STATE OF MICHIGAN

STATE OFFICE OF ADMINISTRATIVE HEARINGS AND RULES

In the matter of:	File Nos.:	GW1810162 and MP 01 2007
The Petitions of the Keweenaw Bay Indian Community, Huron Mountain Club, National Wildlife Federation, and Yellow Dog Watershed Environmental Preserve, Inc., on permits issued to Kennecott Eagle Minerals Company. _____/	Part:	31, Groundwater Discharge 632, Nonferrous Metallic Mineral Mining
	Agency:	Department of Environmental Quality
	Case Type:	Water Bureau and Office of Geological Survey

D R A F T T R A N S C R I P T

HEARING - VOLUME NO. XIII

BEFORE RICHARD A. PATTERSON, ADMINISTRATIVE LAW JUDGE

Constitution Hall, 525 West Allegan, Lansing, Michigan

Wednesday, May 14, 2008, 8:30 a.m.

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Lansing, Michigan

Wednesday, May 14, 2008 - 8:34 a.m.

JUDGE PATTERSON: Whenever you're ready.

MR. LEWIS: Good morning, your Honor. We had left off -- when was it? -- yesterday, I guess, with -- we've gotten to a description of the plan for the surface facilities of the mine and then we talked about the underground mining plan and showed the video. And we're going to pick up this morning with some other elements of the mine plan.

STEPHEN V. DONOHUE, PH.D.

having been called by the Intervenor and previously sworn:

DIRECT EXAMINATION

BY MR. LEWIS: (continued)

Q Mr. Donohue, next I'd like you to, if you would, give us a brief overview of the design plan for the temporary development rock storage area.

A Sure. The development rock storage area has been designed in accordance with Rule 425.409 (a)(1)(be) to (f) which specifies the type of analysis that needs to be done to demonstrate equivalency with the prescribed design standard that's promulgated in the Rules. That analysis is contained in the application and the supporting appendices. In essence, the development rock will be placed and stored on a line system. This consists of a geosynthetic clay liner,

high density polyethylene liner with a leak detection system that will be construction below that. That leak detection system is prescribed and mandated in mine permit special condition F.1. As part of the construction process for the liner system and before it can be placed into operation, there is a construction quality assurance plan that's been developed and will be implemented for the construction process that is contained in Exhibit 21 -- Intervenor Exhibit 21. That was also submitted as part of the mine permit application. Once the development rock is placed in the system and as it's placed in the system it'll be amended with limestone, once the grades of the development rock are brought up to their maximum height, that development rock will be covered with a plastic cover to prevent water infiltration. There is a contact water collection system that is built at the bottom of the development rock storage system. It's, in essence, a gravel layer that's placed on top of the liner that conveys water that impinges on the liner to a central collection sump. From that central collection sump, the water is pumped to the contact water storage basins that we previously described.

As I mentioned before, all the development rock that is placed in the storage area will be amended with limestone at a rate of 20 tons -- those are metric tons -- per 1,000 tons of development rock. And the supporting

calculations for that are contained in the supporting appendices to the mine permit application and are based on the actual geochemical characteristics of the rock that was tested.

Q I think next could you describe the plan -- a little more detail about the plan for the contact water basins, Mr. Donohue?

A Yes. The contact water basins -- if we could have the next slide there. The contact water basins again are lined storage systems. These basins were designed in accordance with Rule R323.2237. And they employ a similar type of liner technology that is being employed for the development rock storage area, namely a geosynthetic clay layer and a high density polyethylene liner. The size of these contact water storage basins -- the design capacity had to be based on a number of factors. One, what the potential pumpage rate of the mine was that was going to be needed to keep the mine in operating conditions as well as peak storm water runoff events to the contact water basins from that operations area that we previously described on the site facility plan.

The design basis for the sizing was -- as I mentioned, it was due to a combined peak snow melt event. We know we get substantial snowfall in that area, and there can be a substantial snow pack in the late winter to early

spring that's got a lot of built-up retained water than can melt rapidly due to warming temperatures as well as precipitation. And you can get, in essence, a very significant runoff event that occurs. That was taken into account in the design of those basins as well as the mine dewatering rate. What we assume was a mine dewatering rate of 250 gallons a minute. That's well in excess of what the expected inflow rate into the mine is of around 60 to 70 gallons a minute based on the modeling work that's been done for the project. We did that so that, in essence, we over-designed the capacity of these water retention basins for an engineering safety factor.

Q And next could you give us an overview of the plan of the wastewater treatment plant?

A Yes. The wastewater treatment plant is a state-of-the-art treatment system that's tailored to the water chemistry conditions that can be expected to occur during this mining operation. The water chemistry that comes out of this mine that's pumped from the underground mine workings that comes from the development rock storage area, et cetera, and comes from the runoff from the main operations areas will consist of dissolved solids that are comprised of metals, sulfate and chloride principally.

The components of the water treatment system consist of, first and foremost, a hydroxide precipitation

step that will remove metals during this first treatment step in the treatment system. The water after it goes through this hydroxide precipitation step then passes through a reverse osmosis system for polishing, metals removal and removal of anions such as sulfate and chloride.

Q What does "polishing" mean, Mr. Donohue?

A It's, in essence, additional treatment, advanced treatment of the primary effluent from the first treatment step. To put this into perspective, reverse osmosis systems are standard technologies that some people use on their drinking water systems at home. And what that technology consists of, in essence, it's like a pressure membrane. The water is put into that membrane and, as it passes through the membrane, things like metals and sulfate and chloride are retained inside the membrane. And so that water inside the membrane slowly becomes concentrated and the permeate has all the metal or most of the metals and the sulfate and the chloride removed. So you have a very high purity water that comes out of this system.

The reject water from the reverse osmosis system goes through additional treatment steps that ultimately lead to the passage of that water through an evaporator and a crystalizer. So at the end of the treatment process what you have is, in essence, water that's gone through hydroxide precipitation, reverse osmosis, a portion of that water

that's rejected from the primary reverse osmosis system goes through additional steps of metals removal and reverse osmosis. Some of that goes through an evaporator system. And ultimately you end up with a very high purity water.

All of the different treatment components here are technologies that have been widely used throughout many industries. There's also provisions in the treatment system for ion exchange for specific ions such as boron, if they're needed. The design capacity for the treatment system is based again on an assumed mine inflow rate of 250 gallons a minute, which is way in excess of what we're expecting. And to accommodate the runoff events that we described previously, we designed the maximum capacity of the system at 350 gallons a minute.

The treatment system will generate through the metals precipitation process, through the process of treating the concentrate that comes off of the reverse osmosis system that's ultimately passed through an evaporator and crystalizer. Those treatment steps will generate a variety of what we generically refer to as wastewater treatment plant solids. That's where the metals and the sulfate and all those types of things will get concentrated down. Those treatment solids will, based on the conditions in the permit, have to be transported off site and disposed of at a licensed landfill in accordance

with standard solid waste regulations.

Q And next, Mr. Donohue, going downstream, so to speak, we've heard about the TWIS. And would you give us a brief summary as to the elements of the treated water infiltration system?

A Yes. The treated water infiltration system is a fairly simple system. It consists of a varied network of perforated piping that is embedded in a gravel bed and then is covered with additional gravel and soil, so it's insulated from frost penetration. It's been designed for a infiltration rate of 400 gallons a minute. And what will happen during the operation of this system is the treated effluent from the wastewater treatment plant will be pumped to that infiltration system into that perforated piping. The water will come out through the perforated piping into the gravel bed. It'll get distributed across the land surface and then percolate down into the subsurface and eventually recharge the water table.

The design of this is based on actual infiltration tests that were completed in the footprint of the treated water infiltration system. And we heard very early on in the hearing here a discussion on mounding analysis. And the mounding analysis that was done for the design of this system was done based on an assumed infiltration rate of 400 gallons a minute, because that's the design capacity for this system. Again we designed it for that rate as an

engineering safety factor.

As we discussed previously, the expected inflow rate to the mine is about 60 to 70 gallons a minute. And accounting for runoff events, the actual infiltration rate into that system on an average basis will likely be substantially less than 100 gallons a minute. So the mounding analysis that's been completed and described in the groundwater discharge permit application is really an extreme worst case type of analysis.

Q Mr. Donohue, in the mine permit, are there a number of water quality monitoring requirements -- I should say the mine permit and the groundwater discharge permit?

A Yes, there are. There is a whole host of different monitoring elements that have to be implemented for the project.

Q Could you review some of those elements that are in the permit condition?

A Yes. The monitoring plant elements that we have summarized up here include monitoring for the temporary development rock storage area, monitoring of the mine inflow rate and quality, monitoring of the contact water basins, monitoring of the performance of the wastewater treatment plant system itself. There's also groundwater quality monitoring around the development rock storage area, around the contact water basins, around the treated water infiltration basins, around

the non-contract water infiltration basins and around the underground mine itself.

In addition to that monitoring, there is also a regional groundwater elevation monitoring element that was included in the permit application and is also specified in the permit. There's also a regional surface water flow and quality monitoring element that was included in the permit application and has been specified in the permit. And then finally there's additional monitoring that has to be completed as it relates to wetlands and then other biological resources.

Q And can you tell us a little more specifically about the monitoring that's required relating to the TDRSA, Mr. Donohue?

