggs.

Also, we have our beavers. The ecosystems that a beaver creates is its own which is tied into a greater ecosystem that belongs to the Reservation as a whole.

And when we have infestations of plants,

wildlife, fish, crustaceans, they affect individual ecosystems and that ultimately affects the Reservation as a whole.

Here's what that means for us. If we have no birch, we have no winnowing baskets or mukuks. If we have no ash, we have no toboggans, no sleds, no snowshoes that are traditionally made by our people. The continued destruction of these resources, along with climate change, has the ability to separate us from our culture. This has to stop.

As we have submitted to the Corps as part of the hearings today, the Band objects to the Corps' issuance of Section 404 permit for PolyMet. This objection is being made not because the Band is against mining, but because the project as planned will not protect the Band's Reservation waters and its treaty resources.

As a federal agency, the Corps has a unique obligation and trust responsibility to protect our treaty resources which includes our Reservation lands and waters.

The Corps also has a legal obligation to ensure that when it acts on a permit that impacts our waters, the Clean Water Act must be complied

with, and if it cannot, then the Corps must deny Section 404 permit.

Now, today you will hear a lot from experts about the discharges from the PolyMet project and the Band's downstream watershed. We have been raising these concerns for a long time but federal and state agencies, including the Corps, have ignored the science that shows the project -- excuse me -- raises significant and negative impacts that will reach the Band's downstream reservation waters.

The Corps has a renewed opportunity to be part of this hearing process to listen to us. You must do the right thing.

As you will hear, we adopted our water quality standards to protect and restore all of the natural resources that I've mentioned and which are essential to our way of life, our culture, and our homeland. Our water quality standards must be complied with but there are no conditions that can be put in place to ensure PolyMet's proposed project will meet our standards. As a result, the Corps must deny PolyMet's Section 404 permit.

Vanessa.

MS. VANESSA RAY-HODGE: Thank you,

Chairman DuPuis. Good morning, Colonel Jansen. My name is Vanessa Ray-Hodge. Last name is R-A-Y, hyphen, H-O-D-G-E.

We are here today because the Band has been fighting for years to protect its treaty resources, which includes the Fond du Lac Reservation, from the detrimental impacts that the proposed PolyMet NorthMet project will have on the Band.

As noted by the Chairman, the Band has been raising these concerns about the PolyMet project for years. In fact, as those of us here know today, the Band had to litigate in federal court to get this hearing.

After successfully litigating to require the EPA to take the first step in the congressionally-mandated process under Section 401(a)(2) of the Clean Water Act, last year the EPA issued a positive determination that discharges from the proposed project "may affect" the Band's downstream water quality standards.

The Band then issued a comprehensive determination supported by multiple experts that you will hear from today that the proposed PolyMet project will result in discharges that will reach the Band's downstream reservation waters and

violate the Band's federally-approved water quality standards.

As a result of that determination, the Band objects to the Corps's issuance of the current suspended Section 404 permit.

In reaching an ultimate decision after this hearing, the Corps is required, under Section 401(a)(2) of the Clean Water Act, to address the Band's objections and either impose conditions on the Section 404 permit that will ensure compliance with the Band's downstream water quality standard, or, if it cannot do so, the Corps cannot issue the permit.

This means that the Corps has a statutory obligation to look at and evaluate all potential discharges from the project. And the Corps cannot reinstate PolyMet's suspended 404 permit unless it can ensure compliance with the Band's downstream water quality standards. This is different than the Corps's general statutory obligations under Section 404 of the Clean Water Act.

Rather here, the Corps must look to the statutory responsibilities it has under Section 401(a)(2) of the Clean Water Act and the purpose for which Section 401 was enacted by

Congress.

Section 401 was enacted to ensure that before a project is permitted, steps are taken to ensure that that project will not pollute waters. Meaning, that it is preventative in nature. It is not intended to merely address pollution caused by the project after the fact through actions like adaptive management. Yet the proposed PolyMet project has been permitted on the basis of adaptive management which is contrary to Section 401 because the project seeks merely to have PolyMet try to address violations after they have already occurred with no concrete plans on how the problems could ever be fixed.

As set forth in the Band's "will affect" analysis, the discharges from the proposed PolyMet project will flow downstream to the Band's reservation and violate many of the Band's water quality standards, including its anti-degradation policies, it's numeric standards for mercury, narrative standards for the protection of aquatic life and culturally-important flora and fauna, as well as designated uses for wildlife, warm water fisheries, and subsistence fishing.

But to put these violations in context of what

it means to the Band, today you will hear from the Band's staff regarding how important and critical the Band's natural resource programs are to the Band's culture and way of life, a way of life which is protected under the 1854 Treaty of LaPointe.

Additionally, several of the Band's experts will detail how the discharges from the proposed PolyMet project will negatively impact the Band's downstream waters and other treaty resources, including causing human health and public safety risks by, for example, increasing the production of methylmercury in fish and wildlife that Band members consume to exercise their treaty rights and further exacerbate environmental injustices suffered by the Band already.

Importantly, you will also hear from the Band's experts that there are simply no conditions that can be placed on the Corps' Section 404 permit for the proposed project that will ensure that the violations discussed in the Band's "will affect" determination will not occur.

For these reasons, the Band submits that after the conclusion of this hearing, the only determination that the Corps can make to fulfill its obligations under Section 401(a)(2) of the

Clean Water Act and to comply with the Treaty of LaPointe, the Corps must revoke the suspended 404 permit. Thank you.

COLONEL JANSEN: Thank you, Chairman DuPuis and Vanessa.

Next up will be Ms. Tera Fong from the USEPA. She's joining us virtually, so we'll take a moment to make sure our connection is up and her presentation is up.

MS. TERA FONG: Good morning. This is Tera Fong. I hope you can see my presentation and me.

COLONEL JANSEN: We see you and the presentation, Tera.

MS. TERA FONG: Great. Well, good morning, everybody. My name is Tera Fong. I am the director of the water division at EPA's Region 5 in Chicago. And I'm here this morning to present an overview of EPA's Clean Water Act Section 401(a)(2) evaluation and recommendations on the Fond du Lac Band's objection to the proposed Clean Water Act Section 404 permit for the NorthMet mine project.

I sincerely apologize for not being with you all this morning but, unfortunately, I have COVID

and was unable to travel yesterday.

I would like to thank the Fond du Lac Band for hosting this hearing and the Corps for the opportunity to present our evaluations and recommendations, especially virtually given the last-minute change.

My presentation is just an overview of our evaluations and recommendations today. We will be sure to share the full documents and make those available.

Our assessment is based on an independent scientific review of the record, including PolyMet's Clean Water Act Section 404 permit application and Minnesota's water quality certification as currently proposed.

For a brief walk-through of my remarks this morning, I'd like to start by summarizing EPA's evaluation and recommendations and then back up a little bit into the details on how we got there, including the 401(a)(2) process and what our evaluation includes, which includes water quality impacts for mercury and methylmercury, water quality impacts from specific conductance, and additional areas that we reviewed in the Band's objection but did not evaluate to the same level of

detail.

Finally, I will summarize our conclusions and restate our recommendations.

For an overview of EPA's evaluation and recommendations, our task at this hearing is to submit to the Corps EPA's evaluation and recommendations regarding the Fond du Lac Band of Lake Superior Chippewa's objection to the issuance of the Clean Water Act Section 404 permit for PolyMet's NorthMet project.

Our evaluation is based on our independent scientific evaluation of the record, including the Clean Water Act Section 404 permit application and Minnesota's Clean Water Act Section 401 certification for that permit as they exist today.

EPA's key recommendation is that the Corps should not reissue the suspended Clean Water Act Section 404 permit as proposed.

As the NorthMet project is currently designed, there are no conditions that EPA can provide to the Corps that would ensure that the discharges from the Clean Water Act Section 404 permitted activities would comply with the Band's water quality requirements.

EPA's recommendations do not foreclose any

future modifications to the NorthMet permit application or the NorthMet project's design. Any future modifications should include meaningful involvement of the Band and Minnesota to ensure compliance with both Tribal and State water quality requirements.

A brief overview on what Clean Water Act Section 401(a)(2) provides as that is the framework under which we operate today.

This section of the Clean Water Act provides for a process for neighboring jurisdictions, which include states and tribes that have received treatment in a similar manner to the State, to participate in the federal licensing or permitting process where EPA determines that a discharge from an activity that is subject to Clean Water Act Section 401 certification from another jurisdiction "may affect" their water quality.

A federal licensing or permitting agency must immediately notify EPA when it receives a license or permit application and a 401 certification, after which EPA has 30 days upon receipt to determine whether a discharge from the licensed or permitted activity "may affect" the water quality of a neighboring jurisdiction and, if so, to notify

that neighboring jurisdiction, the licensing or permitting agency, and the project applicant.

Following EPA's notification, the neighboring jurisdiction has 60 days to determine whether the discharge "will affect" its water quality so as to violate its water quality requirements and, if so, it may object to the issuance of the license or permit and request that the licensing or permitting agency conduct a hearing on its objection.

At the hearing EPA must submit to the licensing or permitting agency an evaluation and recommendations regarding the objection of the neighboring jurisdiction.

The licensing or permitting agency must condition the relevant license or permit as may be necessary to ensure compliance with applicable water quality requirements based on the recommendations of the neighboring jurisdiction and EPA, and any additional evidence presented at the hearing.

The Clean Water Act states that if the imposition of conditions cannot ensure such compliance, the licensing or permitting agency shall not issue the license or permit.

Very briefly on the history of 401(a)(2) with

respect to this NorthMet permit application. On March 4, 2021, in response to a March 4, 2021, letter from the EPA, the Corps suspended the Clean Water Act Section 404 permit for the NorthMet project on the 17th of March to allow for EPA to complete the Section 401(a)(2) review.

EPA made a "may affect" determination and notified the Band and Wisconsin on June 4, 2021, which gave the State and the Band the opportunity to review whether the project "will affect" their water quality.

On August 2, 2021, Wisconsin notified EPA and the Corps that it did not object to the issuance of the Clean Water Act Section 404 permit for the NorthMet project.

On August 3, 2021, the Band notified the Corps that: Discharges from the NorthMet project would affect the quality of the Band's waters and violate its downstream water quality requirements. The Band objected to the issuance of the permit, and the Band requested that the Corps hold a public hearing as we are doing now.

EPA's evaluation and recommendations that I present today were informed by a wealth of information and documentation, including, but not

limbed to, the Band's objection letter providing its "will affect" determination and supporting documents; documents EPA received from PolyMet during EPA's Clean Water Act Section 401(a)(2) "may affect" process and related documents; input received from the Fond du Lac Band during government-to-government consultation with EPA; PolyMet's Clean Water Act Section 404 application to the Corps for the NorthMet project and supporting documents; the Minnesota Pollution Control Agency's 401 certification for the Corps' Clean Water Act Section 404 permit; the Corps' record of decision and final environmental impact statement for the Clean Water Act Section 404 permit for the NorthMet project; the Minnesota Pollution Control Agency's Clean Water Act Section 402 permitting documentation, including a general construction stormwater permit and individual surface water discharge permit for the NorthMet project; and additional scientific review that EPA Region 5 obtained from our Office of Research and Development.

In response to our request to our Office of Research and Development specific to mercury, we obtained a scientific review from EPA's Office of

Research and Development, Center for Computational Toxicology and Exposure, Great Lakes Toxicology and Ecology Division regarding potential impacts from mercury as described by the Band in its objection.

To evaluate potential impacts regarding specific conductance as described in the objection, we requested and obtained a scientific review from EPA's Office of Research and Development, Center for Environmental Measurement and Modeling Watershed and Ecosystem Characterization. Both of these documents are included in our evaluation and recommendations in full as appendices.

EPA's evaluation identified a number of areas of uncertainty. These included uncertainty regarding the full acreage of secondary impact to wetlands from the anticipated drawdown of groundwater from mine construction and operation; uncertainty in the mercury present in, and the fate and transport of, such mercury from wetlands subject secondary impacts from the anticipated drawdown of groundwater from mine construction and operation; uncertainty regarding the quantity of total mercury and dissolved ions, contributing to elevated specific conductance, that would be discharged during mine construction; uncertainty

regarding the quantity of total mercury and dissolved ions that would be discharged from the mine through seepage; and uncertainty regarding the reduction in dilution capacity of water bodies affected by the NorthMet project and that would contribute to elevated specific conductance.

A key area of our evaluations and recommendations is mercury. The Band's water quality criterion for mercury to protect human health is .77 ng/L and is not currently attained in waters within its reservation.

Mercury concentrations in surface waters between the NorthMet project site and the Fond du Lac Reservation are also greater than .77 ng/L.

Mercury released from wetlands adjacent to the mine site as a result of changes in hydrology due to construction and operation of the NorthMet mine is a significant potential source of mercury to the St. Louis River watershed. Such mercury releases could exacerbate the ongoing exceedances of the Band's water quality requirements.

The available data and analysis supporting the Clean Water Act Section 404 permit and Clean Water Act Section 401 certification are insufficient to fully evaluate the mercury impacts from the

NorthMet project in terms of the area of wetlands affected and the effects on the Band's water quality.

Understanding the scope of the anticipated impacts from the NorthMet projet due to changes in wetland hydrologic regimes resulting from the Clean Water Act Section 404 permitted activities is essential to estimate the quantities of mercury that may be subject to mercury methylation, mobilization, and export downstream to the Band's already impaired waters.

Additionally on mercury, the Clean Water Act Section 402 general stormwater permit for construction of the NorthMet project does not contain limits for mercury.

The individual Clean Water Act Section 402 permit for surface water discharges from the NorthMet project does not contain numeric water quality-based effluent limitations for mercury that would ensure compliance with the Band's water quality requirement.

The Minnesota Pollution Control Agency did not find that there was reasonable potential to exceed applicable water quality standards. The permit includes operating limits on mercury at an internal

monitoring station set to Minnesota's water quality standard of 1.3 ng/L which is not sufficient to ensure compliance with the Band's downstream water quality requirements.

The permit also contains technology-based effluent limitations on mercury at 1,000 ng/L as a monthly average and 2,000 ng/L as a daily maximum, which are also not sufficient to ensure compliance with the Band's downstream water quality requirements.

Based on EPA's review of the information contained in the baseline water quality data for the NorthMet project, EPA's evaluation is that the Clean Water Act Section 404 permit and MPCA's Clean Water Act Section 401 certification lack conditions sufficient to protect mercury mobilization, methylation, and export at levels that would exceed the Band's water quality requirements given current project design and discharges outside of the Clean Water Act Section 404 permitted activities.

Turning next to specific conductance impacts. The Band's numeric water quality standard for specific conductance is 300 µs/cm.

Due to discharges containing mineral loadings from many sources in the St. Louis River watershed,

data collected in the St. Louis River mainstream shows that the river has been exceeding the Band's numeric water quality criterion of 300 µs/cm as an annual average in some recent years.

The Clean Water Act Section 404 application and the Corps' suspended Clean Water Act Section 404 permit as proposed, would authorize activities that would contribute additional mineral loadings to the St. Louis River and decrease the specific conductance dilution capacity currently provided by the existing, undisturbed forested wetland mine site.

The degree of cumulative mineral loadings that would contribute to specific conductance downstream of the NorthMet project is uncertain. There are no corrective actions specified in the permits for the NorthMet project that would reverse trends showing that specific conductance is increasing.

Additionally on specific conductance, based on the information that EPA has reviewed, even relatively small increases in specific conductance loadings and/or decreases in dilution capacity would result in violations of the Band's water quality requirements pertaining to specific conductance and anti-degradation.

The Corps' Clean Water Act Section 404 permit and Minnesota's Clean Water Act Section 401 certification predate the Band's adoption of its numeric specific conductance water quality criterion.

EPA notes that the Corps' Clean Water Act Section 404 permit and Minnesota's Clean Water Act Section 401 certification do not account for the potential impact of increased specific conductance on the Band's water quality requirements.

Based on this review, EPA is unaware of any Clean Water Act Section 404 permit conditions that the Corps could add to the NorthMet Clean Water Act Section 404 permit that would ensure compliance with the Band's water quality requirements for specific conductance for Reservation waters, given the NorthMet project's current design and discharges outside the Clean Water Act section 404 permitted activities.

The Band raised additional concerns in its objection that EPA considered but did not fully evaluate to the same extent as the previous. These included: The risk of a tailings basin failure.

EPA acknowledges the Band's concern that a failure of the tailings basin, if it occurred,

would likely constitute an unpermitted discharge of pollutants to the St. Louis River watershed, potentially contributing to the violation of the Band's water quality standards.

We defer to the Corps' conclusion in its record of decision that the design of the tailings basin impoundment damn complies with industry standards for safety and stability safety. Excuse me.

We also considered the Band's concerns regarding future mine expansion. We acknowledge those and defer to the Corps' response to this concern included in its record of decision that at this time further expansion is speculative and, if proposed, may require additional environmental review and would need to meet appropriate regulatory requirements, including applicable water quality requirements.

EPA acknowledges that the Band has raised many concerns regarding its treaty rights to fish and aquatic-dependent species that are important to the Band both culturally and ecologically. We acknowledge that the Band's water quality requirements are intended to protect the Band's water-dependent designated uses within their

reservation.

Finally, EPA acknowledges that the Band has raised important considerations in environmental justice, and we encourage the Corps to consider these as it moves forward in the Clean Water Act Section 401(a)(2) process.

In conclusion, EPA's evaluation has identified both significant uncertainties related to the extent of potential discharge and release of mercury and the potential for additional mineral loadings contributing to elevated specific conductance from the Clean Water Act Section 404 permitted activities related to the NorthMet project. These include: The scale of wetland dewatering that would contribute to methylmercury in the system; net loading from all the discharges of mercury and mineral loadings in the watershed; and the loss of dilution capacity that will contribute to elevated specific conductance in affected water bodies.

Based on these uncertainties, in addition to the reasonably foreseeable discharges of methylmercury, mercury, and mineral loadings contributing to specific conductance that are unaccounted for in the NorthMet Clean Water Act

Section 404 permit application and suspended permit, the Minnesota Pollution Control Agency Section 401 certification for the Corps' Clean Water Act Section 404 permit, and both of MPCA's Clean Water Act Section 402 permits for the NorthMet project, EPA is unaware of any Clean Water Act Section 404 permit conditions that would ensure compliance with the Band's water quality requirements for Reservation waters, given current project design and discharges outside the scope of the Clean Water Act Section 404 permitted activities.

EPA recommends that the Corps not reissue the suspended Clean Water Act Section 404 permit for the NorthMet project as currently proposed, given current project design and discharges outside of the Clean Water Act Section 404 permitted activities.

EPA's recommendations to not foreclose any future modifications to the PolyMet Clean Water Act Section 404 permit application for the NorthMet project or to the NorthMet project's design.

Any future modifications should include meaningful involvement of the Band and Minnesota to ensure compliance with both Tribal and State water

quality requirements.

My presentation today was a brief overview of EPA's evaluation and recommendations. Our full evaluations and recommendations document, this presentation, will be available on our website at the address here as well as the Corps' website at the address here as well.

Thank you very much for the opportunity to share our evaluation and recommendations this morning.

COLONEL JANSEN: Tera, thank you very much for your overview.

So ladies and gentlemen, we're quite a bit ahead of our planned schedule, but as mentioned, we'd like to stay on our original schedule making the assumption that witnesses lined up are lined up with specific time frames. We will take a recess until 10:30 this morning.

(A break was had in the proceedings.)

COLONEL JANSEN: Welcome back, everyone. We'll now resume our hearing. We've allotted 90 minutes for this next block to hear views, opinions, and recommendations from the Fond du Lac Band.

So I'll recognize Ms. Vanessa Ray-Hodge to

open and to call witnesses, and we'll cycle through the witnesses and presentations with our assistance here.

MS. VANESSA RAY-HODGE: Good morning. The first witness for the Fond du Lac Band of Lake Superior Chippewa will be Thomas Howes. The last name is spelled H-O-W-E-S. And he is the Natural Resources Program Manager for the Fond du Lac Band.

MR. THOMAS HOWES: Boozhoo. (Ojibwe language.)

Hello, everyone, all my relatives. So my government name is Thomas Howes, and I am the Natural Resource Manager for the Fond du Lac Band of Lake Superior Chippewa. I'm also a tribal member there. And when what I said to you is that I'm Eagle clan. I'm from this reservation, from this place of the bald island. I'm the lightning that comes before the storm. I represent my five children, and I work to take care of the gifts that were given to us to take care of. And that's what I want to spend my time talking to you about today.

So really what I want to highlight with you guys is, one, I work in what we call our Resource Management Division. But I also want to talk to you about what it is to be a tribal member, what it

is to live this way of life, and I want to sort of highlight that for you and what we do in our Resource Management Division to care for our way of life and what projects like PolyMet, what they imperil in its current form as proposed.

So this is our formal mission statement in English. Our division consists of everything from conservation enforcement and forestry and fisheries, wildlife experts, environmental, cultural resources protection. And the list continues to grow as we add things like invasive species programs, et cetera. But essentially everything to do our part to care for the natural resources under our jurisdiction which is the Fond du Lac Reservation and all of our treaty ceded territory areas. And that's something that I want to kind of jump into next.

Here at Fond du Lac, along with a lot of our other Ojibwe relatives, we were signatory to treaties over time, cessions of land to the United States. And that really drives why we're here and why we do what we do.

If you look at 1837, that ceded territory area, all together that and the other two, the 1842 and 1854, it's about 30 million acres. The reason

that's important is that all of those treaties have similar language in that we agreed with the United States, we made a relationship, and we said we're going to sell you this land. As much as we hate to, we know that we need to. But we're going to retain some property rights, some usufructuary rights you may hear me say. So if you hear me say ceded territories throughout my talk, to me this is normal language, to other people may or may not be normal, but that's what I'm referring to is these territories.

But when we made these agreements with the United States, in our hearts the way we do things as Ojibwe people is we're calling in our whole existence prior to us to help us. So when we sat down with the United States, if you go back and look at the records of it, we insisted that there was pipe ceremonies as part of that because in those ceremonies we call in all of our ancestors, all the representative spirits of all these different, what people today call resources, what we think of more in the philosophy of gifts or our relatives. And so that informs our decision making and part of the reason we're here today.