A Yes. One of the conditions in the regulations is that the drainage system of the development rock storage area has to be designed to maintain a head or a water level on the liner of one foot or less. So the first element of the monitoring of the development rock storage area is continuous monitoring through pressure transducer in the collection sump to demonstrate that the head on the liner is less than one foot. That's specified in mine permit special condition F18. This aspect of the design, the ability for it to maintain a head of less than one foot, is also included in the design analysis in the permit application.

Mine permit special conditions F19 to F21 also require Kennecott to monitor the water quantity and the water quality in the leak detection system to assess the primary liner performance. As part of those special conditions, there's response actions that would be required if the leakage rate or sulfate concentrations in that water exceed specified threshold conditions. Mine permit special condition L13 specifically requires that the water quality from the TDRSA also be monitored.

Q And next, Mr. Donohue, would you give us a little more detail on the monitoring requirements for the mine water -- mine water inflow and quality?

A Yes. The mine water inflow will have to be monitored per special condition L20. And as contained in that condition, Kennecott will be required to monitor the water quality that comes out of the mine, not only the -- for a whole host of metals and anions, so sulfate, chloride, ammonia, nitrate, copper, nickel, zinc, cadmium, pretty much the whole gamut of metals that could possibly be experienced in the water -- in this system have to be monitored.

Q And that monitoring point, is that before it reports to the water treatment system?

A That would be before it reports to the contact water basins, that's correct. There is also a condition specified in mine permit special condition L18 for Kennecott to continue with

the geochemistry studies that have been initiated for the project. And those geochemistry studies will be -- will have to be conducted and will provide Kennecott with an assessment as to what the potential evolution of the water quality in the mine could be as their operations continue to progress into the future.

Finally the flow from the mine will have to be monitored per special condition L8.

Q And, Mr. Donohue, you mentioned or you discussed briefly earlier the additional groundwater quality monitoring that must take place under the permit conditions. Could you add a little more detail to those requirements, please?

A Sure. The groundwater quality monitoring will be conducted around the contact water storage basins, the TDRSA and the underground mine. The monitoring wells that have been installed around these -- or that will be installed and are included around the system, these facilities, are what are referred to in the regulations as compliance and leachate monitoring wells in the principal aquifer. And this is per Rule 425.406(5)(a) and (b). So we have as part of the groundwater monitoring elements around these principal facilities -- we have a series of groundwater quality monitoring points. In addition to that, we have monitoring points in the bedrock around the mine that will be used for monitoring the vertical gradients in the vicinity of the

mine during operations and after reclamation.

Q What's the purpose of that condition, Mr. Donohue?

A The purpose of that condition is the baseline monitoring that has been completed to date shows that there is no substantial vertical gradient in the bedrock.

Q What do you mean by "vertical gradient"?

A That is the pressure difference in -- groundwater pressure difference in the rock that will control the movement of water vertically. So if we see an upward gradient, that would mean you have upward movement. If you see downward gradient, that would mean you have downward movement. The monitoring that Kennecott has completed to date shows that there's no significant vertical gradient in the vicinity of the orebody.

Q And the purpose of this monitoring then is what?

A The purpose of the monitoring is to confirm that that condition remains like that after the mine is reclaimed. And we have contingencies in place, as we'll get to a little later here, that revolve around that monitoring element.

In addition to the monitoring points that Kennecott proposed in the permit application, the DEQ has also added additional monitoring points that Kennecott will have to install for groundwater quality monitoring. And those monitoring points that are conditioned in the -- additional monitoring points that are conditioned in the

permit are specified in permit condition L1 and include monitoring points down gradient of the non-contact water infiltration basins as well as special conditions L5, L6 and L7 which require, in essence, additional background groundwater quality monitoring points.

Q And these conditions you've been talking about are all in the mine permit; is that right?

A That's correct. And our next slide here will show, in essence, where these wells are. So again for orienta- --

Q Could you identify again the figure where it is and so forth?

A Okay. Sure. This is Figure 6-1 out of the mine permit application volume 1 and is also included in Intervenor Exhibit 1, Bates number 02334.

Q And then what does this show, Mr. Donohue?

A Here we'll describe the location of the various monitoring points that I just verbally described. So for orientation purposes here, we have the orebody. Over here (indicating) we have the development rock storage area and the contact water basins. Our -- we've got leachate wells here and compliance monitoring wells here, here and here (indicating).

Now, recall from one of the previous figures that we presented yesterday relative to the site location and comparison to groundwater movement, groundwater movement in

this region here is towards the northeast, thus we have our compliance monitoring points on the east side of the TDRSA. We also have groundwater monitoring wells for monitoring water quality on the east side of the contact water basins here. We have background monitoring points specified right here. And then when we get over to the mine site, we've got a series of groundwater quality monitoring wells located inside the likely compliance boundary, which is the footprint around the mine and the mine workings. These wells will be monitored for water quality on a prescribed basis, which is quarterly for a whole host of metals and anions, et cetera. And then we have our compliance monitoring points here, here, here around the mine.

In addition to the groundwater quality monitoring points, we have several nested piesometers in the bedrock located right here. And I believe there's another one right up here that will be used for monitoring those vertical gradients that we just previously discussed.

Now, as I mentioned, the DEQ, as part of the review of the project, added additional monitoring wells into the program. And those additional groundwater quality monitoring wells will be located up here north of the orebody. There's going to be another nest of wells that are installed here between the mine and the main facility. There's another nest of wells that they want installed over

in this region along the access road. And then as I mentioned they conditioned the permit on the installation of monitoring wells near the non-contact water infiltration basins. So we'll have wells over here, another set of wells up in here, and there will have to be another set of wells installed around the non-contact water infiltration basin over here at the backfill facility.

Q There was some testimony earlier, Mr. Donohue, about the direction of flow of water from the TWIS and some discussion about the location of wells in relation to that water flow. With the original monitoring locations and now with these additional monitoring locations that the DEQ has required, will there be monitoring wells located both down gradient, up gradient, side gradient from the TWIS?

A Yes, there will. And if we could advance a couple slides here -- next slide.

Q Identify the figure again, please?

A This is actually attachment IV out of the groundwater discharge permit itself.

Q What does this show?

A And this shows the location of the monitoring wells around the treated water infiltration system. So here's the buried piping right in this area (indicating). And per the rules, the wells have to be located within 150 feet of the infiltration system. So we've got, in essence, a fence of

wells around the infiltration system right here. These are down gradient of the infiltration system. Because based on the extensive watertable mapping that's been completed for the project, groundwater is flowing to the northeast. We have side gradient monitoring wells located to the southeast here, to the northwest here and then we have an up gradient -- immediately up gradient of the infiltration system another groundwater quality monitoring well located right there. As specified in the permit, there are background groundwater quality monitoring wells that are located right here and then over here as well.

Q Now, Mr. Donohue, would you discuss some additional features of the treated mine water monitoring requirements, please?

A Sure. Could we go back two slides? The treated mine water monitoring will consist of several elements. First -- the first element is continuous monitoring of specific conductance. Specific conductance is an indicator parameter for the level of dissolved metals and ions in the water. So as I mentioned previously, we'll be precipitating out -- the metals out of the water and we'll be removing the metals and other ions from the water through the reverse osmosis system and other treatment technologies.

Q I'm sorry. Is this monitoring and testing of the water coming out of the water treatment system and before it reports to the TWIS?

A Yes; yes, it is. So the specific conductance will give us an indication of the ongoing performance of the treatment system. If any one of the -- any one of the components of the treatment system failed and we would get a spike in metals or ions in the water, we would see that in the monitoring of specific conductance unless the DEQ has conditioned the permit on continuous monitoring of that data and reporting it to the DEQ. And that's specified in groundwater discharge permit conditions 1 and 2. It's also specified in mine permit special condition L16.

In addition to the continuous monitoring of the specific conductance, Kennecott will also be required to monitor the effluent on initially a daily basis for the first 90 days of operation and then on a weekly basis for a whole host of metals and anions with specific standards attached to the effluent. So this again is before the effluent leaves the water treatment facility and is discharged into the treated water infiltration system.

The daily and weekly monitoring is conditioned in groundwater discharge permit conditions 1 and 2 and requires monitoring for pH, arsenic, boron, cadmium, copper, low-level mercury, selenium and silver. The data has to be reported to the DEQ on a monthly basis.

Q Now, I believe -- I wanted to ask you some additional questions about the TWIS monitoring, but I think we've

already probably covered the location of the monitoring points. But would you explain what the -- how the permitted application rate equates to the mine water inflow rate, please?

A Sure. The permitted application rate is for 504,000 gallons per day. This equates to the design capacity of the water treatment system. And in comparison, that compares to an expected mine inflow rate of around 60 to 70 gallons a minute. So the permitted application rate is -- again is based on the capacity of the system. And we need that capacity to accommodate some of those peak storm water events that are going to run off into the contact water basis during operations.

We described, I think, on the previous figures the groundwater monitoring points that are going to be in effect fo this system. And we won't go back over that. But I do want to point out that the standards that will be applied to those wells include specific numeric standards that have been developed in accordance with Part 22 groundwater quality standards development. Those will be applied at the monitoring points. And the include standards for things like ammonia, nitrate, pH, sulfate, chloride, sodium, antimony, arsenic, betaine, beryllium, boron, cadmium, chromium, cobalt, copper, lead, lithium, manganese, maritinum, nickel, selenium, silver, strontium, thallium,

vadium (phonetic) and zinc.

Q It just rolls off your tongue, Mr. Donohue. I don't think I could do that. Next, Mr. Donohue, would you give us an overview of what you referred to earlier as the regional groundwater elevation monitoring requirements?

A Sure. If we could go one more slide back. Thank you. The regional groundwater elevation monitoring will consist of monitoring -- what we're doing here is just what it says. We're doing a broad regional monitoring of the groundwater system, the groundwater elevation, so that we can assess whether there's changes in the groundwater hydrology on a regional scale due to the operations of this mine.

It also includes a wetland monitoring component that consists of continuous monitoring at specified wells 23-B, 24-A, 44-B, 64, 65 and 66. The location of these wells right here that will be continuously monitored are -- were shown on the previous figure that then displayed the monitoring that would occur around the orebody.

In addition to that, Kennecott will be required to implement monthly monitoring at specified wetland monitoring wells WLD-025 to 028. We'll look at the location of these wells in a minute. They are located in the wetland areas immediately in the vicinity of the orebody itself. In addition to that specifically wetland monitoring component -- and here we're monitoring, in essence, the

hydrology, there's also a condition in the permit for Kennecott to monitor quarterly water levels in other wetlands that are more distant from the underground mining operation. These various monitoring conditions are specified -- well, first of all, they were -- most of them were included in the application itself, and then they were modified in the condition in the permit as a specified in mine special permit conditions L4A, L4B, L26 and L38.

Q In addition to these elevation monitoring requirements as they relate to the wetlands, are there also other monitoring requirements for other parameters other than water level that relate to the wetland?

A Without --

Q Do they include, for instance, an annual visual assessment?

A Yes. Before we get to that component, could I just show the distribution of the monitoring wells on these next slides?

Q Oh, sure. Please do. Yes. I'm sorry.

A Okay. This figure here which is Figure 6-3 out of the mine permit application volume 1 and is also Exhibit 1, Bates number 02336, shows the regional groundwater monitoring well network that I just described. So here we have the main mine site. Here we have the backfill facility. Here's the orebody. And all these dots around here are monitoring wells that Kennecott will monitor for groundwater elevation to map the potential changes in the groundwater system

during operations.

Q It's kind of hard to see the dots from here, Mr. Donohue. Could you --

A So we've got a dot there (indicating), there, there, there, right there.

Q Are you pointing to various dots?

A I am pointing to various dots. Up here, here, here (indicating). So it covers a very large area. The next figure shows the location of the wetland monitoring wells that I previously described. The ones that will be monitored --

Q Could you identify the figure, please, Mr. Donohue?

A Oh, I'm sorry. This is Figure 6-5 out of volume 1 of the mine permit application. And it's also included in Intervenor Exhibit 1, Bates number 02338. So here just for orientation purposes, we have the Triple A Road. We have the main mine site, backfill facility, orebody. These wells located here on the southeast side of the orebody, this one located right here on the west side and these two on the northwest side are all installed in the wetlands that have been mapped around the project. These will be monitored on a weekly basis for groundwater levels. These other wetland wells located right here further west of the orebody and these wetland wells located down here further south of the orebody will be monitored for water levels on a quarterly

basis.

Q And does that take us to the topic of additional wetlands monitoring requirements?

A Yes.

Q Would you please explain those requirements, Mr. Donohue?

A Sure. The wetland monitoring program also consists of an annual visual assessment of the wetlands per what was described in the permit application and as condition in the mine permit special condition L37 and L38. In addition to the annual visual assessment, there is also a -- in essence, a performance standard that has been written into the permit as specified in mine permit special condition L.4c. In essence, what that condition says it that, if Kennecott measure drawdown in excess of 6 inches based on -- in excess of 6 inches below pre-mine baseline conditions that have been documented in the wetlands, that they have to increase the wetland -- the monitoring in those wetland wells from a monthly basis to a weekly basis for a period of one month.

The next part of the condition says that, if after four weeks of weekly monitoring the water levels in the wells remain more than 6 inches below pre-mine baseline minimums, additional monitoring and/or mitigation measures shall be implemented as approved by the Department. The additional monitoring that could take place based on this permit condition could range from more intense monitoring of

specific plant species in the wetland to assess whether an impact has actually taken place relative to the potential changes in hydrology. It could consist of more groundwater monitoring points such as additional wells to further map the potential drawdown area and give insight into the area of effect due to the drawdown. As for mitigation, the mitigation measures that could be implemented would obviously be things to control water inflow into the mine. Why would Kennecott want to do that? One, to minimize the impact on the wetland and also because pumping water out of the mine up to the contact water basins utilizes energy. And so anything that Kennecott can do to control the amount of water that they pump up to the mine reduces their energy consumption, which makes the overall operation more economical.

Water inflow control can be achieved through standard practices that include grouting, which is drilling holes into the rock around the mine openings and injecting things like Portland cement, et cetera, very standard-type technology that's used in mining operations and other civil engineering projects involving tunneling. Other mitigation measures that could be employed could consist of water addition to the wetland during critical periods for mitigating impacts on specific wetland areas and specific vegetation.

Q Is there also an element of biological monitoring required, Mr. Donohue?

A Yes, there is additional biological monitoring that will be required. And this figure did not show up too well. I apologize. But this is Figure 6-6 out of the mine permit application and is also included in Intervenor Exhibit 1, Bates number 02339. What this figure shows is the location of proposed aquatic monitoring stations that will be monitored during the operations and were also monitored as part of the baseline studies. We got monitoring points -- just for reference purposes, the main mine site is right here. The orebody is right here. We've got aquatic monitoring stations located south of the orebody on the Salmon Trout River, so this would be upstream. We've got aquatic monitoring stations specified directly in the vicinity of the orebody. There's monitoring stations specified at the -- where the Salmon Trout River flows underneath the Triple A Road, and then other monitoring stations further downstream north of the Triple A Road. Kennecott will also be monitoring aquatic stations on the Yellow Dog River south of the mine site and in the background watershed on Cedar Creek located up here (indicating). These monitoring stations were specified in the permit application. As part of the review of the application the DEQ had also specified additional aquatic

monitoring stations located on the tributary system of the east branch of the Salmon Trout River. I believe there were three additional stations that they conditioned in the permit that are located northeast of the main mine site. And they also specified that, at these aquatic monitoring stations, that tissue analysis on the fish has to be conducted and that those tissues have to be analyzed for various parameters.

Q What about flora and fauna monitoring?

A There is also a flora and fauna monitoring component to the monitoring plan. And that is summarized in this figure, which is Figure 6-4 out of volume 1 of the mine permit application. And this is also included in Intervenor Exhibit 1, Bates number 02337. And just for orientation purposes, let me describe the facilities again. We've got the main mine site right here (indicating). We've got the backfill facility over here. And here is the underground orebody.

Q What does the red line outline?

A The red line here outlines Kennecott Eagle Minerals Company property. So everything inside this line is property that's owned by Kennecott Eagle Minerals Company. These transects here represent transects that were established as part of the baseline studies to assess wildlife and other -- and vegetation and things of that nature. These transects will

continue to be monitored as part of the flora and fauna monitoring that's conditioned in the permit. We have other stations here located here.

Q How are they designated on the figure, Mr. Donohue?

A Frog sampling stations.

Q No. I mean, how are they labeled? I see a little white bar there and then I see numbers.

A These are transect numbers and monitoring stations. There are monitoring stations for assessing the frog population. And these red dots here that you see also represent the location of colonies of a plant called the narrow leaf gentian, which is a listed species. Those colonies will be assessed as part of the monitoring that is required for the permit. It's worth mentioning that the narrow leaf gentians colonies that were observed here have also been documented at other locations around the Yellow Dog Plains, and that information has been included in the permit application.

Q Are there other monitoring components requirements as to erosion control and storm water, Mr. Donohue?

A Yes. As specified in the permit application and as conditioned in the permit itself, Kennecott will be required to implement erosion control inspections during major storm events and then also monitor water quality for any discharge that occurs from the non-contact water infiltration basins. And that would be surface discharge from those basins.

Q Will there be an additional -- what is it? -- sedimentation and erosion control permit required?
A Yes. That permit has been applied for to Marquette County and Kennecott has that permit.
Q And next, if we could, I'd ask you for a little more detail as to the reclamation plan, Mr. Donohue?
A Sure. The surface reclamation plan -- or the reclamation plan consists of a number of components. First there's surface reclamation and then there's underground reclamation. And then there's monitoring and there's also a contingency plan element to the reclaimed mine site. The surface reclamation will consist of totally reclaiming the surface, so all the buildings will be removed. The excavations that were made for the development rock storage area, the contact water basins, the non-contact water infiltration basins, those will all be filled back in. The site will be re-graded to approximately pre-mine conditions. And then the entire area will be re-vegetated per vegetation seeding guide that's included in the permit application. As for the materials that are removed from the site, those will be disposed of. The underground mine reclamation will consist of removing the equipment, sealing various mine closures.
Q How will that be done?
A For instance, the vertical raise, the ventilation raise, if

you will, will be filled with aggregate. And where that raises crosses the transition zone between the lower bedrock and the upper bedrock there will be a concrete plug placed in the hole there. And then as we get up to the surface, there will be other -- as we move above that point, then additional gravel, aggregate will be placed in it. And as we get up towards the top of the bedrock into the glacial system, there will be additional concrete placement there to seal that vertical raise up. And I believe we have a diagram that'll come up later up later here in the presentation that will show the distribution of those sealing features. So we'll seal various mining closures up. And we'll show those on a figure here shortly.