So when we dial into why we're here today,

we're talking about what some people call the Arrowhead region of Minnesota and what we call the 1854 ceded territory.

This one's important because it establishes the Fond du Lac Reservation as well as many other reservations throughout the Great Lakes region. But it's also important to this because the project is within the ceded territories and within this watershed that is noted here as the St. Louis River watershed.

The reason this slide is similar but I'm putting it up here so that you will note the extent of mining that has already gone on and impairment that already is in place in this watershed. And obviously, this project proposes to kind of reuse or recycle some of that. This here in particular is where the proposed infrastructure is and some of its land exchanges. So again, just kind of giving us all the same sort of place that we're talking about.

And the reason that some of this is important and why we're here is, again, as most people are aware, in that watershed and from where those proposed discharges are, they flow down what we call Gichigami-ziibi or St. Louis River in modern

vernacular or common understanding. But the lake that flows to the Great Ojibwe Sea or to Lake Superior as some people call it. It also forms our northern and eastern boundary of the Reservation, and that's why our water quality standards are called into this discussion.

And the sort of second half of that slide is just, again, where the project proposed is and where -- how it's hydrologically connected to us.

So now we have sort of the sense of where we are and who we are a little bit. I want to just sort of talk about this. And I'm going to talk back and forth as an individual, as a tribal member, as a hunter, as a fisherman, as a rice maker, as a wood worker, as a father, as a uncle, as a cousin. And that's how I approach what I do. It's very hard to separate being an individual human being from my work. It's all the same. It's a basket. It's all woven together. So that's kind of how I'm going to present things to you here today.

And what this is is the -- is Gichigami-ziibi or the St. Louis River. The slide on your left is along the Fond du Lac Reservation in a place we call Ashkibwaa or the place of the artichokes or

some people call Brookston, but it's one of my favorite places on the river. And this is the place -- this river is where I learned to fish. As a young, young boy, I would walk down from Reservation Road and fish there.

And so aside from my connection to it, the Fond du Lac Band's connection to this river and a lot of people's connection throughout Minnesota and expansion is through this river. The Ojibwe people came across the Great Lakes and the navigational route for all westward expansion, fur trade, everything that -- there were no roads. These were the highways was this river. And part of that river network is what you see there on the right is a place we call Kitchi Kabekong or the place of a lot of falls. It's today called Jay cook State Park.

But what that was was part of that path up here to where you are today. So you take Lake Superior. You go through what's called the St. Louis River estuary to the bottom of a rapids. And then you would have to portage around Kitchi Kabekong, and you'd get up to this village. This is one of our seven villages that we have historically utilized.

So our history is tied to these ceded territories but especially for us as a band to this river. And so you would portage up here. And when we signed treaties, we decided that we'd keep this village up here on the river where our rice lakes are or this is what we were able to hang on to because I -- I would have -- if I was there, I would have wanted to stay by Lake Superior. But this is where we ended up. And this is a beautiful place. That's why we fight for it because it's the only thing that we have left. And so that just gives you a sense of a little bit of our connection to this place.

These are my grandparents. They're the reason that I'm here. And literally this is supposed to be a representation to you that we have connections to the past but also an obligation forward. And that is the lens through which we see our work. It's the lens through which I approach my work. But it also shows how, even back in the '50s when our treaty rights weren't acknowledged or recognized, people were still utilizing them and that we had to fight for a very long time to get those acknowledged. We've had to litigate and we've spent millions on resource work to protect

those rights. And that's where we are is in this phase where we've gone through the '90s and early 2000s to have our treaty rights recognized by the United States and the states. And now we're in the phase where we're trying to ensure that those are there for our grandchildren. Because everything is -- this isn't about hunting or fishing or gathering in a recreational way. This is about subsistence. This is about food. This is about medicine. This is about a way of life.

When we were signing treaties, it got written down in English as hunting, fishing, gathering or some version of that depending on which treaty you're looking at. But what we -- the best understanding we have, because we all spoke Ojibwe at the time these treatise were negotiated, the old people are believed to have said that we want to hang on to (Ojibwe language) or those things that give us life. That's what we want to -- we said yes, we'll sell you the land but we want to have those things still that give us life.

So these are the things that give us life. These are the foods that give us life. And that's a little bit of kind of what I want to highlight here.

This is literally the composition of my youngest daughter's first solid meal. And these are all these gifts from the land, from our ceded territories and from on the Reservation.

So this was mahnomen or wild rice; miin, blueberries; and zhiiwaagamizigan or syrup. But these are all food -- they're not only food. They're a preventative medicine. They are the best thing for us as humans. If I had this, I'd be even -- if I only ate that stuff, I'd be even leaner than I am, and I would live a lot longer time. People would live to be 120 very routinely if you live a subsistence lifestyle.

And so that's what we're about as a people. That's what I'm about as a person is as food, as medicine but food as -- and wellness in many ways beyond our physical. We've been disconnected from many things over the course of our interaction with the United States, and we're just trying to reclaim and rebuild these things so that we can be as strong as we can possibly be because life is hard. And so we respect all of the things that have fed our people over time. We have a relationship that is, what I explain to people, akin to a life dead. So all those things, those things that give us life

have fed us and made it possible for me to speak to you today, and in return, I have a debt back to them, to the fish, to the trees, to the plants, to mahnomen, et cetera. I have a responsibility to speak for them when they can't. They gave me the ability to speak, so that's why I'm here.

And so I think I said it before but this isn't about recreational harvest. This is about feeding our families. This is about making sure that intergenerational transmission of cultural knowledge continues. This is what feeds absolutely everything we do. It's about community and it's about healthy food.

So as I said, we spend a lot of time and effort to ensure that these things can continue to exist whether that's law enforcement or personal safety of the people from accidents or from other people harassing them, that's what we have to do.

Right now this is going on in our ceded territories. We're doing our spring harvest of fisheries. Hundreds of people will be fed, tons of ceremonies from -- ceremonies from the time we're children to the time that we pass on into the bones that we memorialize so our ancestors that have gone on will be taken care of through these gifts.

So these are just to show you that this isn't a catch-and-release scenario. This is a catch and eat scenario. And it's, you know, all parts of the systems. And we studied the forests and take care of them because they take care of us. Doing things like prescribed burning and wild fire prevention so that our communities are safe and also fed.

All parts of the forest have different uses to us at different times. We just finished this season of our sugar making seasons. Again, because this is something that has always taken care of us and that's why we do that so that we have gifts, so we have food, so that we have that medicine.

We spend quite a bit of time, because we live here where it's cold, trying to stay warm and trying to stay well fed with proteins. As an agency, we also spend an awful lot of time making sure that everything we do is sustainable. These harvests aren't without engagement and partnership with state and federal partners. We're trying to make sure that everything we do is absolutely responsible so that our grandchildren enjoy better than what we have.

And sometimes that's a challenge, you know. Sometimes there are climate impacts and there are

other impacts, conflicts between species and so there's things like the moose that we spend a lot of time doing research and study on, and that's in partnership with states and federal agencies.

But we're also doing things like thinking ahead. And that's a lot of what the next section of my slides is about is thinking ahead.

And so one of the things that we're thinking ahead about is the elk and trying to have populations that used to exist here be brought back. We're trying to restore that and honor that relationship that they -- they fed our people in the past. And they've been extirpated from this part of the state and part of the country, so we're trying to bring that back and honor that relationship and also continue to feed our people.

But it's not always about food. It's also about imperiled species and endangered and threatened species. For cultural reasons and those kinds of things, we will study and protect species even though we're not going to consume them. But they have a place in the order of creation that should be respected and protected as well.

So we'll spend -- we have a lot of collaboration with the State of Minnesota on their

wolf population modeling because it's important to make sure that these guys continue to exist as a species.

This is supposed to have -- (video playback.) There's sound to it but I think we all know what a river sounds like. Just for scale, those are six-foot fish.

And what that is is something I really -- it's near to my heart because it's a project that I work on a lot. But it's one of -- an example of, again, the Band thinking ahead and honoring a relationship and planning ahead for the future. And this is a project we -- the Band itself completely initiated in the mid-'90s is the sturgeon reintroduction program on Gichigami-ziibi or the St. Louis River up here along the Reservation above some hydro dams that separate us from Lake Superior. And this was an intentional effort to reestablish a species that was considered extirpated in the St. Louis River because of numerous ways that it was degraded, overfished, its habitat altered, log drives through the river, et cetera. But they were considered extirpated up here. And so in the mid-'90s we began studying and actually initiated stocking in 1998. And that's what that slide prior of the --

the video is -- those are the parents of these fish.

And so we have to -- we have to work really hard to get this done. There are two stable populations of lake sturgeon in the Lake Superior basin where we can get genetics from that have enough spare genetics. That's how bad of shape this species is in.

But as Ojibwe people along this river, our village where I live now is this place called the Nagaajiwanaang near Duluth. It's the name Fond du Lac. It's at the base of that portage I talked about earlier. That's where our annual fish camps were. So the walleye would run right this time of year. And the water warms another 5 degrees and the mawoc or sturgeon run up the river and spawn there. And then in the fall a whitefish run would run there. And those were the three species that really sustained our community. And so to honor that relationship, now that we're here up at this upper village where they've been extirpated, we're trying to bring them back.

So we have to travel all the way to the Sturgeon River where the Keweenaw Bay Indian community, nearby their community near Baraga,

Michigan to get these parents.

And so we'll go and live-capture some adults, borrow a small percentage of their genetics, and working in partnership with the Fish & Wildlife Service, hatch them out and then eventually transport them and bring them back home. And we're bringing them up here to the St. Louis River.

And we've been doing this in waves, like I said, since 1998. Because we're trying to rebuild the connection to our community with these. And we're using a lot of different ways. And so it's, you know, more -- more modern techniques like pump trucks. We started out with just coolers of fish and some handcrafted things that had their own nicknames, bubbler jars, just to get them here safely. But this has been successful.

This is a live capture of an adult for tagging purposes. So this is an ongoing part of it is we're still continuing to stock so we have the right amount of genetic diversity. But we're also capturing them now because they're of reproductive age. Lake sturgeon take about 20 years to become reproductive. And so the fish that we initially stocked are now of reproductive age, and we want to see where in the 120 some miles of free-flowing

river up here they're doing that activity. Because we want to, one, document their actual reproduction in the river. But in a high-tannin river it's a challenge, and so we're adding radio tags to help us pinpoint locations and also sort of show the success, the growth rate, et cetera, of this effort. So that's just a little bit about that. Because those are -- those are what we intend -- we don't harvest them right now. They're protected as a species because there's not enough either known about how successful they are, but also how many there are. So we're saving those for our grandkids.

This, as you're probably well aware, if you've ever met an Ojibwe, is one of the plants of utmost important to us. This is mahnomen or some people call it a rice. But it's something that's unique to this part of the world that is, again, responsible for us as a people and especially in our culture to have survived through a very challenging history. We actually thrive in this region because of this plant, and we've survived since then because of it. And that's why we advocate so strongly to protect it because, one, it's the only place in the world that this species,

just from a biological level, exists but, two, because it's fed us as a people and it's interwoven into everything that we do and we are.

This is from the headwaters of the St. Louis River up near where this project is proposed. But also this species is throughout the watershed here on the Reservation as well. This is one of our lakes on the Reservation that we routinely harvest from. And it's a focal point for our community. The harvest season is extremely important.

Just to show you, give you an idea of how important it is, we've spent millions over the last couple of years, or couple decades I should say, restoring damages to watersheds, converting plant communities back to dominance by this -- by mahnomen from ill-informed decisions about land use, channelization, dredging, ditching, wetland fill, etc. And so we take our responsibility to this plant just as serious as all those others.

This involves installing water control structures and managing water level in a way that's more historically representative of where those lakes and things should be but also doing things like managing beaver populations and removing obstructions so the conditions exist that are

favorable.

And then going down the watershed to near Lake Superior, this is down in one of the areas of concern in the Great Lakes that we're trying to do our part to get it delisted and by restoring habitat and reintroducing habitat function and species richness down there. We're in our ceded territories living out our obligation and bringing wild rice back down there in partnership with the different state agencies to bring this back to our old village areas. And this is our staff reseeding this rice back down there. This is something we've been doing for the past six years.

Now, I won't to delve into the chemistry and all that, and I'll leave that for other folks to talk about, but just to say that our interest in this goes into being early -- early adopters and advocates for better understanding and science around contamination and threats to mahnomen. That's all just another part of our responsibility is to look at it from as many angles as possible because we know from the some of the work that we do whether it's from a sediment core near other poorly-made decisions about discharge. You can see sulfur wipe out whole lakes.

So this is -- these things are the reason that I'm here. It's not just about what we as people want, but our responsibility to our relatives whether they're the fish or future generations.

I'm here because I'm trying to advocate for the United States to live up to its obligations to us as a people, to honor their treaty obligations, to honor their trust responsibility.

I'm here because some of those of our relatives can't speak for themselves whether they're plant nation or the fish but also the old people that can't be here, the people that came before me that didn't have their voices heard or the ones that have yet to even be born. We're here to -- I'm here to basically make sure these kinds of things continue.

I have to imagine that it was very hard for my ancestors to make a treaty with the United States and give up territory, a time in history that was probably very challenging to them, and they probably saw that as very, very challenging and yet they still managed to think ahead. And I think we're still at those kinds of decision points. And we still need to think ahead so that this way of life continues.

And I would just encourage the Corps to live up to its responsibilities, the United States to do its duty to ensure that the Band and its rights are acknowledged and respected.

With that, I thank you for listening to me. That's all I have to say. Migwetch.

MS. VANESSA RAY-HODGE: Thank you, Tom, for that great presentation.

Before I introduce the Band's next witness, I also just want to let everyone know and recognize the Reservation Business Committee who is here with the Chairman today. We have Secretary/Treasurer Ferdinand Martineau, District 1 Representative Wally Dupuis, District 2 Representative Bruce Savage, and District 3 Representative Roger Smith. It is through the RBC's leadership and dedication and perseverance that we are here today.

And I also want to recognize the Band's in-house legal counsel, Tribal Attorney Sean Copeland, Tribal Attorney Ally Jo Mitchell, and also my partner and colleague at Sonosky, Matthew Murdock.

The Band's next witness is Nancy Schuldt. She is the water projects coordinator for the Fond du Lac Band of Lake Superior Chippewa.

MS. NANCY SCHULDT: Boozhoo. It's an unexpected yet long-awaited opportunity to be able to meet with the Corps today. Thank you, Colonel Jansen. And I thank EPA as well for listening to our concerns and examining the work that we had done and sharing their conclusions and recommendations with us in advance of our comments today.

So Tom really set the stage very well, but I always like to begin my comments when I speak about the work that I do for the Fond du Lac Band with maps. It's so important to have that knowledge and sense of place. And as Tom explained to you from his perspective as a Band member and as a person who exercises treaty rights and has grown up in this area, my comments will focus, as his did, around the St. Louis River watershed and our reservation lands that are within the watershed as well as the 1854 ceded territory. This all represents Fond du Lac homelands, and it is what we all strive to work for.

I've been a staff member since 1997. I was hired by the Band to develop water quality standards that were ultimately approved by EPA. And that was 25 years ago. And it is maybe one of

the most important investments that the Band made in being able to prepare for the future and to be able to protect our resources.

There's fewer than 50 tribes nationwide out of over 570 recognized tribes that have gone that distance to have approval for treatment as a state and then to develop water quality standards that are federally approved and implemented.

And again, the hydrologic connection is going to be the crux of my comments because our water quality authorities under the Clean Water Act pertain to waters of the Reservation, but the St. Louis River forms over 20 miles of Reservation boundary. We share jurisdiction for these waters with the State of Minnesota and the State of Wisconsin and, obviously, the Clean Water Act authorities that federal agencies like the Corps and EPA have.

So for the work that I do and was originally hired to do on Reservation, it's all about the waters of the Reservation, the lakes, the streams, the wetlands, and the St. Louis River to which our authorities apply. We have implemented our treaty rights through a robust monitoring program, through 401 certifications that are issued always with

conditions.

And the off-reservation part of my job has evolved as we began to realize that some of the problems that we were seeing through our monitoring program certainly did not originate on the reservation, but rather were coming to us from upstream sources.

So the Clean Water Act provides for opportunities for the Band or for a state to look at what is happening outside of their boundaries, outside of their jurisdiction, and there are certain frameworks where there is an opportunity to be able to weigh in and explain and defend your perspectives around what the impacts might be if an action were to be permitted to go forward that would originate outside the Reservation, yet impact Reservation waters.

And so for those off-reservation issues, we really do rely upon our relationship with the federal government, with the USEPA primarily, but also with the Corps and with the Fish and Wildlife Service, Department of Interior, with other agencies that also have that trust responsibility with the Band and understand that the protection of treaty resources is central to that trust

responsibility.

I mentioned our water quality standards. I was hired, as I said, after the decision had already been made by the Tribal Council to pursue TAS, treatment as an affected state. And that TAS had been approved the year prior to my being hired. And water quality standards were already in draft form, but I worked closely with my colleagues at the Resource Management Division, with the community at large, and with the tribal leadership to establish the same elements in our water quality standards that form the standards for states and those federal standards that EPA implements.

We have tribally-specific designated uses that include such things as wild rice, cultural resources, aesthetic resources. We have established numeric and narrative criteria both that are intended to protect our water resources so that they can continue to support and provide the kinds of resources that our community relies upon for subsistence. So it isn't just about a basement level of protection. It's about protecting the qualities and the condition that allow for diversity, for healthy, highly functional ecosystems.

We also really focus on antidegradation. We have high-quality waters on the Reservation, and we intend to protect them at that high level of function and that high condition and quality through our antidegradation provisions. All of the waters of the Reservation are considered at least Tier 2 or exceptional use waters. Our wild rice waters are considered Tier 3 where we would not permit any degree of degradation to occur.

In fact, what we have seen over 20 plus years of monitoring is that really the only impairment that needs to be addressed for waters of the Reservation is mercury. And we have problems with mercury in both concentrations measured in the water and the concentrations measured in fish, fish tissue.

But these water quality standards, as was so profoundly explained to me by tribal leaders and by my managers at the time of my hire, was that this was maybe one of the most fundamental ways that the Band could exercise its sovereignty in a modern world to maximize the ability to protect these important resources.

And as I said, we developed a monitoring program and have been implementing that since 1998.

We're looking at physical, chemical, biological measures. We understand our waters and the biological communities that they support. We've been collecting data long enough that we're in a position now to begin doing some of this deep dive to be able to discern trends, including climate change impacts.

And as far as water quality trends, we see that we're holding stable with the exception of mercury and with the exception of the specific conductance criterion that I will speak about shortly. That seems to be an increasing problem. And then, of course, we are already experiencing some of the hydrologic changes that climate change is wreaking in this region. But that does also inform the development of new standards.

So when I talk about our awareness of upstream impacts to our reservation waters, it wasn't until I'd been working for the Band for about six or seven years that Tom and I became involved in a multiagency biological assessment of the entire St. Louis River watershed upstream of the area of concern.

Back in 2005, I think it was, Tom and I spent many, many days on the river all the way up at the

headwaters outside of Seven Beavers Lake, all the way through the Mesabi Range and down past Floodwood and the Reservation. And we were essentially replicating a massive bioassessment that the DNR had done back in the '40s and then again in the '70s. And it was intended to be able to track the condition of the fisheries. And we also brought a new component of habitat assessment, water chemistry measurements, and looking at the benthic invertebrate community to understand the condition of this river.

And it was about that time that there was a boom and an expansion in the existing taconite industry. If you look at the headwaters of this -- in this figure, you see that the St. Louis River meets the Rainy River watershed and the Mississippi River watershed at a single point that actually lies on the property controlled by Hibbing Taconite, the Hill of Three Waters. So a major Continental divide lies along the Mesabi Iron Range, and it has been heavily mined for the past 150 years, high grade iron ore. And then as that was mined out, there were new technologies developed to be able to go after the lower grade taconite ore. Obviously, a lot more waste involved

with that.

And so the result of over 150 years of mining across the Mesabi Iron Range is that almost the entire 110-mile length of it is covered with waste stockpiles, mine pits and shafts, tailings basins and mining facilities and all the infrastructure that ties it together. It has been a massive and permanent footprint on the land and in the headwaters of the St. Louis River.

And understanding that impact, this is a figure that I borrowed from Michael Croutteau, a hydrologist that used to work for the DNR, with the forest service now. He mapped a lot of the existing mining features and did a GIS analysis of where those impacts have occurred across those three major watersheds. And about 50 percent of the wetland impacts and the headwaters burial, et cetera, has occurred in the St. Louis River watershed upstream of the Reservation. So when I get to talking about cumulative impacts, I want to stress and reinforce the fact that the cumulative impacts that the Band is concerned about don't just originate with the PolyMet project.

It was about that time, as I said, that we were beginning to be aware of a number of

expansions at these existing taconite mines. I knew very little bit -- a very little bit about mining and mining processing and how it could impact water resources. But we were able to connect with supporting staff at GLIFWC, Great Lakes Indian Fish & Wildlife Commission, and the other bands that share treaty resource rights in the 1854 Grand Portage and Bois Forte and the 1854 Treaty Authority. So when I talk about "we" and "our" work on mining review and permitting review, it includes the work that we did as a team of tribal scientists and tribal staff members to understand the existing and potential future impacts of mining on the resources in this watershed.

So we began to review EISs, the air quality, water quality permits, and engaging and requesting consultation often with the Corps because usually there was a relatively large wetland permit associated with these expansions, extensions, progressions of existing facilities. And so under Section 106 of the National Historic Preservation Act, we would request consultation. And we began to have this dialogue over and over again about natural resources as cultural resources. And we

weren't just concerned about protecting the remnants of a rice camp or the physical feature of the Mesabi Wajiw, the Mesabi Iron Range and its significance, but also about all of those resources that Tom kind of laid the table with you about that comprise the cultural identity and the cultural and spiritual and physical health of the Ojibwe people. We really needed to educate ourselves on the mining process and what was and was not being examined in the environmental review of these projects.

And right away we were calling attention to problems that we saw that, in fact, these were already impaired waters. The entire watershed is impaired at least for mercury in fish or in the water column or both and the impacts that have already occurred, the alteration of hydrology, et cetera, so many thousands of acres of wetlands that have been permanently erased from the landscape and the functions that they provided and the loss of access to treaty resources everywhere that this footprint has left its mark. There's been an erosion of the resources, the quality of the resources, access to the resources.