Another element of the reclamation plan for the underground mine is accelerated re-flooding. Kennecott will pump water into the mine at the time of reclamation to accelerate the filling of the mine to reduce the exposure of the underground workings to oxygen and cut off the oxidation processes that can lead to the acid rock drainage conditions that have been discussed previously in the hearing here.

In addition to the basic reclamation efforts that will be initiated at the time of reclamation, once reclamation is complete, Kennecott will continue on with the groundwater quality and gradient monitoring program around the orebody as well as the surface water flow and quality

monitoring program. Those elements are required to remain in place for a period of 20 years after reclamation of the site.

Now, as I mentioned, the reclamation plan also contains a contingency that is -- consists of several elements. As I mentioned before, the baseline data that's been collected on vertical gradients shows that there is no upward gradient from the bedrock into the glacial system. And that condition would have to exist if there was going to be the potential for contaminants to move up out of the mine into the aquifer after reclamation. So what Kennecott will do after reclamation is monitor groundwater quality in the mine workings to assess what the concentrations of constituents are in the water after reclamation is complete. They will also monitor the vertical gradients in the bedrock piesometers that are nested around the orebody. If the gradients and the water quality based on that monitoring indicate a potential for upward migration of contaminants and contamination of the glacial aquifer, Kennecott will implement flushing of the open workings and treatment of that water at the wastewater treatment plant. As I mentioned previously in the discussion when we talked about the construction time line, the wastewater treatment plant will remain at the site after reclamation for a period of time to be available to implement this contingency. And

what would happen is that water would be pumped out of the mine workings. It will be pumped into the water treatment system, and then that clean water would be flushed back through those open workings to flush that -- flush those contaminants out until we got to a point where we have conditions in the mine workings that would be protective of the -- of the aquifer. It bears to reiterate that this is a contingency based on having a contingency that has to be implemented into the application per what's required in the Part 632 statute and rules. This plan is also adaptable to the actual observed conditions that will be documented in the mine at the time of reclamation. So we've got a plan that will be implemented in concept and will be tailored to the actual conditions that are documented in the underground mine during operations.

Q Is there also a financial assurance requirement in the permit?

A Yes.

Q Oh, I'm sorry. Did you want to explain this figure first?

A Sure. This is -- this is the figure that shows where the various sealing will take place in the underground mine. First of all, the portal will be sealed.

MR. HAYNES: Excuse me. Just for the record, which figure are we talking about here?

THE WITNESS: Oh, I'm sorry.

A This is Figure 7-2 from Exhibit 17, Bates number 178362. Figure 7-2 was included in the response to comments document from October 2006. And I believe it's included in attachment 2, but I'd have to verify that when I look at the document here. So first of all, the portal will be sealed with a concrete plug. Where the decline transitions from the upper bedrock to the lower bedrock will also be sealed with a concrete plug. Here we show these vertical raises going to the aggregate borehole and the main ventilation raise. These will be initially filled with gravel. And then where those raises transition from the upper bedrock to the lower bedrock, there will be a concrete plug put in there. And where they go from the upper bedrock into the glacial system, they'll also be filled with concrete. These vertical raises over here, right now this region of the mine actually could not be developed per the permit condition that's been specified in the permit. So Kennecott will monitor the open drifts that are left in place. These are the open drifts on the north side of the orebody. Kennecott will monitor those for water quality. They'll monitor the vertical gradients. And then based on the data, if the data shows that that's needed, the water treatment system will be available to address that condition.

MR. LEWIS: I don't believe in the earlier proceedings the mine permit application -- groundwater

discharge permit application materials were offered and admitted I think subject to perhaps some objection. I don't believe that the response to the MDEQ comments has been offered. And I'd like to offer that at this time. That's Intervenor Exhibit Number 17.

MR. HAYNES: I thought those had already been offered and, in fact, stipulated to subject to our reservation that the documents are admitted only for purposes of showing they were filed with the DEQ. I thought all that stuff was in already.

MR. LEWIS: I'm not just sure about those responses, Mr. Haynes.

MR. HAYNES: Maybe not the responses, but same objection or same qualification on the admission of the responses. But other than that, I have no objection.

MR. WALLACE: No objection subject to that.

MR. REICHEL: No objection, Judge.

JUDGE PATTERSON: Okay. I was just checking to see if they have been entered and I don't see that they have been so --

MR. HAYNES: And just for the record, the responses are Kennecott Exhibit 17; is that right?

MR. LEWIS: Yes.

MR. REICHEL: Counsel, I understand that these -- the testimony to be that this was part of a document

submitted by Kennecott to the DEQ in October 2006 responding to some comments on the mine permit application, the questions raised by the DEQ?

MR. LEWIS: That's right.

JUDGE PATTERSON: They will be entered.

(Intervenor's Exhibit 17 received)

Q Now, Mr. Donohue, I think we're ready to turn to the financial assurance requirement. Could you please explain that?

A Yes. The total financial assurance as specified in the mine permit application is for $17 million. Actually, this is specified in the permit itself. The permit application as originally submitted had a financial assurance estimate of I believe it was about 11 or $12 million. As part of the review process, the DEQ increased that substantially to $17 million. And what that covers is the estimated reclamation costs, cost for MDEQ administrative oversight, costs for environmental contingencies, and then operating costs to cover certain things like operations of the waste water treatment system.

Q Now, earlier you discussed elements of the contingency plan as it pertained to the -- I believe the TDRSA. Are there other elements of the contingency plan that we have not yet discussed?

A Yes. Per the statute and the regulations, the applicant is

required to submit a contingency plan. And that is included in I believe it's section eight of the -- I can verify that -- section eight of volume one of the mine permit application. And that addresses a range of things that are required by the rules, including the release of toxic and acid chemicals from the site, contingencies for explosives, contingencies for fuel storage, fires, waste water collection and treatment, berm failures, air emissions, spills of hazardous substances, other natural risks such as tornadoes, things like that, power disruptions, unplanned subsidence, containment, system leaks and emergency procedures and testing of the plan itself. So that's been filed with the department and will be periodically updated per the requirements of the code and as required in the permit itself.

Q Now, Mr. Donohue, could you describe the work that has been done in the various elements of the environmental impact assessment?

A Yes. The environmental impact assessment is contained in volume two of the mine permit application and addressed a number of resource topics, including topography and drainage, soils, geology and hydrology, including potential changes to groundwater elevations and quality, potential changes to surface water flow and quality, potential for subsidence. It addressed potential impacts on water supply

wells due to issues such as things like drawdown. It addressed potential impacts to wetlands due to surface facility construction, due to drawdown of the water table. It looked at impacts to terrestrial biology, plants and wildlife due to operations of the mine. It looked at potential impacts to threatened and endangered and special concern species. We mentioned before the narrow leaf gentian is located in some of the wetland areas. The potential impact due to mine drawdown on that particular species was assessed. We looked at invasive species. We looked at potential impacts to natural and wild and scenic rivers as prescribed by the rules. The EIA looked at potential impact to public and private buildings, public infrastructure, state and federal wilderness areas, research and recreational areas; looked at potential impacts to land use; looked at potential impacts to aquatic resources due to changes in potential stream flow; looked at impacts to air quality due to emissions from the facility. And finally, it also examined aesthetics.

Q And was there also an examination of and consideration of potentially effected areas, Mr. Donohue?

A Yes. The EIA did assess potentially effected areas due to physical alteration of the landscape and alteration of surface water runoff. This impact is limited to approximately 92 acres in the watersheds of, as we described

earlier on, the watersheds of the Salmon Trout River and the Yellow Dog River. Those watersheds are very substantial and cover tens of square miles.

We also looked at the potential effected area for groundwater and surface water which is primarily constrained to the Salmon Trout River watershed and Yellow Dog River watershed south of the mine site. In particular, the watersheds or the subwatersheds that in groundwater basins of the Main Branch and the East Branch of the Salmon Trout River are really the areas of -- the areas that cover the area of potential effect due to groundwater changes, potential groundwater chemistry changes, and also potential changes in surface water flow. So the study area -- in essence what I'm saying is, the study area for groundwater and surface water encompassed an area that is greater than the area of potential effect for those resources.

The potentially effected area for wetlands is really constrained by the potential drawdown and drawdown-related impacts to a narrow strip of wetlands over the mine on land that is owned by Kennecott. The potentially effected area for terrestrial wildlife and plants is primarily the construct footprint in a heavily logged area where there are no listed species in that area, and then also in some cases due to the drawdown that may occur due to the mine, for instance, the narrow leaf

gentian. Next slide.