The kinds of wetland that have been impacted are really generally high-quality boreal forested

wetlands, peat bogs. There's so much diversity in these systems. There's so many functions. They capture and sequester carbon at a higher rate than just about any other ecosystem on the planet besides the ocean. They provide foods and medicines. They're habitat for other important species. And once they're gone, they're gone. You don't just grow another peat bog or a forested wetland out of a cornfield, which is what we were seeing in terms of mitigation for the Army Corps permits that were being issued for 3, 4, 500 acres of impact at a time from the entire progression of projects from the western edge of the Iron Range all the way to the north shore and the eastern edge. If there was wetland mitigation, it was out of the watershed, out of the ceded territories, and completely out of kind. Permanent, complete loss to the Band.

We notice that there were already impacts to wild rice waters. There's -- our poster child are the Twin Lakes outside of the Minntac tailings basin, one of the first projects that we reviewed. And we -- where we came to understand for the first time that the State agencies that we assumed were enforcing the regulations that are on the books and

have been on the books for decades to protect wild rice, that was not happening. And it wasn't because the DNR and the MPCA didn't realize there were wild rice resources up there or that high sulfate could be a problem. They just looked the other way and went ahead and permitted these expansions and these extensions and these progressions. Did not require the industry to treat their waste.

And so there are wild rice waters that are now mine pits. There are former wild rice waters that no longer support wild rice because they've been loaded with sulfate for decades. This kind of heavy intensive industrial earth moving unleashes a lot of minerals and ions from the landscape. And once it's in the water, highly soluble, you end up with really high concentrations in mine pits, in the leachate coming out of waste rock stockpiles, certainly coming out of tailings basins. And these are unlined and they are impacting the waters, the receiving waters nearby.

And so we know from the research that we have helped to support for over 15 years now, we have seen the scientific evidence that demonstrates not only a confirmation that sulfate loading is toxic

to wild rice, but how it is toxic to wild rice. It's when it is reduced to sulfide in the anaerobic sediments of wild rice waters that it is highly toxic and at a very specific point of the life cycle of the wild rice plant.

Our ongoing experiments that have continued for the last 10 years since the State was going through its rule making have really been able to shed a lot of light on our knowledge about how sulfate affects wild rice.

We know that it can increase methylation of mercury that is deposited in these waters and in these watersheds. Sulfate-reducing bacteria can use that sulfate as an energy source, and a by-product is methylmercury. And so our watersheds up here are really, really efficient at methylating mercury. And you'll hear more about that from others today.

It contributes to the observed aquatic toxicity that the State Minnesota has seen in some of its impaired waters and the waters that have been listed on their 303(d) list.

It can contribute to eutrophication. There's a number of lakes up along the Iron Range that are getting a load of sulfate out of these existing

mines, and it is contributing to some pretty drastic impairments. And it's even been associated with the pitting and the corrosion of the steel piers and infrastructure in the harbor.

So this is a picture of an engineered seep at the toe of a tailings basin where you can see the water pooling. And off in the distance, you can see my cursor up there, that's the Twin Lakes outside of the Minntac tailings basin. So you can see the distance as the crow flies is about a mile at most.

But that seepage that has been designed here to discharge through this wetland and make its way over to that lake over the course of the last 40 years has completely wiped out a wild rice population that Grand Portage and Bois Forte Tribal members were harvesting a generation ago.

And not only does it wipe out the wild rice, but that seepage, the hydrologic impact itself causes conversion. You probably saw in the distance, you know, there's a nice spruce-tamarack bog here. Well, it's also altered the hydrology to the extent that it's completely converted the wetland type. And so you've lost that forested wetland component, and you've got a nice cattail

monoculture stretching all the way from the tailings basin to the wild rice that no longer supports wild rice.

You can see that it plays a role in the phosphorus released from the sediments, and you can see some algal scum developing in that pool.

The mercury in fish. Again, a lot of the problems that we are seeing with the mercury in fish in our reservation waters, in our ceded territory waters originates and is exacerbated by the mining industry. And so from the headwaters all the way past the Reservation, all the way down to the area of concern, the estuary where it meets Lake Superior, there's a relatively strict fish consumption advisory in place by the State. And, of course, we're doing our own fish consumption advisories, doing our best to balance the need for encouraging the practice of traditional life ways with the knowledge that you simply can't eat very many of the fish that you can catch out of these waters because of the neurological and other physical impacts.

Again, we've tried to be sensitive as to how we communicate this information, encouraging eating the size of fish, the species of fish at a

frequency that is safe and healthy. But that's walking a really fine tightrope and it is not a solution. A solution would be getting the mercury down and getting the sulfate down.

Some of the data that we have collected -- oh, that's interesting.

Just to give you an idea, this is just a few seasons of mercury data from five of our permanent monitoring sites on the St. Louis River. And you can see the GLI Standard, the Great Lakes Initiative Standard of 1.3 ng/L is almost always exceeded. This is our standard which was calculated assuming a fish consumption rate that is double that of the general population, which is where the GLI Standard was pegged. And so you can see that the St. Louis River, from this data set, is exceeding our mercury standard almost always.

Another way of demonstrating that here. This is a little broader data set. The lower purple line is actually the method detection limit. And then this blue turquoise line is, again, our criterion. And you can see that over the years at the different sites we're almost always exceeding our water quality standard for mercury.

And in the work that I've done with the --

around the basin with the Lake Superior -- first it was the binational program. Now the partnership, the work group. One of the things that we do is track the sources of these bioaccumulative contaminants of concern, including mercury and their sources. And over time as other sources of mercury or omissions have been able to bring them down under control, the portion that the taconite industry represents has become a much larger piece of the pie to the extent that they are far and away the largest source of mercury emissions in the Lake Superior basin. In fact, in the entire upper Midwest.

So that mercury problem affects not only our on-reservation fishing with the St. Louis River being our most important on-reservation fishery resource, but also the treaty fishing that is done and is going on, as Tom said, right now, this time of the year.

So wild rice and mercury, obviously, these are things that we have expressed concern about over and over again understandably but it is more than just the fish and the rice. It is all of the other gifts that this landscape provides. The materials, the maple sugar, the medicines that are at risk,

the wildlife, the unique wildlife that this kind of an ecosystem supports when it's healthy and functional and intact.

We are seeing diminished resources that have been important over many, many generations to the Band, and it's from a host of stressors not only due to mining, but certainly on top of climate change and disease and other issues that our scientists are looking at. Every stressor compounds the problem.

It was during the draft EIS for PolyMet that we became aware of a study that the Minnesota DNR had commissioned looking at what habitat remained across the Mesabi Iron Range that was still intact that was not a mining feature. And at that time there were, I think, 16 places across the entire 110-mile stretch of the Mesabi Iron Range that still had relatively intact habitat where there could be migration, there could be populations moving back and forth. And it isn't just the big animals. It isn't just the moose and the deer. It's other animals that rely upon intact habitat to be able to move around. This essentially becomes the Great Wall of China for wood turtles or for other smaller animals once all of those green

spaces are closed up.

So what we learned -- the "we," tribal staff working together -- is that mining has a really distinct fingerprint in terms of what it does to water quality. We see elevated dissolved constituents contributing to specific conductance or total hardness is another measure that -- where it's often really apparent. These are naturally really soft waters with very little solutes in them. Really soft waters, really low in sulfate. But once they come in contact with the mine processing or mining features, they're elevated. There are process chemicals. There are minerals and other ions that are released.

We're seeing evidence that some of these concentrations are above the regulatory standards, including mercury, that can be released from disturbed peat lands just from the actual disruption of the landscape.

Wild rice has been diminished or outright destroyed. And the biological communities that we rely upon have become impaired or imbalanced. They're missing sensitive species. They no longer support the diversity that they once did.

And we've wondered early on how far downstream

did those impacts propagate. And so eventually we did begin to examine that.

The mining footprint is something that I alluded to earlier. It's a really heavy and permanent change to this landscape. Thousands of acres of wetlands have been filled or dredged. The hydrology has been completely modified.

We've worked with the USGS to develop a model of what mining has done to change the groundwater flow patterns across the headwaters of the St. Louis River and what it has done to diminish existing wetland features, and it's a profound change.

We have headwaters that have been buried and changes throughout the watershed. These lakes, natural lakes and mine pits are being used sometimes as tailings dumps.

There's been a massive interbasin transfer of water from groundwater being pumped and then discharged into a different watershed which we've called into question about being consistent with the Great Lakes water quality agreement.

And traditional cultural properties, things like rice camps, sugar bush, hunting grounds, sacred places, trails, et cetera, have been

degraded or destroyed and these impacts are permanent. They're a permanent loss.

Altered hydrology I mentioned. It can change things in both direction where you have excess flow through a system or you have entire watersheds being pirated of their water at the headwaters. It changes groundwater. It changes base flow in streams and rivers.

And then maybe most importantly, we were beginning to get a sense that none of these projects were adequately addressing the cumulative effects of what this amount of mining across time has done to this watershed and to the ceded territories. The cumulative effects analysis that was going on for any of these environmental reviews was so narrowly constrained to a very small area, maybe the actual footprint of the proposed action, and nobody was looking at the big picture and taking it into context and understanding that it was a cumulative impact to treaty resources for the Band and one that was not being addressed in any fashion or any kind of mitigation or even being recognized.

And we also began to recognize that -- and it wasn't just from our own monitoring but from

studies that were being done by, for instance, the State DNR or the Minnesota Pollution Control Agency's monitoring, is that these violations of the Band's water quality standards on our reservation were coming from existing impacts of permanent mining facilities. And so all of that flows downstream, that hydrologic connection from the Reservation upstream to downstream.

And we began to look for help. We asked EPA Region 5 to provide some technical and financial support so that we could learn what we needed to learn and understand what to review and how to review and what kind of comments we could make in this environmental review process that could gain traction and maybe make a difference in the way a project unfolded.

We were able to access some specialized training in hydrology and hydrologic modeling in understanding financial assurance because as the PolyMet project began -- was announced with their intent to move forward and they were going through the preliminary process and the scoping process for the EIS, we recognized that we were going to have to really step up our game and pay close attention to every step of the process because if taconite,

which everybody considers this relatively benign kind of hard rock mining that doesn't release toxic chemicals, and that the State of Minnesota was so vigorously enforcing its regulatory framework around, if we were seeing the results of that, we could only imagine what the potential results would be if the next big mining project was a sulfide ore body because we would get all of those other impacts, plus a much more toxic water discharge. And the scale of this project in terms of the amount of wetland impacts was a little bit breathtaking. So, again, we asked for help.

One of the things that EPA provided for us was some contractor support to develop a protocol for conducting a cumulative effects analysis at a scale that was relevant to our concerns at a scale of, say, ceded territories. And it was essentially a GIS-based format that would take advantage and leverage as much existing information as possible. It wouldn't require a lot of new data. It would be a way for the lead agencies in a project like PolyMet to actually, for the first time, do a cumulative effects analysis that addressed the concerns that the Bands were bringing forward.

And when we became engaged in the

environmental review process, not just for PolyMet but for these other mining projects as well, we really -- the direction I was getting from tribal leadership was to focus on the regulatory process. This was not about trying to shut down or curtail an industry. It was about trying to do everything we could within our power to protect our way of life, to protect the resources that support our way of life.

And so at every step of the way the kinds of comments that we were making, the kinds of critical analyses that we were doing around impacts were about trying to make this industry follow the rules. We figured that if the permitting agencies were going to allow a project to go forward and it could meet water quality standards, that they could minimize their impacts and mitigate for what they couldn't minimize, that was something that we would deal with.

And so that was the direction that I was getting -- that my colleagues that were working for other tribal agencies and governments were getting.

We were expecting that the state and federal agencies were upholding their regulatory frameworks and their authorities both in the environmental

review and then the issuance of permits.

And we had a lot of faith that water quality standards should play an important role. We were always advocating for more data, better understanding, more transparency, a clearer picture that everybody could understand, a common basis for understanding what the impacts may be. And we wanted to make sure that it -- any project moving forward would be compliant with our water quality standards.

So as the GIS -- the environmental review process began for PolyMet, we were already engaging with the Corps at that time and expressing a lot of interest. We actually requested face to face that we be invited to be a cooperating agency. Months went by. The scoping process began. That invitation was not forthcoming.

It wasn't until our tribal chairwoman wrote a letter to the district commander, if I'm not mistaken, in May of 2007 that actually brought results in September of 2007 with a direct invitation to Fond du Lac, Bois Forte, and Grand Portage to be cooperating agencies.

Now, this is something under NEPA that should have been forthcoming immediately, particularly

once the Bands expressed an interest in participating at that level to be at the seat -- in on the review of all of the technical support documents, the drafting of chapters, the analysis of impacts, to be able to bring our expertise into the picture and to be able to review and comment on early drafts before they were released to the public. So we were already kind of behind the eight ball when that letter inviting us as cooperating agencies came. In fact, the scoping was pretty well done at that point.

But we were offered some limited participation in some of the working groups. Some of the comments we got from Corps leadership at that time was an assumption or presumption that really we only had expertise in cultural resources. And as I mentioned before and as Tom laid out, the Band considers natural resources to be cultural resources. They are integral to the maintaining of the Ojibwe culture and traditional life ways.

And at this point we all had staff that are trained, that are experienced, that have strong scientific backgrounds and a strong connection to the community to understand what those concerns would be.

We were immediately able to identify what we thought were some pretty significant data gaps in some of the preliminary analyses that were happening. Things like a real paltry amount of water chemistry data, the hydrologic data that was being relied upon for the water quality and hydrologic modeling was -- it was 20 years old and taken from a gauge that was about 15, 16 miles downstream of the project, so really not relevant to current conditions. Certainly not taking into account climate change impacts and understanding of what existing hydrologic conditions were. And there was a clear intent to really spatially and temporally limit the analysis of cumulative effects.

So the tribal response. Fond du Lac's staff as well as the other agencies that I mentioned was, you know, being able to review the technical documents, to understand what was going into the drafting of the chapters for the EIS. And we provided substantive comments along the way on some of our own analyses. And certainly the comments that we provided were scientifically supported and well cited.

We hosted a training for all of the permitting

and environmental review agencies. We brought in EPA's national hard rock mining team, Steve Hoffman and Jim Kuipers, to walk through what would a sufficient financial assurance package for the State of Minnesota's first ever copper, nickel, sulfide mine look like and what do you need to really be thinking about. There was a brand new set of regs on the book but the State of Minnesota had never permitted a sulfide mine before.

And so it was an attempt to make sure that everybody was on the same page and that had clear understanding of what we needed to know to protect the public's interest, not just the Band's interest, but how the state and federal agencies could make sure that if this project moved forward and was permitted and operated, that we wouldn't be left holding the bag for cleanup down the road.

We sought some external expert review of some of the early documents as well, particularly the hydrologic model.

And we went to USGS. From our perspective, they're the gold standard when it comes to environmental data, particularly hydrologic data and water quality data.

And we talked to people in both the Minnesota

and Wisconsin water science centers.

And USGS is notoriously shy about getting involved in anything that might be perceived as political. Their intent was not to try to sway a decision. It was an attempt to make sure that there was a clear and common understanding of the science. And in fact, they brought forward some really strong recommendations for how the model could be improved, how it could be clarified so that everybody, including the public who was going to review it, could have a common understanding of what was being put forward.

And finally, we really tried to persuade the co-lead agencies, the Minnesota DNR and the Army Corps at this time, to follow that cumulative effects analysis protocol that EPA had helped us develop. The State of Minnesota was not interested. It was just guidance as far as they were concerned. And disappointingly the Corps decided that they didn't think that it was appropriate to follow that protocol.

We elevated our concerns about mercury impacts from this project from the very beginning. We had at that point a fair amount of our own water quality data. We had been collecting fish from

reservation waters for a number of years. We had been working with the State agencies, Department of Health, PCA, DNR in trying to understand mercury impacts in this watershed. And what we were seeing in terms of the analysis of mercury impacts for this project during the draft EIS phase was that it was completely deficient. It was not accurately representing existing conditions, never mind accurately projecting or predicting what the impacts and future conditions would be.

We had to fight to get some of the technical documents. We knew when work products were underway. We would ask consistently and periodically to have access to them, but it was often, you know, quite a bit of time after they were released to the other agencies when we were able to see them.

So the draft EIS was published in 2009. We had collectively and individually for our agencies developed comments in addition to what we had been providing all along through the environmental review process.

And we actually had to invoke dispute resolution under the MOU that we had signed with the Corps to be a cooperating agency because rather

than following NEPA guidelines and presenting our dissenting opinions or our alternative analysis alongside what the co-lead agencies were providing, we were relegated to footnotes. We were asked to quickly cobble together a set of unified comments that could be inserted as footnotes to the draft EIS.

I cannot tell you how discouraging and demeaning it was to have several years of work treated in that fashion, but it was just as gratifying, then, when EPA came out with a determination that that draft EIS was getting the lowest possible rating, EU-3; meaning, that it was both inadequate from a NEPA standpoint in terms of how it went about doing the analysis and the environmental impacts were unsatisfactory and this project should not move forward as it has been defined in the draft EIS.

And one of the key issues that they identified in their comments on their decision document was that it failed to take into account the impacts to downstream water quality standards and water resources of the Band.

So when it became apparent that we were going to have to go back to the drawing board and do a

supplemental EIS, we were hopeful. We were hopeful that that would lead to more engagement, more involvement, more listening perhaps, more consideration.

We started off with a field visit to the site to get a common understanding of the extent of the wetland resources up there and a better understanding of the hydrologic connection to groundwater. And it was a good start, a promising start.

Now because it was clear that the land exchange was a connected action, Superior National Forest became another federal co-lead agency. And because EPA had rated this an EU-3, essentially gave it a failing grade, they felt compelled, obligated to step in and be a part of the process during the supplemental EIS to help steer it in a direction to where it could pass muster and go on towards permitting.

We again requested to be integrated with the technical work groups in the different media areas. And more importantly, we requested responsiveness. We didn't want to be just dismissed out of hand without any explanation as to why our well-reasoned and well-supported comments and recommendations

were not even being addressed in the draft chapters.

At that time the Corps expressed a lot of interest and a better understanding of what we meant when we talked about our downstream water quality standards. And obviously, EPA had called it out in their earlier rating of the draft EIS.

And specifically, I was asked on two occasions with written communications from Tamara Cameron to lay out the details about how we promulgated our standards and how we implement those standards to better understand how they should probably be considered in the supplemental draft EIS.

And, you know, we laid out our concerns around mercury, and we were also really clear about our concerns for specific conductance. At this time we were looking at potentially establishing a hatchery -- I think that's still on the dream list -- so that we don't have to go over to the Upper Peninsula to get stock. But we needed to understand what kind of conditions were needed to be able to do that sort of investment in restocking. And we were saying that early life stages, the eggs, the larval fish, the really young ones were sensitive to high salinity. And so if we

were going to try to raise fish, we needed to be able to provide the kind of water quality that would support them.

And at that time we were considering a specific conductance standard, but it had not -- we had not yet promulgated that. But we communicated it clearly that it was something that we were investigating. And as Tom pointed out, there has been a huge investment for the last 20 years on behalf of the Fond du Lac Band to reestablish a sustainable population of lake sturgeon in this stretch of the river.

The state agencies have invested for more than 30 years to try to reestablish them down in the estuary, and the tribal agencies have certainly been a part of supporting that, helping to track their success. In fact, our fisheries biologist was the first one to find the first promising beginnings of natural reproduction down in the estuary. We're hoping to see the same thing happen up on this stretch of the river. But we have to make sure that we're providing the right kind of habitat and the right kind of water quality to support that effort.

We have measured specific conductance on every

monitoring trip that we have ever done for any lake, stream, river even in our wetlands. It's easy, cheap to measure. And it's a really nice parameter that gives you a lot of information.

And so across the board, across all of our water bodies we are always in really low numbers, 100 to 200 µ/cm is pretty typical. We've got some really soft waters that are even lower than that.

On the St. Louis River, however, it's a different story. And it's because of that river connection. We are hydrologically connected to what is happening up in the headwaters. And we have just, you know, snapshot kind of data taken at a discreet sampling event going back probably 15 years or more on the St. Louis River.

But last year we installed continuous specific conductance sensors in three of our five river sites. Last year, if you recall, we had a pretty extreme drought. And by the end of the summer, we were down to maybe some of the lowest base flow that I have seen in the St. Louis River and across all of our waters.

And so here at river mile 53, which is west of Brookston, it's our most upstream monitoring site on the St. Louis River. You can see that from --

what are the dates here? All the way from September into late October that we are exceeding that water quality standard that was finally approved in 2020 100 percent of the time.

Now, mind you, this is a chronic standard and how it would be implemented would be an annual average, right. But this gives you a sense of how we are able to measure upstream water chemistry inputs 79 miles downstream of where they may have originated. And it makes sense because if you look at our next downstream site, which is at the Highway 2 bridge, it's still exceeding our standard but not by quite as much. The Cloquet River has come in at this point and is diluting it. And then if you go further downstream, right around the place Tom said he learned how to fish on the river, it's still elevated, but it's kind of hovering right around our new chronic specific conductance criterion.

So this is just some raw data. We happened to have it available, and I wanted to include it in this presentation because I think there's been a lot of people scoffing at the idea that water quality impacts from up on the Iron Range are impacting or detectable as far downstream as our

waters.

Unfortunately, our high hopes about a better process with the supplemental draft EIS did not come to pass. There was still, from our perspective, grossly inadequate data that the analyses were based upon. There was still a black box around the hydrologic and water quality modeling. And not understanding how those predictions were calculated makes it hard to have a lot of confidence in the output.

We constantly raised concerns about the methodology employed to understand indirect wetland impacts. There were many other ways that it could have been done more accurately and in a way that would be much more informative to the permitting process so that everybody understands that this isn't just going to impact the 900 plus acres that are going to disappear. It is going to have profound impacts radiating out because of the changes in hydrology. And there are ways to measure that that go beyond the way that was employed in the supplemental draft EIS.

We constantly suggested that more attention should be paid to how impacts could be minimized if an underground mining project were to be developed.

And in fact, we have every reason to believe that if this project does move forward, that this 20-year mine plan that was permitted is just the beginning and that there's likely a lot more reserves at depth, higher quality reserves at depth that would probably be next up for exploitation.

There was a really, really simplified approach to understanding and predicting mercury impacts. I'm going to leave it to Brian, our mercury expert, to go into detail about that. But suffice to say that our comments that were submitted on the draft EIS were detailed and extensive and heavily cited and were the foundation on which we built our "will affect" determination.

There was really a narrow view of climate change impacts. I mean, all of the things that we had talked about during those meetings with the co-lead agencies where we were hoping to get clarity on how our input was being considered, or not and why, and it still ended up in a place where there was a deficient cumulative effects analysis and climate change analysis.

The socioeconomic analysis was really focused only on what kind of jobs, what kind of an impact is this going to have on the labor economy of this

region. And it failed, completely failed to take into account what a healthy, intact environment would provide in terms of economic and environmental services. We felt it was really a narrow and very biased approach.

What we ended up call these sieve list meetings with the co-lead agencies felt like, at the end of the process, just a way for them to check the box to make a big Gantt chart and say, okay, we talked about wildlife and we talked about cumulative effects and we talked about climate change. We're going to move on without any real resolution, without any real consideration or incorporation of the perspectives that we brought to the table.

So when we saw what was happening, that our positions, our perspectives were really not being reflected, we began to conduct our own studies. And mind you, this is prior to the SDEIS being published.

We did our own attempt at a hydrologic model and did some training with EPA but under the tutelage of USGS.

We did our own analysis of indirect wetland impacts, wild rice impacts, and cumulative effects

analysis. And I will just hit a couple of those just for reference.

This is an example of some work that Esteban did. And you may see more from him about this a little later, an understanding of where wetlands were actually delineated and where there were potential impacts and the massive gap in information between what was accounted for in the analysis and what was not.

We looked at a different approach for understanding drawdown and what that might mean for the wetlands and the expanded area of influence with the amount of bedrock drawdown that would likely be occurring and what that would mean in terms of the shift in wetland type and function if there was as much drawdown as we anticipated and the impacts are what we were professing they would be.

These are really unique systems. And they require a very specific set of climate and hydrologic factors to persist. And they take centuries to be created. And over the course of the 20-year mine plan, we were truly concerned about how many thousands of acres of this kind of wetland would be degraded or diminished.

Essentially, this whole area in the upper Partridge River watershed where the PolyMet mine site occurs, this headwaters of the Partridge River, it's also part of a feature that is known on the USGS maps as the 100-mile swamp. It's a large area of really high quality, intact, undisturbed peat lands and wetlands and open water areas.

And what we were predicting would be likely to happen because of the proximity of the PolyMet mine pit to the existing north shore Peter-Mitchell Mine pit, which, by the way, had already been permitted for an expansion, if both of them were going to dewater to the extent that they were being permitted to dewater or projected, it could essentially dry out the entire headwaters of the Partridge River watershed.

We had serious, serious concerns about what was being projected in terms of the ability to control highly-polluted groundwater seepage from the tailings basin. Mind you, this is a former taconite tailings basin that PolyMet was going to reuse for their tailings, and so they were going to build it up another several hundred feet. And right now the existing conditions are such that the polluted water from the former LTV processing has

already impacted the Embarrass River watershed and it is continuing to do so. And piling more tailings on top of those tailings is not going to cause the problem to disappear.

So eventually the project was proposing to capture that seepage by putting essentially a series of dewatering wells and keying in some sheet piling to the bedrock below. And where we have seen that implemented around this region it is certainly not capturing 100 percent of the seepage, at best. It's capturing somewhere between 50 and 60 percent.

So a lot of what this project ultimately was permitted to do based upon this environmental review, we have clear evidence that there's no way that this project can perform the way that it has been predicted to perform on a whole host of levels.

We were constantly trying to persuade the permitting agencies that existing wild rice waters in the Embarrass River watershed and the Partridge River watershed needed to be protected. In other words, the sulfate standard needed to be implemented at places where PolyMet's discharge would reach known stands of wild rice. And these

were documented stands that the project proponent's own contractors provided the data on. And they really -- the MPCA was really only thinking about applying it at a few very discreet locations as opposed to all of the places where it actually occurred.

We did our own cumulative effects analysis. And I think I am going to leave this and pick up with my last few comments about permitting and the final EIS for after we get back from lunch. So thank you for your patience.

COLONEL JANSEN: Thanks, Vanessa, Thomas, and Nancy. So we'll go ahead and recess. We can be off the record.

(A lunch break was had in the proceedings.)

COLONEL JANSEN: I'll call our hearing to order. I'll recognize Nancy for the remainder of your presentation.

MS. NANCY SCHULDT: Thank you for your forbearance. It's really hard to distill 12 years of work into an hour, hour and a half of comments. A lot happened. I'm sure many of you can appreciate that in the room.

So where I left off was the discussion of what the tribal staff continued to do as the

supplemental draft environmental impact statement was being developed.

Despite our original hopes, when you came to realize as the draft chapters were being written that a lot of what we were raising was still not making it into the analyses, into the chapters, and we weren't really getting a clear picture in many instances of why or why not.

When we recognized these deficiencies in the analysis, we took it upon ourselves as best we could, mind you there's a handful of us trying to do this work on behalf of our tribal governments, our tribal communities to bring our perspectives out more clearly so that the public can be aware of them and consider them as well. So obviously, one of the places we started was cumulative effects analysis. Using the protocol that EPA underwrote the development of, we took it upon ourselves to try to go through media by media and do an analysis of what the impacts would be across the spatial scale that we felt was really relevant to what the impacts from this project should be.

We evaluated, obviously, cultural resources but that means the natural resources as well. We looked at land use, water quality, hydrology,

mercury, sulfate on and on and on and took advantage of a lot of existing data sets. We had some that we knew were readily available from the state agencies, some that we worked on our own to develop. Esteban is going to talk about some of the mapping and analysis he did. He really supported a lot of our work, our geospatial analysis with his skills. And so we provided our own analyses of the impacts. And we provided the data and the references and citations to back them up.

But importantly, we were putting it in the context of what was important throughout the ceded territories and across a time scale that we felt was relevant because there have been impacts that have been cumulative over time.

Originally, when we sat down with the Corps early on in the process to talk about what the area of potential effect would be, they agreed that it ought to be -- it should encompass those upper areas that show up highlighted in yellow, the Partridge and Embarrass River watershed, but then it should also include at least the riparian areas and follow the whole track of the St. Louis River downstream. That was the earlier proposed APE,

area of potential effect.

But by the time the supplemental draft impact statement was published the APE had been shrunk to just the Embarrass and Partridge Rivers because of decisions that had been made along the way and analyses that the company provided, that the state agencies, the permitting agents essentially bought that there would be no impacts beyond the Embarrass and Partridge River watershed, so there wouldn't be any impacts to the St. Louis so we don't need to consider them in a cumulative effects analysis.

Meanwhile, we tried to provide information and context such as this coverage of what we proposed ought to be considered a tribal historic district. This isn't just the 1854 ceded territory or just the St. Louis River watershed, but it's also area that is rich in traditional cultural properties. There are trails that are still visible using lidar and other techniques. Some of them still used today, in fact, or have become highways and roads today or rail lines. There were villages. There were sugar bush sites. There were encampments that were sacred spaces.

These were all that we could readily compile and willingly share with the public to demonstrate

the density and importance of this whole area that we felt would be affected by this project and the cumulative effects of all of the mining that has gone on and has been permitted to go on.

We called attention to the fact that there were already water quality impairments in all of the waters that were draining at the site within the Partridge and Embarrass River watersheds. Most of those are mercury impairments. Mercury in the water column, mercury in the fish. There's exceedances of the State's sulfate criterion. There were aquatic life use impairments. So there's already existing impairments. Another major sulfide mine added on top of that could only increase the effects.

We had a Ph.D. candidate that was working with GLIFWC at the time who got into the State's water quality data and did an analysis, a spatial analysis of sulfate data and specific conductance data to answer that question about how far downstream do these elevated constituents -- are they measurable. And again, mind you, this was data that was either collected by the State or by permittees that is quality assured, that is in their database, and is readily accessible. And it

was clear that for both sulfate and specific conductance, that, first of all, we know where the sources are. They have been mapped. And we know from some of the work that was done using stable isotopes where they were originating. And in fact, we can measure elevated sulfate and specific conductance, as I said before, all the way downstream past the Reservation, all the way down into the St. Louis River estuary or area of concern.

What we didn't see considered in any of the analyses, particularly for downstream effects, is that the riparian wetlands that are connected to our stretch of the St. Louis River are pretty extensive. And they're mapped here. And every time we see a cycle of high flows, like right now it's raging, the hydrograph is off the chart with snow melt and the heavy rains that we've received, and then you've got the opposite like last October where it's just base level, you see that drawing down and rewetting and drawing down and rewetting. With that load of sulfate adding to the system, adding to the mercury that's being washed off, you have a perfect methylating environment. None of that was considered in the mercury analysis or the

cumulative effects analysis. And so the experts coming after me are going to dig into that pretty deeply.

So finally, the supplemental draft EIS was published in 2013. The project had changed pretty considerably. There were a lot of new features, things that were not part of the original project that were added intending to minimize some of the predicted ecological and environmental impacts. There were some liners and caps. They were going to backfill a lot of the waste into the east and central pits, and they were proposing to do some mechanical wastewater treatment including reverse osmosis. And the goal was to be able to transition after closure to a maintenance-free scenario when, in fact, it was pretty clear that the amount of pollutants that would remain in the pit water and coming off of the site were going to require management and mechanical treatment far, far into the future as far as we could model.

We felt that the impact analyses were, in many cases, still really deficient, especially as they reflected upon impacts to treaty resources.

And again, the tribal analyses that we had done, that we had shared, that we had brought to

the table for discussion were relegated to essentially a really brief bulleted chapter, Chapter 8, major differences of opinion, and our cumulative effects analysis and some of GLIFWC'S work on hydrology relegated to appendices.

So again, instead of being presented as alternative analyses, alternative predictions of impacts so that the public could read and consider and at least be aware of, we were considered a -- something less than the formal environmental analysis, something that was not worth the consideration of the co-leading agencies.

These were not minor disagreements. These are fundamental differences of our predictions on how this project would impact the environment across every media imaginable and a cross time scales that bordered into perpetuity. And yet this is what the co-lead agencies released to the public.

We participated in several open meetings, provided our own posters and tabling and fact sheets and information. Provided a lot of -- a lot of Q and A sessions to people that wanted to hear what the tribes had to say. But again, it didn't make it into the formal SDEIS. There were, I think, 3,000 comments on the draft environmental

impact statement and somewhere north of 50 or 60,000 comments received on the supplemental draft impact statement.

So there was some time afterward after the public comment period closed. And while that was happening while the co-lead agencies were reviewing the comments received and thinking about how to respond to them, we continued to do our work. We still felt like there had been insufficient attention paid to some really fundamental processes that if this project was going to be moving forward absolutely needed to be addressed and permitted. In fact, a lot of the things that we were red flagging along the way, the agencies said we're not going to deal with these now. We'll wait and deal with them during permitting.

So some of the work that we undertook had to do with -- I mentioned our concerns about the socioeconomic analysis being really biased towards jobs only. So we did a -- we contracted for an ecosystem services valuation of the St. Louis River watershed so that we could begin to quantify some of the services that a healthy intact watershed could provide not only to the Band but all of us.

We continued to do some work on groundwater

modeling with assistance from USGS. And we relied upon an expert review of the seepage capture report that essentially affirmed our concerns about the inability to really capture the seepage of really highly polluted tailings water as proposed.

Some of the work that was done at this time and since has included a more, I believe, accurate depiction of what the groundwater drawdown would be from this project. I mean, right here in the blue those are the east-west and central pits at closure. So that's their footprint. And it's essentially this area and immediately adjacent to it that was what the 900 acres that were permitted as direct impacts under this 404 permit. But the drawdown at closure, when you have pits that are 600 feet deep, the hydrologic modeling that has been done since then essentially demonstrates that there's quite a radius of impacts that extends quite a ways out and that there is reasonably easily foreseeable and predictable impacts to wetland condition, function, type, et cetera, and not to mention some of the other landscape processes that are affected by hydrology.

Our ecosystem services valuation, as I said, was intended to begin to quantify what some of

these important functions are in this big watershed. And we really -- we had no budget to go after in independent studies. We relied upon an extensive reference library that Earth Economics retains on similar studies. And so we just looked at really broad ecosystem types and land use types and did calculations that establish ranges, a high and a low value for what the amount of acreage of each of those land use types would be. And so we end up with an annualized value of somewhere between 5 and $14 million just in the simple ecological services provided by these basic landscape types.

We also looked at what carbon storage would mean in the various landscape types. Remember I mentioned earlier our concerns for the simplicity of the climate change impacts analysis and not recognizing that it isn't just about the omissions that the vehicles put out, but it's also about what we have lost in terms of thousands of acres of carbon storage.

And so if you combine those two and prorate it across 20 years, so a generation, essentially, the asset value of the St. Louis River watershed conservatively is between 275 and $689 billion.

And again, this is really lowballing it. We only looked at a few select landscape types.

Some of the hydrologic modeling that we continued to do took into account the known impacts of the concurrent mining and pit drawdown that was going to be happening at the Peter-Mitchel pit which is just several miles away from the mine site.

And what we were able to demonstrate, essentially John Coleman's modeling from GLIFWC, was that the head change would instead of causing most of the groundwater flow from the pits at closure to flow southward into the Partridge River, which was what the project proponents were saying their model showed, that, in fact, it was going to be drawn northwards towards the Peter-Mitchel pits and into the Rainy River watershed which includes the Boundary Waters. And this is a fundamental difference in what post-closure groundwater hydrology is going to be.

And this fundamental difference was something that we brought to the attention of the co-lead agencies. Took time to get into the nitty-gritty of how the model was developed to produce these results and what it meant. And we hope that this

might at least press pause on the finalization of the environmental review on the record of decision.

But I leave this for you to ponder just a moment because this really encapsulates our experience as a cooperating agency trying to bring sound science and more holistic review of impacts to bear. Even when the co-lead agencies recognized that this analysis was probably correct, they were not going to deal with it at this point. They were going to move forward, and they were going to rely upon adaptive management to deal with whatever problems might occur.

Now, mind you, one of the arguments that the project proponent had that this was not going to be a problem was that a groundwater mount would form in that area of the Partridge River watershed between the PolyMet pits and the north shore Peter-Mitchel pit. And that groundwater mound would prevent water from flowing northward. That does not comport with any of the laws of physics as our consultants at USGS have come to utilize. And it was really something that we were aghast and appalled that the co-lead agencies were willing to accept. But they were ready to move on. At this point we'd spent upwards of eight years, seven or

eight years in environmental review and it's time to move on permitting.

We felt strongly enough about the importance of getting this right now that we did a last ditch effort and appealed to the three federal agencies involved; the EPA, the Army Corps, the Forest Service. We asked one of these federal agencies to elevate this discrepancy to the CEQ before the EIS would be finalized. We were not eligible. We were not in position where we could do that. It could only be done by one of the federal agencies involved. And none of them agreed that it was important enough to resolve now. It did not need to go to CEQ. It was time to wrap up environmental review and move on to permitting.

They also declined to include in the final EIS any of the additional analyses that the tribes had done during the time between the SDEIS being published and the final EIS being published. They were only going to include information that had been available through the SDEIS.

The Forest Service was the first to issue their record of decision in their final EIS. I'm not going to spend a lot of time on this other than to say that we have objected. We did object to the

issuance of the record of decision and actually the approval for the land exchange. We thought that at the very least it could wait to be finalized until permits were in hand, but the Forest Service declined.

And, mind you, there were a whole raft of issues that we brought to the regional Forest Service during consultation about why we were objecting. But at the end of the day it's important to note that the land exchange meant that about 6,000 acres of really high-quality, relatively pristine, intact contiguous acres of habitat, wetlands were going to be taken out of the public domain, out of the access that the tribe has for treaty resource harvest, and what was being replaced in the land exchange were a number of scattered parcels. They did manage to find them all within the 1854 ceded territories and that was because we had made a point of elevating this. Some of the earlier offerings included lands outside of the ceded territories. But at least these were all within the boundaries. But there's nothing about this scattered series of holdings that provides the same kind of quality habitat, and resource values that the lands that were exchanged

provide.

So the permitting began. We felt there were a whole lot of unresolved EIS issues that, as I said, were supposed to be dealt with during permitting but from our perspective, were still not being resolved.

Adaptive management is a term that was used across the board. I don't have anything fundamentally against the notion of adaptive management if it means something along the lines of continuous improvement if you can find new and better ways of doing things that are less destructive or damaging to the environment. But this is -- in the context here adaptive management meant that even though we could reasonably foreseeably predict certain things were going to happen, we'll deal with them when they happen, when the horse is out of the barn. And I don't know that anybody can make a good argument that that is the most responsible way to deal with known environmental impacts.

We noted some really disturbing and stressing permitting irregularities associated with the NPDES permit and the interaction between the EPA under the Trump administration and the MPCA. That's to

be dealt with another day in another court.

But I would say that what was really distressing and is entirely relevant today is that on three separate occasions the Fond du Lac Band sent written communications to the Army Corps leadership and to the EPA regional administrator after the FEIS was done and permitting was taking place but before the 404 permit was actually issued. And we asked that a 401(a)(2) letter be sent to the Band so that we would have this opportunity to share with the permitting agencies before the fact our concerns for impacts to downstream water resources on the Reservation. Three separate letters. And I believe the Corps responded that they received them. We didn't even get the courtesy of that response from the EPA regional administrator.

Mind you, in the previous 8 years Region 5 had supported the tribal staff with technical support, with training, with some resources and development and guidance. You know, they -- they could do things up to a point to help us build capacity to engage at this level in what we hoped would be a meaningful fashion early in the process at a time when things -- when our concerns could be

considered and a project plan could be improved or changed to ensure that the tribal resources were considered and protected but that did not happen.

And then as we were seeing the permits emerge, the draft permits emerge, again, there were no numeric limits and particularly the water quality permit and really, really hard for us to understand how the State could be satisfied with a permit that had no enforceable limits.

So we find ourselves at a point here at the end of the final EIS and records of decisions being published and permits, draft permits going out for review and being finalized, hundreds, if not thousands, of pages of comments, consultation, our best attempt at bringing well-founded scientific analysis to the table, and our trust and confidence in the regulatory framework that we thought existed and ultimately, the trust responsibility that we believe that the federal agencies needed to honor and implement through this process.

We ended up with a project that we felt we could not walk away and throw up our hands in despair, that we needed to continue to fight to be heard, and so we turned to the courts. And we have challenged a number of the decisions that have been

made. The land exchange, the dam safety permit, the permit to mine, 401 cert. and the 404 permit. Obviously, the 402 permit, the air quality permit, these are all in court right now. We're stretched pretty thin trying to make sure that the Band's perspectives are fully considered at this point in time.

But I have to say that overall these last 10, 12 years have felt a lot like our efforts have just been swept under the rug. And that's -- that's not good for any of us. It isn't just that the tribes are trying to look out for themselves. I think that in the work that we did to shine a light on what we thought were fundamental flaws and discrepancies were things that the community as a whole would find important, that the co-lead agencies and the permitting agencies would take to heart as their fundamental responsibilities. But I don't think that at this point in time that we can say that that has happened.

I think today what we are doing right now is a beginning of a recognition of how the Band's regulatory authorities and legal standing and treaty rights ought to be considered and listened to and heard. And I hope that that is what we all

take away from today and these next couple of days as we hear about some of the things that maybe haven't been heard all at one place in one time.

Migwetch.

MS. VANESSA RAY-HODGE: Thank you, Nancy, for that very thorough and great presentation.

Next up we have another witness for the Band. His name is Esteban Chiriboga. The last name is spelled C-H-I-R-I-B-O-G-A. And he is an environmental specialist at the Great Lakes Indian Fish & Wildlife Commission.

MR. ESTEBAN CHIRIBOGA: Okay. Thank you. Good afternoon, everyone.

So yes. My name is Esteban Chiriboga, and I'm going to talk a little bit about the work that GLIFWC has been doing since the PolyMet project was first proposed as well as some recent mapping in support of Fond du Lac Band's "will affect" submission to EPA.

So I've personally worked at GLIFWC's environmental section for almost 25 years now, and one of my primary tasks at GLIFWC has been to characterize the effects that large-scale land use alterations have on natural resources that tribal

members depend on. And I use geographic information systems as probably my primary tool. And I've worked on various aspects of the proposed PolyMet mine since it was first proposed almost 20 years ago now.

So just as a quick background, Great Lakes Indian Fish & Wildlife Commission is an intertribal agency of 11 Ojibwe tribes in Michigan, Wisconsin, and Minnesota. And our primary charge is to exercise delegated authority from those tribes --

COLONEL JANSEN: Esteban, I'm sorry to interrupt. I think we inadvertently muted --

MR. ESTEBAN CHIRIBOGA: My apologies.

COLONEL JANSEN: No, it's okay. It was just those few seconds there.

MR. ESTEBAN CHIRIBOGA: Okay. Again, I apologize. I'll just start over with this slide.

So we're an intertribal agency of 11 Ojibwe tribes in Michigan, Wisconsin, and Minnesota.

GLIFWC's primary charge is to exercise delegated authority from those tribes to implement various federal court orders regarding the exercise of treaty reserve rights to hunt, fish, and gather in the ceded territories, which as can see on this map as well as earlier today.

As part of ensuring the continued existence of treaty reserve rights, the health and sustainability of ecosystems must be protected and maintained. The Fond du Lac Band is one of our member tribes. It is located in the 1854 ceded territory right up here and downstream, as you've already heard, from the proposed mine.

COLONEL JANSEN: Esteban, I'm very sorry to interrupt. If you can exit out of that box that's blocking part of the slide. Sorry to interrupt your flow.

MR. ESTEBAN CHIRIBOGA: That's quite all right. I appreciate the help.

Okay. Some of the work that I've done recently is really geared toward illustrating the hydrologic connection that exists between the Iron Range and the proposed PolyMet area and the Fond du Lac Reservation. And I think we've done plenty of that already today.

I also work to provide wetland type and acreage data for our experts that will be speaking after I do. And I'm going to try and describe some of GLIFWC's past work characterizing indirect impacts to wetlands from the proposed PolyMet mine.