The potentially effected area for aquatics is tied to the potential for hydrologic changes in the Main Branch and the East Branch of the Salmon Trout River. That includes both stream flow and water quality. The potentially effected area for air quality is limited to the fence boundary in compliance with national ambient air quality standards. As we assessed this issue, we looked at emission control units consisting of SCR's, or selective catalytic reduction units, that are going to be applied to the generators at the site for the control of NOx. We considered also the bag houses, the bin vents, for control of particulate matter from the ore crushing and the ore storage facilities. We also looked at the fact that relative to metals emissions, which we've heard a lot about in the hearing here, when you look at the metals emissions from this project, it constitutes a minor source. And based on those criteria that we're dealing with a minor source here based on relative to a metals emissions, and based on the air dispersion analysis that was completed for the air permit application which demonstrated compliance with national ambient air quality standards, it was deemed not necessary to do further deposition analysis as part of the EIA.

The potentially effected area for archeological

and cultural sites is limited to a small project footprint where based on extensive testing there has been no uncovered evidence of any kind of archeological use of the area where the construction is planned. There are no federal, state or listed areas downgradient of the mine site. And as for aesthetics, there's the potential to see the ventilation air raise from surrounding vantage points. Lights at the facility will be constructed with light shrouds. Local sound impacts from the crushing operation in an enclosed building are certainly possible when you're standing out on the Yellow Dog Plains. And initially people will hear several controlled blasts each day as the portal is initially developed.

Q Were you also required to consider alternatives as part of the permitting process, Mr. Donohue?

A Yes. There is an alternatives analysis that was completed for the project. And that is contained, I believe, in section four of the environmental impact assessment that is provided in volume two of the mine permit application. And the alternatives analysis looked at a variety of alternatives, including the mining method, whether the mine is constructed via underground or open pit mining methods. And underground mining was determined to be less intrusive than an open pit in this area.

The alternatives analysis looked at ore processing

and did not elect to construct a mill site in this greenfield area, and instead shipped the ore offsite for further processing. Thus, the operation is limited to in essence an ore extraction, an ore storage and a crushing operation, and then transfer of that material offsite. As for the transportation of the material offsite, we also looked at how that would be done; would there be a rail line that would be constructed into the site or would it use existing public highways and transportation systems. The construction of a rail line into the site was determined to be more intrusive in our assessment as opposed to using existing infrastructure. As for power supply, the permit as it is -- and the mine permit and the air permit as it was originally submitted called for the utilization of generators for power supply, generators that would burn diesel facility for power supply of the operation.

The alternatives analysis did look at potential upgrades of the power line going up to Big Bay and utilization of the power grid -- or the alternatives analysis looked at the utilization of the power line that goes up to Big Bay tying into that at the time the application was prepared. However, the condition of that line at that time was not suitable for tying into and utilization for this particular project. Since that time, Kennecott has had discussions with the local power co-op and

apparently there has been an agreement reached to upgrade that line which may prove -- be useful for the power co-op to run a power line in along the existing right-of-way of the transportation infrastructure to the site that would allow Kennecott to tie into that power system. What that would mean for the project is that one of the emission sources for air emissions would be taken away from the site.

Q That being the generators, the diesel generators?

A That being the diesel generators; correct. As for the transportation routes, Kennecott is working with the Marquette County Road Commission to upgrade portions of the Yellow Dog -- or the Triple A Road to improve the road base there and improve runoff that currently is occurring and erosion that is occurring on that road.

The project site location was also evaluated. And we looked at a number of different locations, obviously the one that is included in the permit application. That one was selected based on its distance from the Salmon Trout River, its screening by the outcrop, the location of it relative to a portal that provides a safe means of entry into the orebody and also due to its avoidance from construction in wetland areas and also its occurrence in a clearcut area. So all of those factors factored into the selection of that site for the construction of the surface facilities.

The alternatives analysis also looked at waste water treatment and discharge alternatives, whether it's discharged into the groundwater system or discharged as a point source into a surface water system. The infiltration of the water back into the groundwater system in essence puts the water back where it came from. And it also eliminates a direct discharge to surface water that can result in certain thermal impacts and local alteration of the aquatic environment where that discharge takes place.

Q Mr. Donohue, we talked yesterday at the beginning of your testimony about your experience and background, not only in hydrology but in the mining industry in the area of regulations and permitting processes and so forth. And we talked about your experience in doing the kind of studies that you've done for the Kennecott project, also on other mining projects. Based on that background and based on your experience that you've just summarized in the Kennecott project, how would you characterize the quantity and quality of the background studies and the characterization that has been done for this project?

A I would say that the quality of the background studies that have been done for this project are of a very high quality. They represent a very significant and substantial effort on the part of Kennecott and the professionals that have worked on those various reports that culminated in this series of

applications.

Q And how would you characterize the compliance by Kennecott with all of the applicable application and permitting requirements?

MR. HAYNES: Objection; calls for conclusions of law from this witness. He's not qualified to assess whether or not the application complies with the statute.

MR. LEWIS: Well, I think he certainly is. He's testified at great length that that was part of his job to insure that the application materials complied with the statutory and regulatory requirements. He's also testified that he's had exactly that task in connection with other mining projects. So I think he's certainly qualified to let this court know how he would characterize the degree of compliance with those regulatory application and permitting requirements for this project.

JUDGE PATTERSON: I'll allow him to answer.

A I believe that Kennecott, one, they put forth a substantial effort to comply with those statues with those requirements that are in the code. They put forth a very exhaustive effort to do so. And based on all of the work that's been done that I've been involved in -- and it's been quite extensive -- I believe that they do comply with the requirements of Part 632 and the requirements of Part 31.

Q And again, based on your experience in this industry in

doing this kind of work for other mines and based on your now years of working with Kennecott and Kennecott officials in the permitting application process for this mine, how would you characterize Kennecott's commitment to design, operate and reclaim this mine project so to minimize potential impacts to the environment?

A I think their commitment is of the highest level. I've worked with them on this project for four years. I've worked with them on other projects over the last decade. And my experience with them has been that they not only go forth and put forth a very serious effort to comply with the permits that they have to operate under, but will go the extra yard and be proactive with regards to the addressing of the conditions that are in those permits.

MR. LEWIS: Your Honor, I neglected earlier on the Exhibit 17, that's the response to the DEQ questions, we apparently did not list the various attachments to that document in that exhibit. I'd like to identify those for the record and offer them. The attachments to that Exhibit 17, response to the MDEQ comments, include Intervenor Exhibit 18, 19, 20, 21, 22, 23, 24, 25. And that's the end of that list.

MR. HAYNES: Subject to the earlier qualification, I don't have any objection to their admission. And I'd note for the record that these are also DEQ Exhibits 69, 70, 71

and 72.

JUDGE PATTERSON: Okay.

MR. REICHEL: I believe that's correct. And no objection.

MR. EGGAN: I agree, Your Honor.

MR. WALLACE: Agreed.

JUDGE PATTERSON: Thank you.

(Intervenor's Exhibits 18 through 25 received)

MR. LEWIS: That's all I have for the direct examination.

JUDGE PATTERSON: Do you want to take a break before? These demonstratives, are those going to be in the record or offered?

MR. LEWIS: I will offer them, Your Honor.

JUDGE PATTERSON: Just it would be helpful for me. It's kind of a nice outline --

MR. LEWIS: Sure; sure. We'd be very happy to do that.

JUDGE PATTERSON: -- what happened, unless there's some serious objection.

MR. LEWIS: I'll offer them as a so-called demonstrative.

MR. HAYNES: No objection as demonstrative exhibits.

JUDGE PATTERSON: Okay.

MR. REICHEL: No objection.

MR. EGGAN: Well, I guess I would have an objection, Your Honor. My concern is we offered or presented a series of what our witnesses had as conclusions, and did not offer them either as exhibits or demonstratives. And my concern is that this outline, extremely self-serving, is going to go into the record now as some sort of exhibit or something. And I'm concerned about it.

JUDGE PATTERSON: Well, my intention isn't to make it part of the record. And if you want to offer, you know, those summaries, I think my notes on those are pretty good. I didn't track this as well. You're talking about the conclusions of your --

MR. EGGAN: Yes; yes.

JUDGE PATTERSON: -- by the summaries? Those would be helpful too, if you want to just make those available, I guess, is what I'm saying.

MR. PREDKO: Your Honor, I do believe, although Mr. Eggan may not have entered his witness' outlines, Mr. Dykema and Mr. Wallace did for their witnesses. And they were entered as demonstratives.

JUDGE PATTERSON: Were they? Okay. Then forget it.

MR. LEWIS: We'll prepare that package for you, Your Honor.

JUDGE PATTERSON: Okay.

MR. EGGAN: Is it admitted over objection?

JUDGE PATTERSON: I don't know if "admitted" is the right term. I would just like to have them available for my use.

MR. EGGAN: Well, it seems to me that, if they're going to be available for your use and you're going to be relying on them, then they are in essence an objection.

JUDGE PATTERSON: Well, they should be admitted as demonstrative exhibits, not as substantive.

MR. EGGAN: Understood.

JUDGE PATTERSON: Okay.

MR. EGGAN: And I would maintain my objection, but it sounds like you're going to --

JUDGE PATTERSON: By admitting them as I am, I'm not implying and vouching for any of it. It's something -- frankly, it's just a nice outline of what occurred and what is contained in these voluminous documents. It will make it easier for me to work through that, I think, when I write the PFD.

MR. EGGAN: I understand.

JUDGE PATTERSON: But that's all. Okay. Let's take a break.

MR. LEWIS: Thank you, Your Honor.