Just for disclosure, all the wetland and

hydrography data that you will see today was created and is maintained by either the State of Minnesota or the Federal Emergency Management Agency or FEMA.

The mine features that we depict on the maps were created by PolyMet. And I will be talking about a USGS groundwater model, and all the files and reports related to that model are available on this link.

And again, as you've heard already, establishing a hydrologic connection between mining at the headwaters of the St. Louis River and points down gradient seems relatively straightforward. This middle range purple area here is the St. Louis River watershed. And all of the mine pits, tailings basins, and stockpiles that are located in this basin send their effluent and their contaminant load downstream. These contaminants do include mercury and sulfate which are very important to the conversation today.

Notably, the green rivers and lakes that are depicted on this map are on the State's 303(d) list of impaired waters and those impairments do include mercury.

You've seen this map before, but if additional

evidence of the hydrologic connection beyond simply watershed processes is needed, water quality sampling provides this.

As Nancy mentioned, this map shows some work that Scott Cardiff did as part of his successful Ph.D. defense now using MPCA sulfate data. The large yellow dots located up here next to the Iron Range are the source of the sulfate. And the larger the dot, the higher the sulfate level in the sample. The dots get progressively smaller with distance from the mines as the contaminate plume is diluted.

This concentration and distance relationship for sulfate is statistically significant. The dark blue dots on this graph are MPCA samples from the St. Louis River, and the regression line indicates that the mining water quality signal persists downstream of the mines for about 200 kilometers.

So given the hydrologic connection, I'm going to turn to some of the mapping work of riparian and floodplain wetlands along the St. Louis River and the two tributaries that link the area of the proposed PolyMet project with the Fond du Lac Reservation. So those are the Embarrass and the Partridge Rivers.

And you will hear more about this from the next speakers, but what we're doing here is identifying the wetlands that are hydrologically linked to the rivers because these are the wetlands that are affected by the sulfate load coming from the mining areas. The combination of the sulfate load, the mercury load, and seasonal or occasional wetting and drying processes in the wetlands result in enhanced methylation of mercury which is a primary concern for tribal members or, in fact, any group that engages in subsistence fish harvests.

So the next slide that I will show will be No. 25 here. We're going to zoom in to this map on the index, a section of the St. Louis River just upstream of the Fond du Lac Reservation.

So again, the St. Louis River runs down the center of the map. And the northwest corner of the Fond du Lac Reservation is on the bottom right corner.

Again, the wetland polygons depicted come from the latest data set from the State of Minnesota, and both the riparian wetlands and wetlands that are connected to the 100-year floodplain are depicted.

Riparian wetlands are those that immediately

border the river like the purple wetlands that you see right here. The HGM wetland classification that the State develops is helpful here because by definition, the lotic wetlands, the purple ones, are part of the river ecosystem and have river water flowing through them.

As I mentioned, we also mapped wetlands connected to the 100-year floodplain because while these may not have a constant hydrologic connection with the river, they can still occasionally receive water with the higher sulfate and/or mercury load and still be a source for methylmercury to the St. Louis River during periods of flooding.

So I'm now going to focus a little more on the area surrounding the proposed PolyMet project and look at the hydrology and wetlands.

So on this section I hope everyone can see the cursor. This is the Embarrass River on the, more or less, left-hand side of the figure. The yellow areas are wetlands that are connected to the 100-year floodplain of the Embarrass River.

In the center, this large gray feature, is the existing taconite tailings basin that PolyMet proposes to reuse and deposit their tailings on top. We have the red areas are wetlands to the

north of the tailings basin. There's some orange wetlands here on the western side of the tailings basin. I'm going to be talking a little more about those here in a moment.

So zooming into the area existing north of the existing taconite tailings basin, these wetlands, and in fact, the entire surficial aquifer between the tailings basin and the Embarrass River is saturated with high sulfate tailings water that has been seeping out of the facility for decades.

Water enters these wetlands and moves via shallow groundwater. A lot of it -- I'm having trouble with this. And a lot of this water enters the Trimble Creek and this unnamed creek here which are tributaries of the Embarrass River.

Similar condition exists on the west area of the tailings basin. Water flows out of the tailings basin to the surface water features here and move toward the Embarrass River located on the top left corner of the figure.

This stream here is officially an unnamed creek, but we have nicknamed it Rice Farm Creek because this area of the figure used to be a wild rice farm. It then became a wetland mitigation site. And you can see here the constructed berms

that were put to induce flooding and create new wetlands. And I believe this site is now a wildlife management area.

So this, I think, is a perfect example of the types of existing methylmercury generating environments that we find in the area. Having an area that is purposely flooded to build wetlands and then having a stream with high sulfate water running through it is exactly the types of conditions that should be avoided.

So these features that I've mentioned at this point are all existing contributions to the sulfate load in the St. Louis River.

I do want to point out this area in red on the bottom right-hand corner of the figure. It's the proposed location for PolyMet's hydrometallurgical tailings disposal facility. These would be the most highly reactive tailings that the project would generate, and they have to be segregated from the environment in perpetuity in order to avoid very serious water quality impacts.

I would point out that there is a hydrologic connection between this site and Rice Farm Creek via wetlands and ditches that have formed on the western end of the tailings basin. Historically,

there used to be a creek that ran or originated right in the middle of what is now a large wetland area. The creek has become buried by tailings over time, but this water in this catchment area still is finding its way to Rice Farm Creek, to the Embarrass River, and on to the St. Louis River. And so this facility is a future concern should the mine be constructed.

Next, we're going to take a look at the hydrologic connections and wetlands in the area where the mine pits and stockpiles would be located. The Partridge River runs along the bottom of this figure roughly through here. The pink color wetlands are the wetlands within the -- that are connected to the 100-year floodplain of the Partridge River. These gray features over here are proposed mine site features. There are the two pits, some stockpiles, roads, and other facilities that have been proposed for construction. And this oval area of darker pink wetlands are the areas that could be affected by groundwater drawdown caused by the project.

So at this point, and I'm confident that most of you in the room understand this process very well, but just in case we wanted to give a very

simple description of what we are thinking about when we talk about groundwater drawdown.

So this very simple schematic provides a good look at this phenomenon as the mine pits would be developed. This dashed blue line you see right here is the groundwater level that -- and it would extend across this area prior to the construction of any mine pits. And this white box in the center is intended to represent the pits.

As digging begins, groundwater surrounding the pits begins to flow into the new hole and needs to be pumped out in order for mine development to proceed. This pumping creates a cone of depression in the groundwater surrounding the pump. As the mine pit becomes deeper and more water is pumped, the cone of depression also becomes deeper and extends a greater distance away from the mine pits. So any surface water feature that is located in the area of this cone of depression, then, is subjected to a new downward hydrologic gradient that did not exist prior to any digging or any pumping at the mine pits.

So at this point I think it's important to provide some context or some of the history on this issue.

Early in the project GLIFWC and Fond du Lac and other agencies argued for using a quantitative method to determine indirect wetland impacts due to groundwater drawdown. And one of these methods has been called the Crandon Method.

So the use of this Crandon Method has several advantages. It was used in the past by the St. Paul District of the Army Corps for their EIS on the proposed Crandon Mine in Wisconsin. It is a quantitative method for indirect wetland impact prediction and combines the calibrated groundwater drawdown model with wetland delineations and detailed plant lists that are collected in transects across the wetlands of a site.

This method identifies acres of wetland where groundwater drawdown impacts are reasonably foreseeable which is a useful piece of information to have because then the Corps can require mitigation or other options to avoid these wetlands could be developed by the project proponent.

Initially, the lead agencies, the Corps and the Minnesota DNR, rejected the Crandon Method approach because of the mining company's assertion that the wetlands in the mine site were all perched bogs or disconnected from groundwater.

The speakers that are going to come after me are going to talk about this in more detail. I'd only say that the concept that wetlands are so disconnected from groundwater that no amount of drawdown can have an effect on their hydrology really isn't supported at the site of any available information.

Now, when the -- what we call the second DEIS process began, this is after the EPA gave the first DEIS its failing grade, the lead agencies convened a set of impact assessment planning or IAP groups. And the goal was to improve the environmental analysis of the proposed mine. The Wetland IAP group was tasked with providing recommendations to the lead agencies on a number of things. And the methods that would be used for predicting impacts to wetlands from groundwater drawdown were one of those topics.

So the Corps wrote on July 1, 2011, the final summary memo for the IAP groups, and that memo indicated that a quantitative assessment of indirect wetland impacts from groundwater drawdown using additional field data and a calibrated groundwater model, basically the Crandon Method, was the recommendation from the majority of the

agencies that participated in the IAP group. That included federal agencies, the MPCA, and several tribes and intertribal agencies.

The summary memo goes on to state that the two lead agencies, the Corps and the Minnesota DNR, ERM, the contractor for the lead agencies, and Barr Engineering, PolyMet's consultant, disagreed with the broad overall recommendation of the IAP group. Consequently, the final EIS used a different method altogether. They did not take the recommendations of all these other agencies. Instead, the final EIS has an analog method, what has been called an analog method.

So this method compared water level fluctuations of the Canisteo mine pit, which is an existing taconite pit in the Iron Range, to water level fluctuations in wells located in its immediate vicinity or at some distance to the mine pit. And the idea was to try and infer what the hydrologic connection is between the pit and these wells by trying to correlate fluctuations in those two areas.

Based on that data, there were four analog zones created for the FEIS and wetland acreage in each zone were calculated. And there was some

effort to discuss the likelihood of impact to wetlands from drawdown in each of those zones.

Now, the analog method has many shortcomings. And I know my agency and many other agencies attempted to communicate these shortcomings to the Corps many, many, many times.

GLIFWC's position is that this method can produce some useful information, but it's not in any way a replacement for a quantitative predictive method. In fact, the final EIS does state that indirect effects analysis performed for the EIS were not performed to characterize impacts but done to inform where monitoring should take place for those areas that were identified as having a potential for indirect wetland effects. So not an effort to predict impacts but simply an adaptive management solution.

At GLIFWC we believe that an EIS needs to assess past, present, and reasonably foreseeable impacts of a proposed action. Simply monitoring for an impact so that mitigation can be done after the impact has already occurred is a flawed approach.

But we failed to convince the lead agencies to do something different other than the analog

approach. So GLIFWC, we have been forced to use this analog method in an attempt to provide some information that can be used to predict indirect impacts to wetlands from drawdown and to provide some information on behalf of Fond du Lac and the "will affect" determination.

Back in 2013 we submitted to the Corps an analysis of indirect wetland impacts using the analog method. We modified it some. Our analysis incorporated some additional water level information for wells in the -- that the EIS did not use. We obtained these wells in data from the Minnesota DNR mining hydrologist at the time. We urged the lead agencies to incorporate this additional data into the analog analysis method but this was also ignored.

This figure shows the analog impact zones in GLIFWC's analysis. They are slightly larger than those that appear in the EIS.

Zone 1 was the closest area to the mine pits where drawdown of 5 to 10 feet would be expected.

Zone 2 drawdowns are expected to be between 3 1/2 and 5 feet.

Zone 3, from 1 to 3 1/2 feet.

And the outermost zone, No. 4, we would expect

drawdown of up to a foot to occur under the wetlands.

Here's a map that we prepared for Zone 3 as an example showing wetlands potentially impacted by 1 to 3 1/2 feet of mining-induced drawdown.

As you can see, these wetlands are hydrologically connected to some of the surface water features, Yelp Creek and the Partridge River that surround the area where the mine would occur or would be constructed.

There's a similar situation for wetlands in Zone 4. There's large areas of the potential impacts from drawdown. According to the EIS, these are also many of the areas that would need to be monitored, which seems like a very difficult thing to do over an area like this.

This map indicates that wetland drying in this zone, while having the same hydrologic connections of the previous map, also may involve another tributary to the Partridge River, Wetlegs Creek in the southwestern section of the mine site.

Okay. So as I've indicated more than a few times now, GLIFWC is not comfortable using the analog model. So a few years ago we contracted with the United States Geological Survey to build a

groundwater model like the one that was really needed for the project in the first place. Work has recently been completed on a model that looks at the impacts of existing and proposed mines for the Partridge River basin. The PolyMet project is only one of five different projects included in the analysis. And, once again, the report, final report and all the model files are available at this link.

The drawdown contours generated from the USGS groundwater model for the Partridge River basin confirm that groundwater drawdown under wetlands around the proposed PolyMet mine will occur. The cone of depression becomes very steep in this area close to the pits. If we had tried to map them, it would just be a solid black area, so you wouldn't distinguish any detail. But this area in the center has predicted drawdown greater than 16 feet and extends or increases to hundreds of feet.

The drawdown depicted in this map was calculated by subtracting model files of groundwater elevation, or head files, for the "with mine" scenario from model files of groundwater elevation without the mine. This difference reflects the drop in groundwater elevation due to

the PolyMet mine pits when they are fully developed.

Drawdown induced by the PolyMet mine was found to be essentially the same when looking at the model layers representing the surficial deposits as when looking at layer representing the top of the bedrock.

Now, there are obviously differences between the USGS model drawdown data and the drawdown estimates for the analog method. This is not at all surprising given that they are very different methods.

And the differences do make it difficult to conduct a direct comparison between the results of each. However, in general, it does seem that drawdown in analog Zone 1 and 2 are underestimated. In some areas this underestimate is substantial.

Differences in drawdown estimates in analog Zones 3 and 4 can vary. However, we do note that both methods agree that mine-induced groundwater drawdown will occur.

These results, both GLIFWC's analog analysis and the USGS modeling, do suggest that hydrologic stresses on wetlands due to mine-induced drawdown are likely to be far greater than was estimated in

the final EIS.

Mine-induced drawdown that extends out to about a mile and a half from the mine pits is not surprising given what has been seen at other mine pits. So these figures were taken from a Barr Engineering memo and show that substantial drawdown in the surficial aquifer extends about one and a half miles from two existing iron ore pits. So these areas in the figures, these large depressions here and the cross-sections are the mine pits. And you can see very nicely defined cones of depression in both of these that extend out about a mile and a half.

This figure I put up here also to give an example of how analog information can be useful. In this case by providing a reality check on the groundwater model outputs. But again, we would say that analog information alone is not sufficient for impact prediction.

So that is the end of what I prepared. Thank you for your time and attention and sorry for my problems with the mouse. Thank you.

COLONEL JANSEN: Thanks very much, Esteban. We are going to go ahead and recess for an afternoon break. It's 2:15. We'll reconvene at

2:30. Thank you.

(A break was had in the proceedings.)

COLONEL JANSEN: Thank you very much for your cooperation with the break. That's great. Everybody's back. We'll resume our hearing. During the next presentation, you may see a sign-in sheet either on iPad or a notepad circulated around. Definitely appreciate it if you enter your information into that.

Okay. I'll go ahead and recognize Vanessa.

MS. VANESSA RAY-HODGE: Thank you. The next expert for the Band is Dr. Brian Branfireun, B-R-A-N-F-I-R-E-U-N. He is a professor at the Department of Biology for Western University in London, Canada.

DR. BRIAN BRANFIREUN: Thank you very much. I'd like to first thank the Fond du Lac Lake Superior Band of Chippewa for welcoming me back to their land and waters. Migwetch. Also, thank you Colonel Jansen and Army Corps representatives for your attention today.

So here's a bit of an outline of what I'm going to talk about today. I'd like to give you a little bit of background or sort of where I've come from professionally and then provide -- I think

it's useful to give a bit of an overview on the mercury cycle, why we're concerned about it, what the relationships are between mercury, hydrology, sulfate, and the formation of methylmercury in the environment.

I'm then going to run through a number of sort of critical issues that I found with respect to prior submissions that I think undermine the statements of sort of no environmental mercury impact on the project, and those are listed there. And I'll go through those one by one after I go through the mercury overview.

And then there's two main issues, really, that I think sit with the consideration of the "will affect" notification and objection and those relate to the enhanced release of mercury, methylmercury, and sulfate due to water table changes that we've heard about from the last couple of speakers, as well as enhanced release of mercury, methylmercury, and sulfate due to direct mine discharges to proximal wetlands that will increase mercury downstream waters. And I'll give you a little bit of a summary and synthesis after that.

So I've been studying mercury, if you count my graduate work, about 30 years now. That probably

doesn't mean anything to you but it makes me feel pretty old.

My area of expertise is in mercury biogeochemistry by virtue of the work that I've done in my training over the years as well as my continued research program. And that really has also focused on mercury and mercury sulfate interactions in the environment. And those are naturally linked to issues of hydrology and biogeochemistry of wetland systems.

I've also taken to focusing on those problems in the context of climate change which is an important environmental stressor that faces all ecosystems now.

That's my sort of training and employment. I've served at two different universities in Canada, moving to my current position in 2010 as a Canada research chair in environment and sustainability.

According to Google, and thankfully the internet keeps track of these things because I'm not very good with details, 152 published papers, books, chapters, and reports.

But I think more importantly, I've served as an expert for the State of California as part of

their mercury TMDL program, the USDOE and Forest Service with professional program reviews, as well as advised on several Canadian federal and provincial agencies on mercury-related concerns.

I do actually have quite extensive prior work here in Minnesota myself. My own personal research as well as those of my students have been conducted at the U.S. Forest Service Marcell Experimental Forest in Minnesota. I've also worked with Minnesota power and the Fond du Lac on wetlands, reservoirs and mercury questions in the mid-2000s. So I have a bit of history here working in this land.

And then I've also provided opinions on this project and had quite a significant experience with the this program from the SDEIS process in 2014 and '15.

So a bit of an overview of mercury. I think it's important for us to place what we're talking about here in the context of mercury in the environment and the relationship between it and other cycles of chemicals in the environment because really it is a complex contaminate and sometimes the concerns that we have about mercury and mercury processes in the environment actually

have very little to do with mercury itself. It's the other things that are going on around it that matter.

So mercury is a high-priority global pollutant recognized by over 150 countries now as part of an international convention on the reduction and elimination of mercury use. It's released -- it's an element. It's a natural element in the environment. It's released in the environment through a range of natural sources. So volcanos, geological sources circulated in the atmosphere. But human sources have increased mercury by a factor of about 10 since preindustrial times through emission of primarily combustion of coal and other metallurgical processes.

Unfortunately, what that means is that it's been distributed globally in a gaseous form in the atmosphere as well as discharge from point sources. So it means it's kind of everywhere as an element.

It's dominantly released in its inorganic forms, so it's dominantly released in its metallic forms. But it's actually only really toxic at the -- in an environmental sense in its organic forms, so after it's been converted into a form of mercury that we call methylmercury.

I'll throw around lots of terminology. We've probably -- there we go. We've probably heard some of these being thrown around. And it's important to actually define these.

The first one is that we often talk about elemental mercury, and that's the mercury you're familiar with, the quicksilver, the sort of liquid mercury that we would see in thermometers that's now, of course, not used anymore. This is an interesting and important form because it also evaporates, so it also circulates globally as a gas. And so that's how mercury has become a global pollutant is through this vaporization of elemental mercury.

Inorganic mercury is the most common form of mercury. It's the most abundant form of mercury in water and soils and sediments. And we often will denote it Hg(II) because it's got a charge of 2 or IHg for inorganic mercury. And that's differentiated from methylmercury, which we often will abbreviate MeHg. That's not a technical correct chemical formulation but methylmercury is a long word, so it's easier to write. And it's the inorganic form of mercury. So this is the form that we're concerned about that bioaccumulates and

is a very potent neurotoxin.

From a regulatory standpoint and from a scientific standpoint we often see the term total mercury discussed. Total mercury actually isn't a real thing. Total mercury is an analytical thing. It is the sum of all forms of mercury that are in the environment.

So total mercury is an operational term because the instrument that we use to measure mercury takes all the forms of mercury and spits out one number. It could be that total mercury is 100 percent methylmercury. It could be 50/50 inorganic and methylmercury, but it's the sum of those two things. Those are usually analytically differentiated. However, it's rarely done from a water quality standpoint. And it's actually a very important distinction because the proportion of total mercury that's methylmercury actually dictates the relative toxicity and importance from an environmental perspective.

So elemental mercury circulates in the atmosphere. We often see cartoons like this one showing mercury depositing from the air coming down in rain as Hg(II). So there's our ionic form, our inorganic mercury. It deposits to the environment

and it goes through all kinds of transformations in the environment. And those transformations are important because those are the transformations that form methylmercury.

We do have cases in which industrially-produced methylmercury has been discharged to the environment caused by catastrophic problems, but actually the methylmercury problem that we have in the environment around the globe and that we have in Minnesota is a result of a naturally-occurring bacteria just doing its thing.

Methylmercury is dominantly formed in the environment by a bacteria, by sulfate-reducing bacteria. And in oxygen-free waters and sediments a really small fraction of inorganic mercury, and in most environments it's about 1 percent of mercury, is in the methylated form, this toxic form.

So it seems perhaps a little bit incomprehensible how this infinitesimally small fraction of also a very small amount of a contaminate that has been circulated globally come down in rain and deposited over the last few -- since the mid-1800s or 1900, how this leads to the

environmental mercury problem that we see today. And the key to this are two processes called bioaccumulation and biomagnification.

So methylmercury, so the organic form, is the only form of mercury that bioaccumulates. So that means it's strongly retained in biological tissues. And in doing so, that mercury is retained in biological tissues. Then consumed by the next highest trophic level organisms. And all of the mercury in those organisms is then retained in those organisms. And so as a consequence, as we move up the food chain from aquatic invertebrates -- here's water. Here's aquatic invertebrates. Here's our small fish, our prey fish, all the way up to our top piscivorous fish -- sorry. There's a bit of an overlay problem. That just says trophic level -- mercury will continue to magnify and accumulate in higher organisms that are eating lower trophic level organisms.

And it's a good rule of thumb, and it holds actually quite true, that a fish contains about a million times more mercury than the -- more methylmercury than the water in which it lives. So there's about a ten to the sixth-fold amplification of the amount of mercury in a fish from the water

in which it lives.

So we really can have concentrations of mercury in water in low nanograms per liter and have concentrations in fish that are above consumption guidelines. And those are the situations that we see with impaired waters in Minnesota.

Top consumers, birds, mammals, and so not just people but we are concerned about people, but also concerned about piscivorous birds and also mammals, are exposed to elevated methylmercury primarily through fish diet. So all we have to do is place another trophic level above the trout or above the walleye and that's us or that's a mink or an otter or a heron.

So if methylmercury wasn't formed in the environment, there would be no mercury problem. We would not have a global environmental mercury problem if mercury was not methylated because it would not bioaccumulate and biomagnify to levels that present a health concern for the environment or for people.

So this diagram is from a paper that we wrote a long time ago, and it's not mechanistic at all but I think it captures this notion that

methylmercury, the fraction of mercury that's depicted in red in any given compartment changes as we move through the environment.

In the atmosphere, if this pie is mercury and the white is inorganic mercury, every small fraction of the total amount of mercury is methylmercury. Even in upland soils and runoff typically it's quite low. You know, maybe less than a percent.

As we start moving through the environment and through environments that support methylation, that support the conversion of inorganic mercury to methylmercury, we see that fraction of the methylmercury, that fraction of the mercury pie increase in the form of methylmercury where we have wetlands being a very strong source of methylmercury to the environment because they support those conditions that are conducive to its formation. Sometimes it actually drops a little bit in lake water because there are processes that remove methylmercury in lakes.

In the end, in biota, methylmercury comprises 100 percent typically, 95 percent of the mercury that's in a fish is in the methylated form because that's the only form that has been retained in that

organism.

So sulfate-reducing bacteria which are the organisms that are responsible for this are really -- they're quite happy in these oxygen-free organic-rich environments of most wetland environments, which is why we have high fractions of methylmercury here.

We also will find high fractions of methylmercury in lake bottom sediments and any other anaerobic or oxygen-free environments. And it's useful to think about them as being like any other organism. They have to eat things and they have to breathe things. Instead of breathing oxygen, they breathe sulfate. They eat organic matter, and they convert inorganic mercury to methylmercury.

And this little diagram kind of depicts it in the sense that it's a bit of an accidental process. They're not doing it on purpose. They're not trying to eat mercury. They're just bumping into inorganic mercury. Goes into their cell. They have a cellar process that kicks it back out again, and in doing so, it turns it into this bioaccumulating toxic compound.

So we can dig a little bit deeper into this

formation of methylmercury in wetlands and the role of sulfate-reducing bacteria.

So if we ignore mercury, sulfate-reducing bacteria, the activity of a sulfate-reducing bacteria will increase when it has more sulfate available. So it stimulates its activity, all being equal. So long as there's organic matter, so long as oxygen is depleted.

And we've known since the early 1990s that additions of sulfate, particularly from atmospheric pollution, so -- sulfate is a very large acid rain constituent, for example. That increases of -- additions of sulfate from atmospheric pollution increases methylmercury production in lake sediments. So this is something that's known.

This relationship is even more clear for wetlands because they have a very distinct and clear reducing environment that's often very nutrient limited.

And this is actually work from my own Ph.D. work ages ago that shows a pretty clear relationship. This is from the experimental wetland in Sweden that shows a relationship between the amount of methylmercury that's in sediment and the amount of sulfate that is being loaded.

3 hg/ha/yr is kind of about what Minnesota gets right now. 20 is kind of the high end during peak sort of acid rain years would be about the kind of sulfate that we would get. And so this experiment was looking to see what kind of relative differences there were between loadings of sulfate and methylmercury. And there's a clear positive relationship. When there's more sulfate added to wetland soils, there's more methylmercury.

And that relationship has held true experiment after experiment, including this one that was done, in fact, here in the state of Minnesota at the Marcell Experimental Forest in collaboration with the Minnesota Pollution Control Agency and with the U.S. Forest Service, a long-term experiment looking at the role of sulfate and methylmercury formation. And this is simply a figure from one paper from this experiment, there actually have been numerous, where the addition of sulfate coming from the sort of simulated rainfall with extra sulfate coming from sprinklers dramatically increased wetland methylmercury concentrations which, really, without going into any detail about it, those are the red bars. You know, they're higher than the other bars which are either a control or a recovering fraction

of the wetland.

The top graph is absolute concentrations and the bottom graph is perhaps useful to think about because this is this percent methylmercury. So that's the amount of methylmercury relative to the other forms that's there. So when we add sulfate, we really increase dramatically the amount of methylmercury that exists as total mercury. So if we reflect again on that total mercury term.

So relative to an unsulfate-impacted wetland here, which are the yellow bars, that's very -- that's what we would expect to see in most wetland sediments; 1, 2, 3, 4 percent methylmercury. We add sulfate here and we're up to 60, 80, and in some cases with those outliers close to 100 percent methylmercury.

Even small amounts of additional sulfate can significantly increase methylmercury concentrations in wetland soils.

My students have done quite a number of experiments and theses related to this question -- not surprisingly, it's something I'm interested in -- using an experiment like this which is a set of columns that are about this big, about a foot long, three inches around. And we packed those

with wetland sediments from various places. We've done experiments from wetlands all over Canada and the United States.

And this particular experiment was a useful one because it shows us how even a small amount of additional sulfate in an environment that receives little sulfate can stimulate the amount of methylmercury produced quite dramatically.

So our control, which is just addition of just pure water, maintains methylmercury concentrations. This is absolute concentrations in parts per trillion of less than 1, so .5 to 1. Relatively unchanged. One milligram per liter causes a quick rise but an increase to -- you know, on the order of 2 to 3. So 2 to 300 percent increase just with one milligram per liter sulfate. Five milligrams per liter of additional sulfate increases methylmercury 20 times above, above the control levels.

Interestingly, and this is also very consistent with what we see in the literature, as we get into higher levers of sulfate, we actually start interfering with the ability of those bacteria to do what they do, and we actually have not as linear an increase. It's still higher.

It's still now 30 times higher than it was before, but it's not -- it's not 60 or 100 times higher simply because other limiting factors come into play.

We've had very similar results to this from field experiments in which we've done experimental additions of sulfate in waste -- simulated wastewater discharges in sulfate-limited wetlands and found almost identical changes in water concentrations with, again, this percentage methylmercury instead of being 1, 2, 3, being 60, 80, 90 percent, which is -- that's the number that we're very concerned about.

So you know, why does this all matter? The amount of mercury that's -- methylmercury that's in water, especially in fresh water aquatic systems, is directly related to the methylmercury in biota. So that methylmercury ultimately translates into invertebrates, smaller organisms that then get consumed by increasingly higher-order organisms and increases methylmercury concentrations.

Methylmercury is the only form of mercury that bioaccumulates. So this form, which is formed in wetlands by sulfate -- by the activity of sulfate-reducing bacteria, is really the only form

of mercury that we are concerned about. So in fact, regulating inorganic mercury is really only part of the story. Regulating the processes that govern the formation of methylmercury is perhaps more important.

It's well-documented that methylmercury impacts the behavior, reproduction, and survivorship of wildlife, and that includes fish. It's certainly a lot of work that I've done recently in my own group. This includes migratory songbirds. We've implicated the decline in long-distance migratory songbirds to methylmercury exposure in aquatic insects that have been consumed from wetlands where methylation is high.

Obviously, the links to things like piscivorous birds and mammals is more clear. These are vertebrates, and so a neurotoxin is going to have the same effect on them as it will have on people.

Certainly, the predominant exposure pathway for humans to methylmercury is consumption of fish that's contaminated with methylmercury. And indeed, the health effects of methylmercury exposure on humans can be severe and lifelong.

And we often -- you know, these are not

unfamiliar looking signs. These are signs all across the continental United States and Canada where we have mercury advisories for fish consumption that has really nothing to do with anything other than a landscape that is conducive to mercury methylation, taking that pool of mercury that's been deposited from the atmosphere and converting it in sufficient amounts into this form that increases to levels of concern.

So the health effects on humans is catastrophic. Severe methylmercury poisoning causes something which we refer to as Minamata Disease. This disease is characterized by loss of vision, muscle weakness, paralysis, impaired hearing and speech. It's named after the place where it was first discovered, which is Minamata, Japan in the 1950s where direct industrial discharges of methylmercury contaminated food source for thousands of people and had multigenerational effects to this day.

The developing brain is most sensitive to methylmercury toxicity. Exposure for children and pregnant women has been linked to neurodevelopmental delays that persist over their lifetime. And this is even with exposure levels

that are currently considered to be safe. So under the sort of regulatory limits.

And certainly in addition to this, we've also learned recently about other health effects that are linked to methylmercury exposure, including cardiovascular anomalies. And these are all well-documented in the medical literature.

So the consensus, and these words are taken from our "will affect" memo and are from my colleague, Dr. Elsie Sunderland, at Harvard University and their school of public health, that biologically, there really actually doesn't appear to be any safe level of methylmercury exposure in humans.

So moving on to some discussion about prior submissions. I almost did it.

So we're going to talk about some important issues here. And none of these really are ones that haven't already been touched on, in fact, by some of our previous speakers. I'm just going to put a little bit more substance on them in this discussion.

These are also things that are outlined in both the "will affect" notification and objection and also in prior opinions that I've provided that

are included as materials referred in that notification.

So we have a number of issues that I've chosen to highlight today in the interest of being focused.

This issue of failure to characterize and understand the background of environmental conditions; our reliance on unproven technologies to achieve regulatory limits; our indefensible sort of modeling to come to the conclusion that there will be no effect of mercury as a result of the project; the reliance on a flawed assumption of proportionality between total mercury in water and methylmercury in fish; and then most importantly, which relates to much of the discussion that we're having today, the failure to consider the formation of methylmercury resulting from both direct and indirect effects of mine operations.

So I've done actually a quite a lot of research with mining companies focusing on mercury and sulfate issues. And one of the biggest projects that I've worked on is with DeBeers Diamonds in Ontario. This was a very large diamond project that was the first mine of its kind in a wetland-dominated region of northern Ontario. And

they were both recognized through consultation with their -- with the first nations and territories they were on as well with our provincial regulator that comprehensive predevelopment monitoring is essential to assess change. We can't know how something is changed if we don't know what the background conditions are. And indeed, in this landscape of northern Ontario there had been absolutely zero background characterization. There was no data.

So there was 36 months of intensive background characterization on this particular project at the DeBeers Victor Diamond Mine. About 5 to 700 young-of-year fish, which are used as biosentinels, and by that I mean a young fish will reflect the conditions that it saw in its environment in the year that it grew, so it gives us a good snapshot, an integrated snapshot of the conditions and how they can be used, then, to monitor change over time.

There also was a large-bodied fish program that also sampled hundreds of fish. In this case nonlethally. So these were using biopsy plugs and those plugs were sent to the lab to analyze for mercury. And that was for consumption risk

assessment.

There was also monthly surface water and groundwater collection at over 30 sites, plus reference sites that were distal to the mine site to ensure that there were -- to basically capture the fact that there is variability, there's variability from year to year. And sometimes the variability in weather or hydrology or temperature can lead to changes that we wouldn't want to unfairly attribute to some activity associated with the mine.

Importantly, they analyzed for both filtered and unfiltered. And by that I mean all the mercury that's in a water sample. So we just take a bottle and scoop it out and analyze it. That's the particles. It's the silt. It's anything that might be suspended, but also the filtered form which is the pure dissolved form. And for methylmercury that's particularly important because that's the form that is actually going to be taken up by a small organism or by bacteria.

So filtered and unfiltered total mercury. Methylmercury, which we can then subtract from total mercury to get the inorganic mercury and calculate our percentage. Sulfate concentrations

dissolve metals as well as dissolved organic carbon which is an important fuel for the bacteria that are doing this methylation.

This mine site was required to do annual reporting to our provincial regulator, both predevelopment for 36 months during 12 years of operation until their kimberlite pipe was expired and then post-closure which they're in now and is effectively in perpetuity a monitoring program that looks very similar to this. So this was not done as part of this project. There is no characterization of methylmercury in stream sediments or wetland soils, which is where methylmercury is formed. That's something we would like to know.

There's certainly no biomonitoring data in either small-bodied fish or perhaps invertebrates.

There's a very good study by a mercury researcher in Minnesota that showed that driving fly larvae can be very effective biosentinels as well because they're quite ubiquitous and also reflect the mercury that's in the environment.

And also no monitoring data from streams which is necessary to protect the downstream resources that we're concerned about.

So there was an uncertainty analysis that was conducted on select groundwater constituents, other metals, important metals like arsenic and chromium. And variability for many of those metals exceeded plus or minus 100 percent in the samples that were assessed.

So total mercury and methylmercury were not evaluated because only solutes, and this is a quote, "Only solutes included in the water quality monitoring are assessed." So we don't have any idea about the range and variability in concentrations of inorganic mercury and methylmercury in sediments, water, and biota. So they're effectively unknown as far as the background concentrations despite the fact that methylmercury presents the greatest risk to downstream resources and fish consumers.

So as part of a previous opinion, I spent quite a bit of time actually looking at this because I found this to be kind of an important issue. The headwaters of the St. Louis River has the right conditions for methylation. In fact, the data that we have from this environment already show that it's a potent methylating environment. And this shouldn't actually be a surprise because

it's already reflected in the impaired status of the St. Louis River and its tributaries.

The Embarrass and Partridge Rivers have over 10 percent methylmercury in downstream waters, which for a large river is exceptionally high. We would, again, normally expect to see that as 1 to 2 percent.

And I sort of highlight that at the top of this table. You know, bit of a sort of a blunt statement, but less than 1 percent methylmercury is kind of okay. It's kind of normal. 1 to 3 suggests that we have a reasonably strong methylating environment. And more than 3 suggests that we have an environment that is quite adept at converting inorganic mercury to methylmercury.

So when we have these percentages of methylmercury in surface waters that exceed 10 percent, there's scientific consensus that that is coming from wetlands that are draining into tributaries because there are no other environments in catchments, in watersheds that can convert methylmercury with that kind of potency and deliver percentages of methylmercury to the downstream in concentrations like this.

And in fact, the tributaries that will receive

sulfate and total mercury or inorganic mercury from the proposed development are some of these for which data was provided in data tables but not included in any EIS or other permitting process. And so I took it upon myself to calculate that percentage methylmercury in some of these tributaries. And these are in the vicinity that -- of both the tailings and the pit, and these drain into both the Partridge and the Embarrass watersheds. And these mean percentage methylmercury are definitely in our greater than 3 percent and in some cases are considerably higher than 10 percent.

So we have, then, tributaries of the Partridge and the Embarrass, which they themselves are tributaries of the St. Louis River, which not only already are contributing methylmercury to the downstream system, but are intended to receive additional sulfate and additional mercury from the proposed development. However, these data, which existed because I was able to find them, were not reported in the FEIS and they certainly weren't considered in any decision making about the project.

So switching to the water treatment strategies

to achieve regulatory limits, on the EIS submissions there's an indication that internal water quality will meet limits of 10 mg/L of sulfate and 1.3 ng/L of total mercury. Now, we don't know whether that's inorganic or methyl but total because that's the way the regulatory rules are written.

This is to be achieved through water flowing through mine tailings to reduce total mercury concentrations to acceptable concentrations through absorption with minerals that will remain stable for centuries. This statement was examined quite closely as part of the SDEIS and the FEIS process. Not just by me but by another expert in this case, Daniel Pauly, for which a lot of this information is derived. And the conclusion that the mine tailings were going to be effective at sequestering or storing this inorganic mercury or total mercury, again, to be -- that's the term that was used, was based on what I would consider to be a scientifically indefensible experiment.

In this experiment there were two jugs. One containing just water. The other containing water and tailings material. Mercury was added and the jugs were shaken for eight hours. And there was no

replication of this. And the data looks something like this where a jug with just water starts at 3 1/2, kind of levels off and stays at 3 1/2. The jug with mine tailings drops quickly. And here's our conclusion that we've stayed below 1.3.

So there's a few fundamental issues with this experiment. And it's -- it was one of those things that I thought if one of my students were to do this, this would be a complete -- this would be a fail, right. This would be an unacceptable experiment, you know. And we sort of thought that it would be useful to see what that looked like because I would do this in class. There's our jug with water and mercury. There's our jug with our tailings. Jug C and D. We'll shake these for eight hours, and we'll draw our conclusion about the tailings retaining mercury and achieving our regulatory limit of 1.3 ng/L. So if we just leave those out and pretend they're shaking until the end of the day, that's about how long it was.

I think what's also really important about this experiment is that there isn't a recognition, and Pauly pointed this out, that in fact even though we stay below the 1.3, the concentrations actually start increasing after eight hours. And

in fact, if we extrapolate that slowly, we've exceeded 1.3 in four more hours.

So again, no replication. And in fact, Pauly asked the question, What happened to Jugs A and B, which would be, I think, a valid question since we reported C and D. There's no attempt to mimic environmental conditions. The oxygen conditions, the organic matter conditions, the other geochemical controls like PH are incredibly important for discussing the partitioning of mercury between the solid materials and water.

And in fact, this return, this recovery of mercury back towards a higher concentration is also exactly what we'd expect from the kinetics of absorption and desorption. It's going to be in disequilibrium for a while, and it's going to go back and forth until it settles at some concentration. It clearly hasn't settled at a concentration that is substantially less than 1.3.

So the actual experiment doesn't show continued retention. It actually shows a rerelease in the order of 100 percent which clearly doesn't support the fact that the tailings are going to be a perpetual sink for inorganic mercury.

Interestingly, the EPA objected to this. They

said this experiment lacks scientific integrity. And interestingly, it still remained, the foundation of the project meeting Great Lakes water quality targets that are indeed substantially higher than those that are set out by the Fond du Lac.

There was an experiment that was done, another experiment, and it was conducted actually using far superior experimental approaches over a much longer period of time. That report, and it was done -- this is a diagram that Daniel Pauly produced in his opinion. If you recall that picture of the columns that my students used for their experiment, it looked a lot like this. Attempted to reproduce the geochemical conditions, replicated, ran over a longer period of time. They concluded that there was no clear increasing or decreasing mercury concentrations trend along the flow path through the tailings. So this experiment wasn't reported as part of the EIS or any other permitting.

Finally, there's an end of the stream water treatment process that's proposed using reverse osmosis technology at both the tailings basin and the mine site, but that hasn't been evaluated for mercury removal potential.

So I think that this is an important issue to recall and remember as we move through this discussion because it actually is kind of one of the underpinnings of the argument that we don't have a strong scientific basis here.

So as part of the permitting process, PolyMet also relied on a software program called GoldSim to model water and chemical transport. It's actually quite a common package to use for this process. It's a simple model that can model fate transport of chemicals if, in fact, their CT submodel, which presumably stands for chemical transport, is incorporated, and it can incorporate some chemical processes. And in fact, this is a snapshot of what one of the screens look like from GoldSim, for anyone who cares. It's an object-oriented modeling package that lets us do a mass balance and incorporate some fate and transport processes.

This model was used to particularly assess uncertainty and transformation processes for other metals for which this uncertainty was assessed. In fact, that's one of the strengths of the package is its ability to evaluate statistical uncertainty in the absence of being able to do that in other ways.

However, PolyMet contended that mercury was

not included in the Gold Sim model because there was insufficient data to do that.

I'll point out that the insufficient data is a result of insufficient baseline monitoring in the first place. So there's a bit of a circular argument there.

So the model means that there's -- well, there was also insufficient data and a general lack, and this is a quote, "of the definitive understanding of mercury dynamics that prevented modeling mercury like other solutes."

So that statement is unsupportable scientifically. It implies that mercury doesn't conform to basic chemical laws. It implies that it's unmodelable, which is completely false.

So there was no assessment of variability in mercury and methylmercury because only solutes that are included in the model were assessed. So again, we have this -- sort of this link between insufficient data, can't model it, can't assess uncertainty, insufficient data.

So instead of using GoldSim, a mass balance model was used to arrive at conclusions concerning de minimus contributions of mercury to downstream waters. This model had no uncertainty because

uncertainty couldn't be calculated, so there's no plus or minus on this. And even if we conservatively assumed a conservative margin of error of this data, we would be plus or minus 100 percent. Absolutely without a question if we base that on the existing data from the other metal solutes or if we even simply think about hydrologic variability. Any hydrologist in this audience will know that anyone doing even a remotely good job of capturing a water balance can say plus or minus 15 to 20 percent. I mean really at best. So even if we said the chemical data was perfect, we're still plus or minus 25 percent. I'll contend it's much higher than that.

In the FEIS there's a quote, This simple estimation was preferred over a detailed mechanistic model because it incorporated important input and removal processes for mercury and was very transparent with regard to data inputs and allowed for easy assessment of the effects of changing parameter values on mercury concentrations.

In my opinion this is a highly misleading statement. There's nothing more transparent about a mass balance model than any other kind of model

unless we mean transparent equals simple. Certainly a mass balance is simpler. I don't think that necessarily means it's more or less transparent.

It also is not incorporating processes of chemical transformations or interactions where, as we've discussed, those most important interactions are the interactions between sulfate, organic matter, and inorganic mercury through that biomethylation process that involves biological process, which has also been very effectively modeled in other contexts.

So I simply illustrate what a mass balance model is by drawing one. Two sources. We link them together with a flow. We have a receptor box. The Mass A plus the Mass B is equal to the mass that's in C. It's a mass balance. We're neither creating nor destroying mass. We're just accounting. We're doing an accounting exercise.

For something like this, I consider this to be a pretty naive approach because it can't simulate the real impacts of the operations on the most important watershed scale methylation processes that we've been talking about. Yet, this is the basis of the conclusion that changes in mercury

loading from the project will be inconsequential. And this conclusion has been, in my opinion, erroneously accepted as a valid one.

We also take the result from this mass balance model and we then link it to a model that relates the amount of mercury in the environment to the amount of mercury that's in fish.

So to take this to the next level and to demonstrate there's no impact on fish mercury concentrations, the proponents have maintained that methylmercury content in fish is roughly proportional to total mercury concentrations within individual watersheds and that cites the PCA's mercury risk assessment model. So something that the State uses. And that model is based on this principle of proportionality between mercury and fish at atmospheric deposition.

Whether we want to distinguish between atmospheric deposition or a direct water discharge, I don't think we even really need to go there because it's an outdated conceptualization that really doesn't align with scientific information, even data that's generated here in the state of Minnesota.