(Off the record)

(Intervenor's Exhibit 611 received)

MR. REICHEL: At this time, Judge, I have no questions of this witness. I reserve the right to, depending on the cross-examination, to redirect.

JUDGE PATTERSON: Okay. Mr. Haynes, I understand you're leading off.

MR. HAYNES: I guess I get to go first, Your Honor. Thank you. Good morning, Mr. Donohue. My name is Jeff Haynes. I represent the National Wildlife Federation and the Yellow Dog Watershed Preserve.

THE WITNESS: Good morning.

CROSS-EXAMINATION

BY MR. HAYNES:

Q Your experience with the mining industry before the Kennecott -- before this proposal that we're talking about in this hearing involves two mines -- is that right? -- the Flambeau Mine and the Crandon Mine?

A Those are, yes, permitting of major mining operations. that's correct.

Q And the Flambeau Mine, you weren't involved in the permitting, were you?

A I was not involved in the permitting of that project, no. I was involved in the operations and activities that started after operations.

Q For instance, the so-called closure of the mine; correct?

A Correct.
Q All right. So for your experience in permitting mines, you have one mine that you've worked on -- correct? -- for Crandon Mine?
A That's correct.
Q And that was never permitted?
A That's correct.
Q And was over a ten-year period; correct?
A That's correct.
Q So you've never actually seen a mine gone -- go from a proposal to actual operation?
A That I've personally been involved in?
Q That's correct; you.
A That's correct.
Q You're not an engineer, are you, sir?
A No.
Q You don't have any particular expertise in geology, do you?
A Certainly in hydro geology, yes.
Q Hydro geology, but not rock mechanics?
A No.
Q You don't have any particular expertise in structural geology?
A No.
Q And I think you've been here almost every day during this hearing, haven't you?

A That's correct.
Q So you heard the testimony of Dr. Bjornerud, did you not?
A That's correct.
Q And so when I say "structural geology," you understand that's what she was talking about?
A That's correct.
Q Mr. Donohue, you have -- during your direct examination you talked about the various work you've done for various mining concerns and municipal concerns. Have you ever worked for a state government?
A Have I ever worked?
Q Worked as a, you know -- as a contractor for a state government on any projects?
A I think I may have worked on one contract for the Wisconsin DNR possibly.
Q And what did that involve?
A Boy, it was --
Q A long time ago?
A It was a long time ago, yeah.
Q Perhaps something to do with site remediation?
A I'm not recalling anything in particular.
Q All right. Have you ever -- have you personally ever worked for any environmental group such as the National Wildlife Federation or the Sierra Club or Natural Resources Defense Council or the Environmental Defense Fund?

A No.
Q Has your firm ever worked for such groups?
A Not that I'm aware of.
Q So your experience has been with the regulated community, for lack of a better phrase?
A That's correct.
Q Mr. Donohue, you discussed the Kennecott Exhibits 601 with three photographs of the Flambeau Mine. Do you recall that discussion?
A That's correct.
Q And the Flambeau Mine was an open pit mine; correct?
A That is correct.
Q It was not an underground mine such as the proposed Eagle Mine; correct?
A That is correct.
Q It did not have a crown pillar like the proposed Eagle Mine will have, did it?
A That is correct.
Q How deep did the Flambeau Mine pit go?
A It was approximately 300 feet at its deepest point, which was about 140 feet from the edge of the Flambeau River.
Q And what's the depth, the proposed depth, of the proposed Eagle Mine?
A It's much more substantial than that.
Q Can you give us a number in feet?

A It goes down approximately to 143 meters, and the surface elevation is probably around 450 meters or so. So it's quite deep.
Q Okay. Sorry. I don't -- I don't have the --
A It's about 1,000 feet deep.
Q It's 1,000 feet from the surface to the bottom of the mine?
A That's correct.
Q All right. And the depth of the mine from the bottom of a mine to the height of the proposed -- excuse me. The bottom of the proposed -- newly proposed crown pillar is how many feet, approximately?
A Well, that would be the bottom elevation of the mine is about 143 meters and it's permitted to go up to 327 meters. So the difference between that and the -- and convert that into feet, you're probably dealing with -- but you want me to do the math. I could do the math.
Q Yeah. Could you, please?
A Sure.
Q I count that as about 180 meters; is that right?
A Let me just verify that. That's about 80 meters. That's correct.
Q 80 or 180?
A 180.
Q Which translates into about how many feet?
A 180 times three, that would be -- I'd have to look back at a

diagram to make sure I'm doing my math right here.

Q Well, I understand.

A If I could --

Q Sure. We'll pull one up for you. I don't have quite the faculty that you do to look at these exhibits, so you'll have to bear with me.

MR. HAYNES: Could we look at DEQ Exhibit 25, page 35? I'm sorry. That's another question. Page 54.

Q Mr. Donohue, we're looking at Illustration 4-2 of the mine permit application; is that correct?

A Uh-huh (affirmative).

Q "Yes"?

A That's correct.

Q And the bottom elevation appears to be 143 meters; is that right?

A That is correct.

Q And as you say, the current permitted height of the mine is 327.5 meters, which is about 180 meters, which translates into how many feet? About 500?

A Can you repeat the question again?

Q Sure. Sorry. I was going a little fast. I understand. The bottom level of the mine is 143 meters; correct?

A 143 meters; that's correct.

Q And the top elevation now for the mine permitted is 327.5 meters; correct?

A That's correct.
Q So if we look on Illustration 4-2, we see along the right-hand side levels expressed in meters. And if we go up to the third from the top it says, "Level three 323 meters." Do you see that?
A That's correct.
Q So the current permitted height of the mine is just a little bit above that; correct?
A That's correct.
Q So that's about 180 meters; right?
A Yes.
Q All right. And a meter is about 3.3 feet; correct?
A That's correct.
Q And so what's the height in feet again? If we do 180 times 3.3?
A 180 times three, if we just round?
Q Well, let's not round. Let's say 3.3.
A Okay. Well, it's going to be roughly 360 feet, a little more counting for the decimal place.
Q I'm sorry. 180 times 3.3?
A 180 times three is going to be 360 feet.
Q That sounds like times two.
A 180 times three is going to be 540 feet.
Q All right. And just humor me for a moment. Let's multiply 180 times 3.3, which is more accurately -- that's a more

accurate management of what a meter is, isn't it?
A That's correct.
Q Okay. Let's try that.
A Okay.
MR. LEWIS: I think he's using a pencil rather than a calculator.
Q Oh, I'm sorry. I thought you had a calculator there.
A No, I don't.
Q Oh, I apologize.
JUDGE PATTERSON: I did, too.
Q We saw you figuring, Mr. Donohue. We thought you were punching things into the calculator.
A No. I'm doing it on a piece of paper.
Q No wonder you're using three instead of 3.3. I apologize. You're doing this by long multiplication in a land of calculators.
JUDGE PATTERSON: We all went to law school because there wasn't any math.
A It comes out to be approximately 594 feet.
Q All right. Give or take, 600 feet?
A Uh-huh (affirmative).
Q Can we call it 600 feet?
A That's fine.
Q All right. Thank you. So the depth of the underground workings at the proposed Eagle Mine will be about 600 feet

bottom to top; correct?

A Bottom to top; correct?

Q Under the current --

JUDGE PATTERSON: As permitted.

MR. HAYNES: As permitted; right.

A That's correct.

Q Now, Mr. Donohue, you spoke about the original permit application that proposed going beyond this 327.5 meter level and it goes -- in this Illustration 4-2 it goes up to 383 meters; correct?

A That's correct.

Q That was the top of the mine as originally proposed; correct?

A That was what was described in the permit application as the potential ultimate mine plan.

Q All right. Now, the permit allows Kennecott to mine up to 327.5 meters. But to your knowledge, Kennecott has not abandoned the idea of going above that level, has it?

A Can you -- how do you mean "abandoned"?

Q Well, the permit says you're allowed to go up to 327.5 meters; correct?

A That's correct.

Q All right. And to your knowledge, is Kennecott going to stop there forever? They're going to just stop there and say, "That's it. We're not going to go above that level"?

A Well, I think per the conditions of the permit they are going to collect additional geotechnical and hydrogeologic data underground, and they will evaluate that data. And number one, first and foremost, if they determine that they can safely do it, they will then consider going back to the DEQ and looking for the authorization to potentially mine that.

Q So getting back to my question, Kennecott has not said no at this point anyway to going above 327.5 meters; correct?

A They are not authorized to do so under the permit.

Q That wasn't my question. Let's go beyond the permit for a moment, if we can, to what happens when we go -- when you get to 327.5. Are you saying that Kennecott will never mine above 327.5 meters?

MR. REICHEL: Object to the relevance of this. The issue in this is the permit that has been issued, not some possible future amendment to permit.

MR. HAYNES: Well, but the permit allows Kennecott to come in and ask for an amendment. I'm just exploring that.

JUDGE PATTERSON: Again, I'm going to allow you go ahead.

Q Mr. Donohue?

A Could you repeat the question?

Q Sure. The permit allows Kennecott to ask to seek to mine

above the 327.5 meter level; correct?
A That is correct.
Q All right.
A If they've got the data to support that.
Q Right. So Kennecott if, in your words, has data to support going above 327.5, they're going to go -- they're going to ask to go above that; correct?
A I would expect that they would consider that, yes.
Q Have they asked you to do any studies to determine the feasibility of mining above 327.5 at this time?
A Well, as the permit application described, the short answer to your question at this time, no.
Q All right. But they certainly asked you during the permit application process to look at and to propose in fact going to 383 meters; correct? That's what the permit application said?
A The permit application describes the ultimately resource, and it also describes that as they progressed into upper parts of the mine that additional data would be collected to determine if they could mine that safely and to do the appropriate engineering for potentially mining those areas.
Q Now, looking at Illustration 4-2, we see -- I think those are called -- what? -- levels seven and eight, those upper two levels that are now not permitted?
A Sure.

Q Is that right? Seven and eight?
A I don't see the numbers on there, so I can't verify which number that is.
Q Well, the top two levels, I mean?
A Okay. The top two levels.
Q Correct. And the proposal in the permit application was to mine those areas, those levels, in the same method as the other lower levels; correct?
A I don't believe that's what the permit application said, especially with respect to the upper levels. There is some different language in there relative to what they would do per the upper levels.
Q And tell us what that is.
A I don't --
Q How would that be different than what's illustrated on 4-2?
A Well, there would be selective mining methods potentially employed for those upper levels. And that's described, I believe it's in section 4-4 of the application.
Q I see. But it would be the stope method; correct?
A It would be some variation on that; that's correct.
Q That is, we have primary stopes that would be blasted and the ore would be taken out and then those would be filled with rock fill and then the secondary stopes would be blasted and taken out; correct?
A In a general sense, yes. But I believe that the stope

dimensions and stuff like that at that time could be adjusted based on stability criteria that is needed to safely mine that.

Q "Stope dimensions and stuff like that"? What do you mean "stuff like that"?

A Well, stope dimension --

Q That seems pretty ambiguous.

A Well, the dimensions of the stopes, you know, we've got a basic dimension that's specified in the application. And those can be adjusted based on what's required to mine those areas safely.

Q Just so the record is clear, Mr. Donohue, if we look at the lower levels that are permitted, give us the dimensions of the stopes as they are currently planned.

A Well, the stope width, which is side to side east to west, is about two meters -- or ten meters. Okay?

Q About 30-plus feet?

A About 30 feet; that's correct. The stope height varies between 30 meters, which is about 90 feet, and 15 meters, which is about 45 feet. The length of the stope from hanging wall to foot wall is going to be based on the dimensions of the ore zone at that particular stope.

Q And do you know without looking at documents -- and this isn't a memory test -- but the range of the length of the stopes?

A Yeah. I think it can vary somewhere between around 15 or 17 meters upwards to potentially 50 meters, thereabouts, maybe a little more, little less.
Q So about 45 feet to 150 feet, give or take; right?
A I'm not sure where you got the --
Q 15 to 50 meters --
A Oh, got you.
Q -- for the length.
A Yes.
Q So in feet the stopes are going to be approximately 30 feet wide; correct?
A Well, 30 feet -- 30 feet wide; that's correct.
Q 45 to 90 feet deep top to bottom?
A That's correct.
Q And 45 to 150 feet long?
A That's about right.
Q We're describing a box; correct?
A That's correct.
Q And for the -- again, I'm just trying to understand this diagram so the record is clear on this. The stopes for the various levels that are permitted to be mined, I think they're levels one through six?
A Uh-huh (affirmative). Okay.
Q "Yes"? So there's going to be six stopes -- six levels of stopes stacked on top of one another; correct?

A Uh-huh (affirmative).
Q You have to say "yes" or "no."
A Yes.
Q So if the mine height as currently permitted is now 600 feet and there's --
A Uh-huh; yes.
Q -- and there are six levels, that sounds like an average of, say, 100 feet per stope height?
A Okay.
Q And that's just my rough calculation. Does that sound right?
A Yeah. Go on. I think I understand what your understanding is.
Q Well, so we have about six levels of the mine; correct?
A That's correct.
Q Divided into six levels; right?
A That's correct.
Q Each and -- we have 600 feet of mine?
A That's right.
Q So it's about 100 feet in height for each level?
A That's correct.
Q Rather than the 45 to 90 that you just described?
A Well, 90 feet in height, yeah.
Q Right. You said 45 to 90, but it sounds like there are six levels.

A Well, there's just a small area where they're doing 45 feet.
Q Oh, I see.
A Okay.
Q But if we go looking again at Illustration 4-2, if we go -- if we have six levels there, the top --
A Uh-huh (affirmative).
Q "Yes"?
A Yes.
Q -- top to bottom, then it's about 100 foot per level or 100 feet per stope?
A That's correct.
Q In the maximum vertical extent of the mine; correct?
A That's correct.
Q Now, when you compiled all of the reports that you described earlier in your direct testimony, and the mine permit application, all the appendices, the environmental impact assessment, --
A Yes.
Q -- all those appendices -- right? -- did your firm actually generate the documents? Or let me ask it a little more directly. Which of those documents of the mining permit application and its appendices and the environmental impact assessment and its appendices did Foth actually prepare?
A Would you like me to go through appendix by appendix?
Q Sure.

A Okay. If we start with the mine permit application volume one -- and I'll just go through the Table of Contents that contains the various appendices there -- Appendix A-1, which is the permit application form. There was -- we filled that out. Appendix A-2, which is the Michigan DNR land use application form. We filled that out. Appendix A-3, which is the checklist. We put that together and filled that out. The Kennecott organization report, which is Appendix B, was provided to us by Kennecott. Appendix C-1, which is the geology of the Eagle nickel-copper deposit, was a report that was generated by Kennecott.

Q Wait. I'm sorry. I don't mean to make you go through each of the appendices. All I'm -- to say who prepared them. I'm just trying to figure out which ones Foth prepared.

A Okay. Appendix E of the volume one of the mine permit application; Appendix F.

Q Wait. And just so the record is clear, that's the storm water design calculations?

A That's correct.

Q Okay.

A Appendix F, which is the help model analysis used in the design of the development rock storage area; Appendix G, which is geotechnical calculations for the development rock storage area; Appendix H, which is the contact water collection system calculations; Appendix I, which is the

development rock storage area CQA plan; and Appendix J, which is the planting guide that's going to be used for the reclamation activities. As well as in the permit application form sections one through ten of volume one were put together by Foth.

Q All right. So Foth did -- is it Foeth (pronouncing) or Foth?

A Pardon?

Q Is it Foeth or Foth?

A Foeth (pronouncing).

Q Foeth; thank you.

A Yeah, long "O."

Q Thank you. So you prepared the text of the mine permit application?

A That's correct.

Q And for the EIA?

A We prepared the text. And also some of the appendices with regards to air quality analysis were -- that data was collected by Foth.

Q Now, for the other appendices of the mine permit application and the EIA you compiled those from other consultants to Kennecott; correct?

A That is correct.

Q Did you yourself check the conclusions in those reports; that is, to verify that the conclusions were accurate?

A We reviewed those conclusions.
Q You reviewed them. Did you check --
A Yeah.
Q -- to see that they were accurate?
A How do you define -- how do you define that?
Q Well, did you take the data that was supplied with the appendices that you didn't prepare and compare them to -- the conclusions to see if the conclusions fit the data?
A Yes, we did that.
Q In a general sense?
A Yes.
Q You didn't redo all the calculations though, did you?
A No, we did not redo all the calculations.
Q You didn't check the models to see that the data were appropriately inputted?
A We did not take the actual computer models and run the computer models ourselves; correct.
Q All right. And for the geology, for instance, you didn't go out and check to see that the boreholes were accurately surveyed and to see that the depths were accurately determined? You didn't do that, did you?
A We did not do that.
Q You didn't double check the field work that was done for those appendices that you didn't prepare, did you?
A How do you define "double check"?

Q Well, you didn't go out and verify that the field work was done accurately?
A We spent time out at the field when certain activities were being done, sure.
Q Which ones?
A I was out in the field when archeological activities were being done, things like that.
Q All right. I see. As part of your direct testimony you described in the mining plan certain geochemical testing that was done?
A Yes.
Q It's described in I think Appendices D-1 through D-5 of the EIA; correct?
A That's correct.
Q Can you tell us when the last geochemical testing was done at the site?
A I believe that the -- some of the kinetic tests that are being completed that were initiated for the project are still ongoing.
Q Oh, I see. And what about other geochemical tests; when -- besides the kinetic tests? Are there any -- when was the last analysis done, for instance, of the water quality at the site?
A Of what water quality?
Q Well, of the proposed -- the monitoring of the water

that's -- that was put in the -- into the Environmental Impact Assessment; the baseline water quality.

A Oh, are you talking about groundwater, surface water?

Q Well, let's start with groundwater.

A Okay.

Q When was that -- when was the last groundwater testing done?

A I believe within the last couple months.

Q And what about surface water quality?

A Same thing, within the last couple months, possibly this month.

Q You also talked in your direct examination about Appendices C-1, C-2 and C-3 to the mine permit application. Those are the -- that's the geology and the geotechnical work that was done?

A That's correct.

Q Do you know when the last boreholes were drilled at the site for the geotechnical work?

A That I do not know.

Q Who would know that?

A Mr. Andrew Ware.

Q And for the boreholes that were selected for the water inflow calculations do you know who selected those boreholes for that study?