So Brigham, et al. in 2014 and the subsequent

work showed that mercury inputs to Voyagers National Park decreased by 32 percent. So that's the atmospheric loading of mercury decreased between 1998 and 2012. But in one lake methylmercury in fish increased by 80 percent. And that's because the amount of total mercury that's in the environment is not the primary control on the amount of mercury that's in fish. The amount of sulfate is the primary control on the amount of mercury that's in fish.

Brigham and colleagues, I think, reasonably and correctly attribute the variable response to watershed-specific hydrological conditions and disturbances. And those specific conditions are how is the hydrology supplying sulfate to methylating environments? What's the proportion of wetlands in this environment? How are those wetlands hydrologically connected to the downstream?

Indeed, it's been a long time. We have not scientifically related total mercury concentrations to methylmercury concentrations in the environment. And in part that's because total mercury in part is methylmercury. Right. We're almost comparing something to itself in some way. So operationally

it really doesn't even make any sense.

This is a paper from 1995 that was conducted in Experimental Lakes area which is in northwestern Ontario which is, in fact, just north of here. It's almost due north of here. Very similar landscape. The Experimental Lakes Area, the people who work there, USGS colleagues, they used to joke that the soil that used to be there is now in Wisconsin and Minnesota because the glaciers scraped it off and dumped it down here on the other side of the lakes. It's a little rockier, but otherwise, it looks kind of the same.

This paper asked the very blunt question: Is total mercury concentration a good predictor of methylmercury concentration aquatic systems? They conclude definitively no. Total mercury inputs and/or concentrations are not useful in predicting methylmercury concentrations and the factors within ecosystems -- and this is early days, 1995. We were just on the cusp of discovering that wetlands were important places of methylmercury formation and these authors picked it out already. Factors within ecosystems are very important in controlling methylmercury concentrations.

So summarize a little bit here. We have the

selective presentation of data about water treatment and a failure to collect sufficient background data. And these two things combined kind of predestine the conclusion that the proposed project would have no measurable impact on fish mercury concentrations.

These deficiencies most certainly have not been adequately considered, particularly in the context of Fond du Lac's water quality standards. And instead of having confidence that the project will not change or, as contended, even reduce total mercury concentrations that this entire analysis should be rejected.

If we think about this as a series of dependencies, at the base of this is the insufficient and selective use of background data which that precludes effective modeling which then precludes effective prediction of mercury in fish.

Something that I've spoken about considerably in previous opinions and that certainly has already been touched on today and it was expressed quite explicitly in our "will affect" notification and opinion from the Fond du Lac is that additions of sulfate and changes in hydrology are critical drivers in increased methylmercury production and

export in these Minnesota watersheds and are as or more important than the addition of mercury.

These factors have actually either been ignored or been carefully discounted in prior submissions despite the clear scientific burden of proof and concerns that have been raised in previous opinions and public submissions since the time that I've been involved in this project and program since 2014.

In my opinion I see two primary causes of additions of sulfate and changes in hydrology which are important in formation of methylmercury. The drawdown effect due to dewatering of the proposed open pit, which has already been described, as well as direct effluent discharges from the mine operations.

So for the Band's "will affect" notification objection these factors were explored in quite a bit more detail in the written submission to demonstrate these impacts on downstream resources associated with Fond du Lac's designated uses.

So as Esteban has already presented, he provided some very important information about analog drawdown zones that we've been working with, and as he pointed out, we also have a new drawdown

map that was produced independently by the U.S. Geological Service, so I'm grateful to GLIFWC and to Esteban in particular for this work.

Importantly, this work comes on the heels of the contention that a hydrological model could not be used to estimate impact on wetland hydrology and was not feasible. Prior expert opinions challenge this. This is not from me. This is from another hydrogeological expert, opinion from 2017. I think this is an important one to actually just read aloud.

"While a numerical model (MODFLOW) was used extensively to determine pumping rates, etc., the proponents incongruently argue that it cannot be used to predict a cone of depression that would identify wetlands potentially susceptible to impact. While it is acknowledged that identification of individual wetlands' susceptibility cannot be predicted without a detailed characterization of overburden thickness, a sensitivity analysis using the same model setup as that used to predict pumping rates, would constitute an appropriate scientific investigation that can identify the potential cone of depression that will affect wetland function."

I think that the presentation from Esteban has shown quite clearly that indeed such a cone of depression on a map was not only possible but was quite congruent between two different agencies conducting an independent analysis of this.

Certainly, I think that the USGS model gives us more resolution. But we certainly had the analog model to work with with respect to our consideration of wetlands impact when we submitted this memo on August the 3rd.

So there's the contention that there's no physical evidence -- well, sorry. I'll clarify myself here.

There has been no physical evidence that the wetland types found in the vicinity of the proposed project are perched, and as such, are not coupled to regional groundwater.

And in fact, when we think about wetland types, this isn't even a scientifically accurate statement. Even bog type peatlands, which are contended to be perched or disconnected, if we incorrectly use those as synonyms, are most certainly connected to large-scale groundwater systems. They're not completely decoupled. But importantly, under natural hydrological conditions

with low hydraulic gradients, water exchanges with groundwater are slow. And that promotes surface wetness and the aggregation of these kinds of wetlands.

As Esteban, I think, pointed out quite effectively, the predicted cone of depression creates unnatural hydrologic conditions. So these wetlands exist because there is not a strong downward hydraulic gradient. The imposition of such a hydraulic gradient will impact over 6,000 acres of wetlands and downward flows will cause water levels in those wetlands to decrease to varying degrees depending upon the nature of connectivity.

Indeed, you know, we can go to kind of a textbook kind of presentation of what we might expect to see. I've adapted this from a paper in the Hydrogeology Journal where, you know, normal peatland hydrology, and this would be considered a bog-type peatland, have groundwater interactions through what we would consider a relatively impervious layer, an area of low flows. And these are important sources of water to maintain wetness in wetlands like this. And indeed, there is also flow from the surface and from shallow flows

because the water table slopes towards the wetland, not away from it.

We could also have situations like this one on the left, example B, where groundwater flow is from left to right. So there's more water flowing in on this side and water flows out on this side. That's a perfectly reasonable hydrogeological context for a natural peat-accumulating wetland. And in fact, we could probably see that by looking at the vegetation composition. More nutrient-loving plants on the inflow side and more nutrient-poor plants on the outflow side. We might mistake ourselves in calling this a perched bog when it's not a perched bog at all. It just happens to have a vegetation community that reflects a relatively complex hydrology.

Certainly example C is what we would expect to see in a peatland affected by drawdown even if the peatland itself is not exchanging too much water vertically downwards. The water table around it, instead of flowing towards it, is now flowing away from it and draining water away from that system.

So there's lots of examples we can imagine that underdrainage would create a situation in which even a bog, the hydrology of a system like

that would be affected.

This is important because the water level fluctuations in wetlands affects sulfate and mercury, particularly the formation of methylmercury.

There have been numerous studies that show that drying and rewetting cycles increase decomposition of wetland soils, increases the flushing of organic matter and the associated chemicals that are with that organic matter including sulfate and mercury.

Again, published by a study by colleagues at the University of Minnesota at the Marcell Experimental Forest, periods of extended drought resulted -- this is the same experiment that had the sprinkler with the addition of sulfate. They were able to get all kinds of valuable data from this experiment. And they showed that periods of extended drought released sulfate and inorganic mercury, up to 400 percent more inorganic mercury upon rewetting, and that enhanced production of methylmercury during rewetting happened because of the recycling of sulfate associated with the water table rising and falling.

When sulfate is reduced by bacteria, it forms

sulfide which is relatively immobilized. And it's immobilized under these waterlog conditions. But if we change the waterlog conditions to a fully oxygenated profile, then sulfide converts back to sulfate. Just recycles again, in which case it can be reused over and over again by sulfate-reducing bacteria amplifying the methylation cycle.

So drawdown from an open pit cone of depression effectively creates an extended drought condition of varying severity depending upon the proximity to the open pit.

And we can actually quantify this. We can calculate the area of wetland that might be affected. And we can also calculate the amount of mercury that might be there as a result of that.

In fact, from the studies that we did in the St. Louis River watershed wetlands associated with Fond du Lac back in the 2000s we surveyed a lot of wetlands, both mineral soil and organic soil wetlands and developed quite a library of mercury and methylmercury concentrations in these wetland types.

And in fact, we can use those concentrations and express them over these wetlands, which we certainly reasonably consider to be the same, and

there's hundreds of kilograms of mercury that's stored in this peat, and I would expect that to be the case for wetlands all across Minnesota. This is nothing unique. This is just mercury that has accumulated there from the atmosphere over centuries.

We can also calculate from those concentrations what we would expect poor water concentrations to be because there's pretty predictable relationships between this back and forth of mercury that's on the soil and mercury that's in water. And it's on the order of 8.5 ng/L for total mercury, about 1.5 ng/L for methylmercury. And that's completely consistent with the data that's been measured at Marcell in various wetlands as well as work that we did elsewhere in the St. Louis River watershed. So it's back of the envelope. Not a bad calculation. The 8.3 is an important one to consider, though, because 8.3 is certainly considerably higher than 1.3.

So even a small amount of drawdown can release sulfate. It can release inorganic mercury. It can release methylmercury from these soils as well as enhance methylmercury production.

Certainly during the rewetting process, when we talk about drawdown, we don't talk about a complete desiccation of surficial wetlands. The flow is still relatively slow. And certainly during periods of wet conditions like in the spring during snow melt, the wetlands will rewet, which is actually kind of the worse-case scenario. That rewetting results in a pulse of sulfate that's been well-demonstrated in many environments and total mercury and methylmercury which was demonstrated in Minnesota at Marcell that were not accounted for at all in any mass balances used to justify permitting thresholds.

These cumulative contributions to downstream loads wouldn't be detected and they couldn't be mitigated because there's no monitoring in place that's required for wetland water quality during operations or closure.

We also have direct discharges of water and sulfate. This is, I think, an interesting and relevant example as well. In the EIS and cross-media analysis and other discussion there's seven direct wastewater outfalls that are associated with the mine processing facility. And these, in fact, discharge directly into the

headwater wetlands of a single tributary north of the tailings basin. This is the Trimble Creek wetlands that Esteban talked about.

So if we accept the contention that the internal waste targets can be met, sulfates 10 mg/L, total mercury is 1.3 ng/L, then these wetlands are going to receive an additional 2.7 million gallons of water per day on average. About 220 pounds of sulfate. And in fact, I'll admit to a calculation error here. That's per day, not per year as I said in the memo. So it's actually quite a bit higher than that. And per year about 5 grams of mercury.

And that may not seem like a lot, but just -- if we just assume that even half of those wetlands are interacting with discharge waters, that's on the order of 16 percent of the annual deposition of mercury, and it's over 40 times the annual deposition of sulfate from the regulatory loads that have been permitted already.

Certainly, previous discussions that we've had here about the unreliability of the approach to reach the total mercury concentrations of 1.3 ng/L means that the direct load of inorganic mercury will likely be much larger than this.

Certainly, the water discharge concentrations of 10 mg/L will increase methylmercury production in a system that has already demonstrated that it is a strong site of mercury methylation.

If you recall my experimental work that my students did that showed pretty dramatic increases of methylmercury, about 20 times increase with an increase of only 5 mg/L of sulfate. So certainly we would expect just the actual loads that we have declared to be potentially a problem.

However, there's also another problematic assumption and that's the discharge waters will not interact with natural waters. They're simply going to pass through these wetlands and preserve these regulatory limits as they make their way to surface water systems, which is completely unreasonable from an environmental perspective to consider.

The discharge process waters are going to interact with wetland soils immediately that already contain total mercury and methylmercury. We can estimate how much mercury that is quite simply.

And since the discharge mine waters are theoretically going to have lower mercury concentrations than the poor waters, then just like

in our jug experiment where we shake rock and see the mercury go on and then come back off again, the mercury is going to come off of the peat, and it's going to interact with that discharge water of lower mercury concentration and it's going to bring itself back up to the same high concentrations of 8.3, 9 ng/L that we would expect to see there and that we see everywhere in Minnesota.

So if we reach an equilibrated concentration, if those 2.7 million gallons of water reach an equilibrated concentration of 8.5 ng/L before ever reaching a tributary, then we've loaded not 5 grams of mercury to these tributaries. We've loaded 47 per year. And this is a contribution to the cumulative load of the St. Louis River that's a direct result of mine discharges, and it's completely unaccounted for in mass balances associated with this project.

So even if we accept the contention that mine water discharges may be compliant at the end of the pipe, so 1.3 ng/L for total mercury, that same water could exceed State and Great Lakes water quality guidelines by 650 percent by the time they ever reach a stream. And certainly, they'll exceed the more stringent Fond du Lac's criteria by

1300 percent.

These calculations are not intended to be precise. They're intended to illustrate that there can only be an increase in total mercury concentrations and loading to tributaries of the St. Louis River as a result of the project contributing to cumulative downstream effects.

So to close, the reliance on flawed water treatment approaches means that the projected mercury concentrations that are contended are unreliable and are likely unattainable.

There's insufficient background data, combined with the application of inappropriate modeling approaches, that mean that the estimate of the de minimus loading of total mercury can't be accepted and are most certainly an underestimate.

Insufficient background data and deficient monitoring preclude change detection and responses to unavoidable operational upsets. And the conclusion about no impact of the proposed project on fish mercury levels has to be rejected because of scientifically unsupportable omissions and assumptions and certainly no consideration of the direct or indirect sources of methylmercury, which I will again remind you is the only form of mercury

that we actually should be concerned about here.

Effects of drawdown on loading to adjacent wetlands is going to release additional mercury. It's going to form additional methylmercury that has been unaccounted for in mass balances to justify meeting permitting thresholds.

These cumulative contributions to the downstream loads really can't be detected or mitigated under the current proposal and, as a consequence, only action could be taken after the fact. So as stated before, sort of after the damage is done. So irreparable harm.

These contributions will further interact with extensive riparian wetlands. I haven't even talked about the thousands of acres of riparian wetlands that are directly connected to the St. Louis River and its tributaries. And you're going to hear more about those in a minute.

So all I've talked about are two specific cases that are directly proximal to the proposed development. And there's still thousands of acres of receiving wetlands downstream that will see additional mercury, methylmercury, and sulfate. So these factors have not been adequately considered in the context of the Band's water quality

standards in particular, and in most cases have not just been not adequately considered but haven't been considered at all.

Thank you very much.

MS. VANESSA RAY-HODGE: Thank you, Brian. That was great. The next Band witness that we have is Matthew Schweisberg, S-C-H-W-E-I-S-B-E-R-G. And Mr. Schweisberg is a senior professional wetlands scientist and he's a principal at Wetlands Strategies and Solutions LLC.

MR. MATT SCHWEISBERG: Good afternoon. Thank you.

So my name is Matt Schweisberg, S-C-H-W-E-I-S-B-E-R-G. May have been done already but I'm starting from the top.

Who am I. As I said earlier, I spent nearly 33 years with the USEPA; five and a half at the headquarters office. One of which was in the hazardous waste program, the Superfund program, and then 27 years in the new England regional office.

While in new England, I served as the senior wetland ecologist. I also worked for four years, and my last four years of federal service, on the International Joint Commission for the St. Croix River Watershed Counsel in Maine.

I worked on over 30 hazardous waste sites throughout New England regarding wetland impacts and appropriate remedial actions in wetlands for remediating hazardous waste; mostly in or next to wetland areas.

Lastly, along with a small cadre of EPA scientists, senior scientists, I served on what I call a swat team, a small swat team for the Agency, and we would assist regional offices upon request with controversial projects and travel around the country and work with them on developing documents and testimony and that kind of thing.

Since I retired from the EPA, I also worked on the pebble mine in Alaska. And that's a huge mine, not unlike the NorthMet PolyMet.

So let me start with some key points here. The proposed NorthMet Mine project would result in a discharge of waters containing inorganic mercury, methylmercury, sulfides and sulfates, dissolved inorganic matter to tributaries of the Embarrass and Partridge River.

The Embarrass and Partridge Rivers are direct tributaries to the St. Louis which forms the northern and eastern boundaries of the Fond du Lac Reservation which is about 70 to 80 miles south of

the site, of the mine site.

There are extensive riparian floodplain wetlands along the St. Louis River that contain organic-rich soils, that is, mucks and peats. Fluctuating water levels in these riparian muck and peat wetlands create ideal conditions -- drying out and rewetting, also called, oxidation and reduction -- for enhancing the methylation of mercury. You heard Esteban speak a little bit about that as well.

There is a direct and permanent surface water connection between the mine and plant sites and the riparian wetlands along the Fond du Lac Reservation. And the contaminated discharges from the NorthMet mine would be transported directly down river to these riparian wetlands.

Among other evidence, the specific conductance levels that Nancy talked about earlier spoke to and are clear about the evidence of that direct connection between the mine site and the Fond du Lac Reservation.

In late fall, winter and spring, there's flooding along the St. Louis River that will backup waters into at least the three major streams on the Reservation. They are the Fond du Lac Creek, Stony

Brook, and Simian Creek, and the wetlands adjacent to those streams. So as such, the contaminated discharges from the mine and plant sites may easily reach and contaminate these three streams and their adjacent wetlands within the reservation.

Fish and wildlife resources that use the St. Louis River, its riparian wetlands, the three Reservation streams, and their adjacent wetlands would be exposed to mercury and methylmercury, would consume plant and animal foods containing elevated levels of methylmercury, and in turn, be available to higher trophic levels, including humans, that catch and consume fish from the St. Louis River and the Reservation streams. Biomagnification of methylmercury within these animals, the wildlife, and the humans, is of great concern.

Among other species, the Band's restoration efforts for lake sturgeon could be compromised. The consumption of methylmercury-contaminated foods by fish and wildlife and by humans would impair the designated uses for the St. Louis River and the three streams on the Reservation as well as wetlands adjacent to those areas. And it would affect -- I'm just going to read the highlighted

points -- cultural opportunities, protection of downstream water qualities, and wetland and water-dependent wildlife.

The degradation of Reservation waters and wetlands will result in noncompliance with the designated uses of the Band's water quality standards as well as its antidegradation standards.

On top of that, the filling and disturbance of wetlands and other waters will result in noncompliance with the Section 404(b)(1) guidelines of the Clean Water Act. And I'll say a little bit more about that in a minute. Maybe more than a minute.

So you've already heard a lot about the ecological setting, and I'm not going to go through these things, but just to show you the yellow arrow points to the mine site and the wetlands around the mine site that would be directly affected by the drawdown that Esteban talked about earlier.

For regional aquatic resources at the mine site there are numerous small creeks and streams surrounded by an expansive and diverse landscape where the dominant feature is wetland. And as you heard earlier, most of these wetlands are peat and muck based.

The Embarrass and Partridge Rivers provide a direct flow path via the St. Louis River to the Reservation. And I mentioned earlier that there are extensive riparian wetlands along the Embarrass, the Partridge, and the St. Louis Rivers that contain organic-rich soils, mucks and peats, and these regularly flood during spring from snow smelt and frequent rain.

The St. Louis River forms the northern and eastern boundaries of the Reservation, and riparian wetlands that exist along those two boundaries total about 9400 acres. Of these wetlands, the U.S. Fish & Wildlife Services National Wetland Inventory classifies about 2400 acres as seasonally flooded basin or flat wetlands. These wetlands are the type with extensive organic soils and seasonally flooded wetlands experience fluctuating water levels that wetting and drying over the course of the year, flooded in mid to late winter and spring, then drying out when water levels recede in the summer and early fall.

Fluctuating water levels, as you heard Brian talk about, are ideal sites for where mercury methylation occurs. And along the boundaries of the Fond du Lac Reservation there are numerous

streams and creeks -- again, Fond du Lac Creek, Stony Creek, and Simian Creek -- that connect more interior portions of Reservation wetlands, including some wild rice areas, to the St. Louis River.

These wetlands are predominantly forested, shrub, and emergent types. Many of these wetland areas are periodically flooded, mostly from backwater flooding from the St. Louis River where the water backs up into these streams and in part into the wetlands that are adjacent to those streams. Nearly all of these interior wetlands drain to the St. Louis River which, of course, drains to Lake Superior.

Just to talk a little bit about the regional wildlife, you have a diverse array of wildlife species that occur in this whole area, all of which are found or can be found on the Reservation. And I won't necessarily read most of these, but among them are black bear, timber wolf, moose, badger, marten, bobcat, lynx, fisher, beaver, muskrat, river otter in particular, and a lot of small animals.

Birds. Waterfowl, ducks, geese, and swans; wading births like herons and egrets. Birds of

prey such as hawks and falcons. There are bald eagles that visit the area frequently. You get grouse, sandhill crane, woodcock, and a variety of song birds.

There are also many reptiles, many snakes, many turtles such as snapping and wood turtles and Blanding's turtle and spiny softshell turtles. There are a myriad of amphibians such as frogs. You can see the list on the slide.

Many of these wildlife species and the fish species on the next slide are culturally significant for the Band and needed for the Band to exercise its treaty rights to hunt, to fish, and to gather, as you've heard them say.

Just a quick list of some of the fish that are found in the Reservation waters and along the St. Louis River, in particular, lake sturgeon that you've heard about already, a rare species that the Band is trying to reestablish.

So let me switch now to some adverse impact issues and for adverse impacts to aquatic resources. PolyMet says that the proposed project would fill or alter approximately 900 acres of wetlands. However, PolyMet and the Corps did not completely evaluate indirect adverse impacts in

line with compliance with the NEPA regs, with the Army Corps regs, or with EPA's regulations, especially downstream of the mine and its facilities, and in particular, on the Fond du Lac Reservation.

In the EIS documents and the Clean Water Act application, PolyMet claims only minimal impacts to wetlands, particularly from mercury, and other waters. And the Corps record of decision appears to take that claim at mostly face value.

The analysis that you've seen already and our analysis in particular, shows that the project would fill and alter at least 6,000 acres of wetlands and other waters up and down the St. Louis River watershed, in particular, on the Fond du Lac Reservation.

This is a glaring omission. Neither PolyMet nor the Corps accurately evaluated the adverse impacts of wetlands and other waters from the mine, particularly from the groundwater drawdown and the downstream effects of the mine site, especially on the Fond du Lac Reservation.

You've seen the GLIFWC maps already showing the aerial effects of groundwater drawdown from the mine operation.

Wetland hydrology, just to get a little technical for a minute, is defined as an area with saturated soils at 12 inches or less below the surface for a period of two weeks or longer during the growing season.

In areas with organic soils, the peats and mucks that we have here, the water table may actually be lower, even as low as 16 inches, and the area still retain wetland hydrology due to the capillary fringe or due to capillary fringe rise which is akin to dipping a paper towel in a pool of water and watching it rise up through the towel. It's sort of the same effect in the soil.

The final environmental impact statement in PolyMet's submission describe the wetlands as perched, that is, hydrologically separated from the regional water table. That's not accurate. And it -- PolyMet uses that reasoning to support its contention that there would only be minimal impacts to wetlands on the site from the drawdown of its operation.

There are few truly isolated or few truly hydrologically separated wetlands from the regional groundwater table. Vertical transmission may be slower at times, and I think you heard Esteban

mention that earlier, and you heard Brian talk about that a little, but, nevertheless, the wetlands are connected to the regional water table and there are effects, especially when you have long-term drawdown for years and in some cases maybe a decade or more with the operation of this mine. The GLIFWC modeling shows a much greater drawdown of the water table. You have the maps and you saw the maps.

The modeling and the outcome has been further supported by the work of USGS which shows in some cases even greater drawdown impacts than that analog method that Esteban highlighted.

I'm not going to go through these maps again because you've seen them a couple of times now.

So adverse impacts to aquatic resources. Mercury -- and you heard Brian talk about this a little -- mercury and methylmercury tend to persist long term in the environment, especially in organic soils, peats and mucks, and when you add sulfate, these areas become prolific incubators of methylmercury.

Mercury being one of the most toxic elements to fish and wildlife and humans, especially for vulnerable and minority populations like what you

found in the Fond du Lac Band.

Methylmercury disrupts and causes severe harm to the neurological and reproductive systems in both fish and wildlife and particularly in humans.

PolyMet's analysis of the groundwater drawdown upon streams and wetlands in the watershed subbasin is inaccurate, and it vastly underestimates the extent of that drawdown and the harm from it.

As I said earlier, the FEIS states that over 900 acres of diverse and ecologically valuable wetlands would be directly filled and altered by construction of the project, including at the mine site and from operation of the mine. However, we determined that when combined with construction and dewatering of the open pit, the operation will lower groundwater and surface water levels around the mine and actually adversely impact, directly and indirectly, an area that contains over 6,000 acres of wetlands and waters. That acreage does not -- and let me stress this -- it does not include the indirect effects downstream of the mine facilities, particularly the riparian wetlands along the St. Louis River, and especially to the streams and wetlands along and within the Fond du Lac reservation.

Continuing on adverse impacts to aquatic resources at the Fond du Lac Reservation:

Fish and wildlife resources that use the St. Louis River, its riparian wetlands, and the streams and wetlands of the Reservation will be exposed to elevated levels of methylmercury, the form of mercury that biomagnifies in predatory species, as you heard Brian talk about that a little bit and you heard Nancy talk about that.

So the highest levels of exposure would be in predatory organisms, including wildlife such as fish-eating birds and mammals like herons and egrets, bear, river otters in particular, and then most importantly perhaps, humans, Band members that catch and consume fish or that catch and consume wildlife that eat the contaminated fish.

Methylmercury exposure is a grave concern for fish and wetland-dependent wildlife from the St. Louis River, the three principal streams on the Reservation and their adjacent wetlands. And among other species, the Band's restoration efforts for lake sturgeon would likely be jeopardized.

Project discharges will affect biogeochemical functions of these impacted wetlands, which will in turn substantially affect their ecological

functions. The discharges, in addition to seepage that will not be contained by the proposed and wholly-unproven seepage capture system that PolyMet proposes, will result in increases in methylmercury production in headwater streams that provide water and solutes to downstream reaches, especially the St. Louis River and its riparian wetlands.

The contaminated discharges from the project, because of the direct surface water connections to the Reservation, they will reach and contaminate at least the three principal streams that I've mentioned and their adjacent wetlands.

So I'm going to talk for a minute now about the Band's water quality standards.

Section 701, designated uses of the Band's water quality standards, say that for all wetlands as defined by the Cowardin classification scheme, the uses to be protected include, but are not limited to, among others, cultural opportunity, indigenous floral and faunal diversity and abundance, protection of downstream water quality, wild rice, and water-dependent wildlife.

Discharged waters from the mine and plant sites containing elevated levels of mercury and sulfates will interact with dissolved organic

matter to generate methylmercury that will be transported down river to Reservation waters and wetlands, especially in the event of high flows and floods like you have at this time of year.

Methylmercury will bioaccumulate and biomagnify in fish and other aquatic life such as otter and mink in the river, the streams, and the wetlands and impair designated uses such as subsistence fishing, warm water fish, wildlife, especially fish-eating birds and mammals such as herons and river otter, and potentially wild rice areas which then would be available to humans. You heard Nancy Schuldt speak to the adverse effects on the Band's designated uses.

The other section of the water quality standards for the Band is Section 703, antidegradation. And it says that for wetlands, again using the Cowardin classification scheme, there shall be no degradation of existing uses. That's not a little degradation. That's no degradation.

Again, using that classification system, there shall be no net loss of the water quality, the functions, the area, or the ecological integrity of high value or high quality, among others,

palustrine and riverine wetlands, after satisfying applicable antidegradation provisions, including avoidance, minimization, and mitigation replacement requirements, the authorized tribe -- unless the authorized tribe that determines that allowing degradation is necessary to accommodate important social or economic development in the area in which wetlands are located. And to the best of my knowledge, the Fond du Lac Band has not made such a finding.

You heard Nancy again speak to the adverse effects that violate antidegradation provisions and the Band's water quality standards.

So the direct effect of loading water, sulfate, or water with sulfates and inorganic mercury to headwater wetlands and surface waters from mine operations will be to elevate methylmercury concentrations and result in increases in exposure of fish and wildlife as well as the Band members who consume those fish and wildlife.

Changes in regional wetland hydrology, and again, you heard previous speakers talk to that, in the area of groundwater impact in the vicinity of the project site will have indirect effects that

will enhance mercury, sulfate, and methylmercury releases in the area and data clearly indicate are -- that data clearly indicate are already exceeding water quality standards. So this will just exacerbate noncompliance with water quality standards.

Project-related changes in hydrology and the release of excess sulfate will stimulate the process of mercury methylation. You heard Brian talk about that a little. And the methylmercury that is produced both adjacent to the project as well as at more distant locations in the St. Louis River watershed, especially on the Fond du Lac Reservation, will contribute to the load of methylmercury in surface waters. And this methylmercury will bioaccumulate and increase exposures of fish-consuming wildlife and Band members who consume that wildlife.

The consumption of methylmercury, of methylmercury-contaminated foods by fish and wildlife and by Band members will impair the designated uses for the St. Louis River and three principal streams on the Reservation as well as wetlands adjacent to those areas.

The degradation of Fond du Lac Reservation

waters and wetlands will result in noncompliance with the Band's designated uses and antidegradation provisions of its water quality standards.

The unavoidable leakages and releases of process water, leachate, and stormwater containing mercury, sulfides and sulfates and inorganic and methylmercury will almost certainly result in degrading the ecological functions and services of the affected Reservation waters and wetlands, including existing uses such as the loss of their ecological integrity.

PolyMet proposes to monitor to determine if noncompliance has occurred. But water quality standards are in effect in the first instance to prevent discharges that result in noncompliance.

PolyMet's proposed monitoring approach would not comply with the Band's water quality standards because the noncompliance would already have occurred. Monitoring to detect a violation and then deciding how to address it in that case is wholly inadequate. It's impracticable, it's unrealistic, and it would result in irreparable harm to the water and wetland resources on the Reservation. Such an arrangement makes compliance with water quality standards negotiable instead of

mandatory, and that would not comply with the Clean Water Act.

I'm going to switch now to compliance with the Clean Water Act Section 404(b)(1) guidelines which are the environmental standards that a proposed project or discharge of dredged or fill material into jurisdictional waters and wetlands must comply with in order to receive authorization from the Army Corps of Engineers in a Section 404 permit.

So that an individual 404 permit can only issue if the proposed discharge complies with those standards. And the guidelines are -- despite the their name, they are binding regulations and they contain four independent tests.

Section 230.10(a) is essentially referred to as the avoidance and alternatives provision. It says that no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem so long as that alternative does not have other significant adverse consequences.

This standard is sometimes referred to as the LEDPA or least environmentally damaging practicable alternative.

The environmental review process by the Corps for this proposed project under the Clean Water Act Section 404 program was fundamentally flawed. And let me explain a little bit why I think that's the case.

A practicable alternative is both available and capable of being done; that is, it's feasible. And those twin aspects are examined in terms of cost, existing technology, and logistics in light of overall project purpose. An available alternative is one that the applicant can reasonably obtain, access, utilize, expand, or manage.

In this instance, the basic project purpose is mining and ore processing. As determined by the Corps in its record of decision, the overall project purpose is to produce base and precious metals precipitates and flotation concentrates from the ore mined at the NorthMet deposit by uninterrupted operation of the former LTVSMC processing plant.

The part that starts with "from ore mined at the NorthMet deposit" is what creates the problem for the way this has been defined.

The incorrect wording here is inappropriate

because it eliminates any other alternative site for a mine. The proponent behind this project is a multinational worldwide company, and it controls mines on all continents except for Antarctica. Worldwide company that has holdings everywhere and yet, the analysis they did only looked at PolyMet. It really didn't look at any other mines. It looked at different ways to arrange the features at the PolyMet site, but it did not look at other sites. That is a significant flaw.

Reading from the ROD, the Corps' record of decision, the Minnesota DNR and the Corps said it will not evaluate alternative mine, pit, or processing plant sites for this project. An alternative site would not meet the underlying need or purpose. That's NEPA terminology, not 404. The mineralization of the desired elements within a geologic deposit dictates the location of the mine, and absent a thorough analysis of alternative sites, again, worldwide for a international corporation, such a conclusion is unsubstantiated. It's inappropriate.

An alternative processing plant site would not likely have significant environmental benefits over the existing mining industry infrastructure. You

can't know that unless you do the analysis of alternatives and you look at other sites. So again, this is an unsubstantiated conclusion by the Minnesota DNR and especially by the Corps.

As the regulations say, without a thorough evaluation of potential mine locations across the world, either owned, controlled, or reasonably obtained by PolyMet, no documented and defensible determination can be made by the Corps or at least should be made by the Corps, that the PolyMet NorthMet site is both practicable and least environmentally damaging to the aquatic ecosystem.

In looking at all of the documentation that I can find both at the Corps site, at Minnesota DNR site, and material that PolyMet has submitted, no such evaluation was done.

And the regulations are very clear that the burden of proof is squarely on the applicant to clearly demonstrate that its proposal is the least environmentally damaging practicable alternative or LEDPA. And in the absence of such a clear showing, the 404(b)(1) guidelines require the Corps to deny the application for a permit. PolyMet has made no such demonstration.

The next independent test is 230.10(b) which

says that no discharge of dredged or fill material shall be permitted if, among other things, it causes or contributes, after consideration of the disposal site dilution and dispersion, to violations of any applicable state or approved Tribal water quality standard.

For this project it's very well-documented now that the suspended Corps permit for the purpose of constructing the mine and the ore processing facilities will cause or contribute to violations of the Band's water quality standards.

We the team that is supporting the Band in its "will affect" analysis explained in great deal the activities that would occur, the effects on the Reservation's wetlands and other waters, and concluded that, among other things, the project will result in the discharge of millions of gallons of water containing inorganic mercury, methylmercury, and dissolved organic matter to tributaries of the Embarrass and Partridge Rivers that already contain elevated levels of methylmercury.

Project discharges will result in direct and seepage discharges of sulfate and inorganic mercury to extensive headwater wetlands in the Embarrass

River or Embarrass River watershed and the seven direct wastewater outfalls to the headwater wetlands of Trimble Creek, increasing water loadings by several million gallons per day that will supply hundreds of pounds of sulfate per year. That's what makes this all kind of an incredible factory for producing methylmercury if this were to occur.

As there is a direct surface water connection between the project site and the riparian wetlands along and within the Fond du Lac Reservation, it is a given that the contaminated discharges from the project will be transported to these riparian wetlands along the reservation as well as to the streams and some of the wetlands adjacent to those streams within the Reservation.

The consumption of methylmercury-contaminated foods by fish and wildlife and by Band members will impair the Band's designated uses for the St. Louis River and the three principal streams on the Reservation as well as wetlands adjacent to those streams.

The next independent test of the guidelines is 230.10(c) which has to do with significant impacts. It says that except as provided under 404(b)(2),

which deals with navigation, no discharge of dredged or fill material shall be permitted which will cause or contribute to significant degradation of the waters of the U.S.

And the guidelines require the analysis of all direct, secondary -- also in NEPA those are indirect -- and cumulative adverse impacts of the affected aquatic resources. Neither PolyMet nor the Corps accounted for all secondary and cumulative adverse impacts. And you heard Nancy Schuldt talk a little bit about that.

There's been no evaluation of downstream -- which are indirect impacts -- most importantly, to the Fond du Lac Reservation. And there's an incomplete, in fact, cursory evaluation of cumulative impacts in the contributing watershed or sub watershed.

The last independent test in the guidelines has to do with compensatory mitigation. It says that no discharge of dredge or fill material shall be permitted unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem.

And quoting from the Corps' record of

decision, it says, To offset unavoidable losses of wetlands associated with the proposal, project -- with the proposal, I should say -- the applicant purchased mitigation credits from the Lake Superior Wetland Mitigation Bank located in the St. Louis River watershed. Wetlands to be impacted by the project are located in the Embarrass and Partridge River watersheds, which are sub-watersheds of the St. Louis River. Therefore, impacts and compensations are located in the same major watershed. The primary wetland type to be impacted and the primary wetland type at the Lake Superior Bank is coniferous bog communities. Therefore, compensation is in-kind.

That's where you take three and two and you get eight when you add them together. That does not make any sense ecologically, practically, and it does not comply with this section of the guidelines.

It's important to note that the adverse impacts described in the final EIS and above are potentially avoidable because the alternatives analysis was not complete.

As explained in my or the document that I quoted earlier, the complete analysis of the

proposed mine for compliance with the guidelines, the applicant has not rebutted the presumption that less environmentally damaging alternatives exist and are practicable. Therefore, because they are likely avoidable, the immense adverse impacts to the aquatic ecosystem from this proposed mine would result from the construction and operation of the mine and, therefore, those impacts are significant by definition, more or less.

Purchase of credits in the mitigation bank is allowed under federal regulation. However, purchasing bank credits does not adequately compensate for the full range, scope, and the severity of adverse impacts to wetlands, rivers, and streams that I've described above and that others have described.

The bank is roughly 25 to 30 miles downstream of the mine site and also would likely be contaminated from mine discharges.

That approach could not come close to adequately compensating for the extent, diversity, and the significance of adverse impacts at the project area. The adverse impacts to water quality, in particular to wetlands and waters on the Fond du Lac Reservation, are not and cannot be

adequately compensated by this approach. In fact, those impacts are not compensated at all from whatever I've seen. In fact, there is no scheme under which those impacts could be adequately compensated.

I've seen nothing that describes in the materials submitted by Fond du Lac and the FEIS or in the Corps' application for this permit that describe how those impacts would be adequately compensated. They would not be appropriate or practicable.

That approach may appear practicable but it is clearly not appropriate, again, for the range, scale, and severity of adverse impacts in this circumstance.

The impacts to this landscape involve not just pristine individual wetlands, but inextricably linked stream, river, and wetland ecosystems as well as treaty resources in the ceded territory and the Band's Reservation. And I think that's real important, that this would adversely impact treaty resources in the ceded territory and on the Band's Reservation.

Finally, and as described on page 60 of the Corps' record of decision, there is considerable

uncertainty regarding the extent of indirect effects that may occur to groundwater drawdown at the site.

Because indirect effects cannot be determined in advance of impacts, the applicant will monitor areas around the project to assess the extent of changes to hydrology and vegetation that can be attributed to the project.

If indirect impacts are found, adaptive management and/or compensatory mitigation would be required to offset these impacts.

I think as Nancy and to some degree as Esteban and Brian have talked about, that's not compensation. The impacts have already occurred. Many of them would be irreparable. And simple monitoring, as I think Nancy mentioned, the horses are out of the barn. It's already occurred.

Here and elsewhere the Corps relies solely on monitoring to determine if more than minimal adverse impacts have occurred. It's unsound, it's unscientific, and it's an unsubstantiated approach. And there's a lot in the application from PolyMet that is unsubstantiated. You heard about some of that from Brian. You heard about some of that from Esteban, and you heard about some of that from

Nancy Schuldt.

Undoubtedly, that approach would result in an additional significant and irreparable adverse impacts to the aquatic ecosystem resulting in further noncompliance with the applicable regulations and the guidelines.

So in conclusion, most of the justification for this project from PolyMet, and to some degree from the Corps, is not based upon factual information. It is conjecture and it's unsubstantiated. The proposed mine would result in a significant and unacceptable violation of the Band's water quality standards.

Section 401(a)(2) provides neighboring states and federally-recognized tribes with an opportunity to object to 404 permits if EPA determines that the permitted discharge may affect the water quality in the state or tribe.

If the imposition of conditions cannot ensure compliance with the State's or tribe's water quality standards, the permitting agency, in this case the Corps, shall not issue the license or permit.

Consequently, the Corps cannot rely on Minnesota's existing 401 certification to justify

the project because it does nothing to address the myriad adverse affects that I and others have described on the Band's water quality standard.

The proposed mine would fill and alter approximately -- well, probably in excess of 6,000 acres of valuable wetlands and waters and result in significant and unacceptable adverse impacts to wetlands and other waters and the fish and wildlife resources that depend on those wetlands and waters, especially those of particular importance to the Band like lake sturgeon, birds of prey, and fur bearers.

Consequently, the Clean Water Act Section 404 permit must be permanently revoked and not reissued. And you've heard that from some others as well.

And I want to emphasize that there are no proven or effective conditions that could be placed on the Section 404 permit or, for that matter, the water quality certification, to avoid the adverse impacts described or compensatory mitigation that could bring the project, as proposed, into compliance with the applicable regulations.

This is not a question of needing more studies or data. Lots has been done. And I think it's

very clear what the result is. The data is more than sufficient. No discharges is the only remedy in this case.

In closing, EPA should not delay or hesitate to invoke its authority under Clean Water Act Section 404(c) and initiate a veto action to prevent this project from moving forward.

And I think that's all I have. So thank you.

MS. VANESSA RAY-HODGE: Thank you, Matt Schweisberg for that great presentation.

Matt Schweisberg was the last expert that we have to testify on behalf of the Band. So we appreciate you all listening to all of our presentations. But in closing, before we move on to the rest of the agenda for the hearing, the Chairman would like to come up and say some closing remarks about the presentations that you've heard today regarding the Band's "will affect" determination.

CHAIRMAN KEVIN DUPUIS: Good afternoon. For those of you who weren't here this morning, I'm Kevin DuPuis. I'm the Fond du Lac Chairman. I'd like to think the Army Corps and Colonel Jansen for listening to Band's presentation in today's hearing.

We have completed our list of main witnesses, and I would like to close the Band's main case by highlighting the importance of this hearing and process and the information that has been presented by the Band's experts.

As you heard from our experts, the science is clear. The discharges from proposed PolyMet project would violate the Band's downstream water quality standards and create negative impacts of the Band's downstream Reservation waters and other treaty resources and culture resources.

These impacts will not only further destroy treaty resources which we rely but result in increased exposure to mercury, methylmercury in the fish and wildlife we consume. This is a real impact and real consequences. We are talking about not just the health and welfare of our grandparents, our parents, brothers and sisters, children and grandchildren and the unborn, but the well-being of our entire culture and our way of life, a way of life that is protected by treaties with the United States.

Colonel Jansen, on behalf of the Corps, you have a very big responsibility on your shoulders, sir. You must take all the evidence before you and

decide whether PolyMet's 404 permit can be reinstated or whether it must be revoked. We strongly believe there is only result that can be reached. Sir, you must revoke and suspend 404 permit issued to PolyMet.

The Band must be treated as an expert on its own water quality standards. Throughout the presentations our experts have been clear and there are no permit conditions that can be applied or be placed on the 404 permit that would ensure compliance with the Band's downstream water quality standards.

You have also heard from the EPA on the Band's objections, and the EPA recommendations agree with the Band. This outcome may seem surprising to some, but it's not surprising to us. We've been saying this for years.

On behalf the Band, we appreciate the EPA for thoughtfully evaluating the proposed project and the Band's objections. It came as no surprise to us that the EPA reached the same result as we did because the result is firmly grounded in the science.

Though it is unfortunate it took so much work by the Band to get us here today, we are thankful

that we are here, and we ask the Corps to listen to the experts, both the Band expert and the EPA experts, and revoke the suspended 404 permit.

We urge the Corps to act quickly after the close of the hearing process so this process can finally come to conclusion. Migwetch. Thank you.

COLONEL JANSEN: First of all, thank you very much, everyone, for your attendance and your attention today. Special thank you to Chairman DuPuis, members of the RBC for your personal presence today.

I'd like to also thank the Black Bear Resort for their hospitality, a wonderful venue for this event. And I do want to thank our staff and our technical team for all the behind-the-scenes work to make sure that we had a smooth hearing, especially the virtual component.

Vanessa, Thomas, Nancy, Esteban, Brian, and Matt, thank you for your statements and presentations this afternoon.

Schedule tomorrow. Tomorrow we will resume our hearing at 9 a.m., and it will begin with hearing from PolyMet. So Fond du Lac is complete with their presentations.

So with that, we conclude day one of the

public hearing regarding Fond du Lac's objection to the Corps' Section 404 permit for the PolyMet NorthMet mine project.

Thank you very much and wish all of you a safe and pleasant evening.

* * *

STATE OF MINNESOTA)
) ss.
COUNTY OF WASHINGTON)

BE IT KNOWN, that I took the proceedings at the time and place set forth herein;

That the proceedings were recorded in shorthand and transcribed into typewriting, that the transcript is a true record of the proceedings, to the best of my ability;

That I am not related to any of the parties hereto nor interested in the outcome of the action;

IN EVIDENCE HEREOF, WITNESS MY HAND AND SEAL.

Lisa M. Thorsgaard