A That was done by a team of folks from Golder, Mr. John Wosniewicz, Mr. Andrew Ware from Kennecott. They examined

that information and made the selection on the appropriate holes to be tested.

Q All right. You didn't make those selections, did you?

A No, I did not.

Q And for the boreholes that were selected -- or the pump tests you didn't selected those boreholes, did you?

A No, I did not.

Q Excuse me. There's one pump test; correct?

A Yes, there was one pump test and I did not select that hole.

Q Mr. Donohue, in your direct examination you talked about the -- let me make sure I've got my references correct here. You talked about overtopping -- I think this is the -- this is the contact water basins and you said that they would be overtopped only in extreme conditions. Do you recall that testimony?

A I don't believe I said that relative to the contact water basins; I said relative to the non-contact water basins.

Q Non-contact. All right.

A Which are, you know, designed for stormwater management.

Q Right. So what kind of extreme conditions would there be for the overtopping of the non-contact stormwater basins?

A Well, if the stormwater event was greater than what was used for the -- as the design basis for that -- for the sizing of that basin, you could get discharge from that particular structure. And they are designed with a discharge structure

for stormwater release, which is standard practice in the industry.

Q Stormwater release into the outside environment outside the facilities; correct?

A That's correct.

Q So you haven't designed the system to make sure that the system will 100 percent hold all stormwater; correct?

A I don't think any system is designed like that for stormwater management.

Q Let me ask the question again.

A Okay.

Q You haven't designed the system so that it's a hundred percent sure that there will be no stormwater overflow; correct?

MR. LEWIS: Objection to the form of the question, your Honor.

MR. HAYNES: I'm not quite sure what the --

MR. LEWIS: Well, it's vague; there's no reference to any standard. Is it a hundred percent certainty it can never occur in a million years; is it a certainty that it won't occur based on the design limit of 50-year storm event, or whatever it was? It's a vague question.

MR. REICHEL: And I would also join in the objection as to vague as to the extent that it's unclear as phrased whether it's limited to the non-contact stormwater

basin or the -- yeah, just that.

Q Well, Mr. Donohue, let's limit it to the non-contact basin. All right?

A Okay.

Q Not that -- which is the stormwater basin; correct?

A Sure.

Q All right. When I asked about whether you were a hundred percent sure whether or not there would be no overtopping of the non-contact basin I mean at any time.

A No, I -- no; that's not a hundred percent guaranteed. If I might add, Kennecott will be applying for an industrial stormwater permit for the release of water from those non-contact water infiltration basins once they get into operations.

Q Oh, I see. That permit hasn't been applied for yet?

A It's not required at this time is my understanding.

Q For the temporary development rock area, the TDRSA, you testified about the design standards for the TDRSA. Do you recall that testimony?

A That's correct.

Q I'm going to ask you a similar question. For the time that the TDRSA is designed to be used for this proposed mine, do you have a hundred percent assurance that there will be no leakage through the liner of the TDRSA?

A The answer to that would be no.

Q Why not?
A Well, because there could be little defects in the liner due to construction, due to manufacture where there could be some percolation through the liner. That's why there's a construction quality assurance plan that'll be in place for the construction of that to minimize those types of occurrences.
Q Now, for the contact water basins, describe for me again what the contact water basins are designed to do.
A They're designed to store water that comes from the mine, from the development rock storage area and stormwater runoff from the operations area.
Q And describe what the liner system is for the contact water basins.
A It's a geosynthetic clay liner, which is a manufactured clay material and a high density polyethylene liner that's sits on top of that.
Q And let me ask the same question here that I did for the temporary development rock storage area. Is the design of the contact water basins such that it -- that there's a hundred surety that there'll be no leakage through the contact water basins?
A No.
Q You testified about the vertical gradient in the bedrock aquifer. Do you remember that?

A Yes.
Q And you testified -- if my notes are correct, you said at one point that there was no substantial vertical gradient in the bedrock aquifer and then a few minutes later you said that there's no significant vertical gradient in the bedrock aquifer.
A Okay.
Q Assuming my notes are correct -- and they may be incorrect, Mr. Donohue -- is there a difference between "substantial" and "significant"?
A What I meant by that is that as part of the studies that were completed out there, there was a network of bedrock piezometers that were installed and the data from those piezometers shows that there is no upwelling of water into the glacial system of any pattern between the different points that shows consistent upwelling of water into the glacial system.
Q And tell Judge Patterson what you mean by the "glacial system." Is that different than the bedrock?
A Yeah, the glacial system would be the sands and gravels that overlie the bedrock.
Q The unconsolidated material?
A The unconsolidated material.
Q You would agree with Dr. Prucha that that's what we should call -- is that an appropriate name to call what you say,

the glacial material?

A Unconsolidated?

Q Yes.

A That's a common term that's used, yes.

Q I just want to make sure we're not mixing apples and oranges here when we're describing these.

A Sure.

Q You didn't perform the tests that you think demonstrate that there's no upwelling?

A No, that work was completed by Mr. John Wozniewicz.

Q And what was the amount of the vertical gradient?

A I don't have that number off the top of my head, but it was very weak vertical gradient that showed no potential for upwelling into the overburden.

Q You testified on direct examination, Mr. Donohue, about the reclamation plan. Do you recall that testimony?

A Yes.

Q And you talked about totally reclaiming the surface; correct?

A Correct.

Q And you talked about sealing the mine enclosures?

A Yes.

Q Mr. Donohue, I want to go to another exhibit just so that I can understand your testimony about this issue.

(Pause in dialogue)

Q Now, Mr. Donohue, you talked about the reclamation plan for the underground workings; correct?
A Correct.
Q And I wasn't quite clear as to how this process is going to work. Could you go through that for us again and describe once the mine is completely mined out how the mine is going to be -- the underground workings are going to be reclaimed?
MR. REICHEL: Excuse me. Counsel, can you tell us for the record what --
MR. HAYNES: Oh, I'm sorry. Yes, it's Figure 7-2 of DEQ Exhibit 70.
MR. REICHEL: Thank you.
Q And this is the attachment 2 to the comments, I believe; correct?
A That's correct.
Q The October 2006 comments?
A That's correct.
Q All right. Anyway, Mr. Donohue, could you -- will this figure help you explain how the reclamation of the underground workings will occur?
A Yes.
Q All right. Could you proceed, please?
A Where would you like me to begin?
Q Start where you like. This is an open-ended question.
A Okay. Well, the components of the underground reclamation

plan are going to consist of several components. Okay? The first is going to be sealing these vertical raises here. Okay? And there's the --

Q And you're going to seal them -- I may interrupt you with some of your commentary, so forgive me.

A Okay.

Q But when you say "sealing the vertical raises," what do you mean by that?

A Well, here we've got a vertical raise, which is the ventilation raise going from the underground mine to the surface. Okay? That is going to be filled with aggregate. Where that raise transitions across the upper bedrock to the lower bedrock, that is going to be sealed with a concrete plug. Same thing with the lined boreholes here; that's going to be sealed with a concrete plug on top of the gravel. On top of the plug there's going to be additional concrete until we get up to the glacial overburden and then we're going to concrete that up to the surface. Likewise, where the portal transitions from upper bedrock -- or where the decline transitions from upper bedrock to lower bedrock, that is going to be sealed with a concrete plug as well.

Q And the -- on Figure 7.2 (sic), the concrete is shows as green; is that right?

A That's correct.

Q At both the vertical raises and in the decline?

A That's correct.
Q And what is the -- what does the brown signify? Is that the aggregate?
A That would be the aggregate.
Q Okay. I'm sorry. Continue.
A And then likewise, the portal up here (indicating) is going to have a concrete plug. And recall that the actual point where the portal penetrates the rock is going to be below the existing ground surface, so once that's sealed up then the -- then that topography there will be reclaimed such that the portal is actually covered.
Q All right. All of that describes what will happen outside the actual mine area itself; correct?
A Right.
Q Could you then go to the mine area? Is that the next area that you were going to talk about?
A Yes. This area here (indicating) represents the mine area and recall that these two mining levels will not be developed, so this plan will need -- necessarily need to be adapted to the actual underground conditions that exist at the time mining ceases.
Q When you say "these two mining areas," you're talking about the top two?
A That's correct; the top two.
Q All right. Continue.

A So under -- assuming that Kennecott ultimately does collect the data and is able to mine the upper two mine levels, this is how the reclamation plan would look.
Q And so -- well, on Figure 7.2 on the left-hand side of the figure we have some brown vertical figures there. What are those?
A These are either/or passes or vertical raises between mine workings for ventilation purposes.
Q I see. And then above those brown -- above those vent raises or -- what did you say, "vertical passes"?
A These are vertical passes within the mine that are either used for ventilation purposes or passing ore from one level to the next.
Q And on Figure 7-2, again assuming that the mining goes above 327.5, this figure shows the green -- there's some green at the upper portion of the mine area?
A Yes.
Q What does that represent?
A That would again represent the concrete plugs at the transition between the upper bedrock and the lower bedrock.
Q All right. And then for the access tunnels, those are the -- what appear to be in this two-dimensional figure, circular figures?
A Yes.
Q How are those going to be sealed, or are they just going to

be left open?
A No, the tunnels themselves, so the spiral ramp and then the drift, the lateral drifts on the north side of the orebody, those will be left open.
Q All right. And then as I understand it when the mine is -- when the mining is done and the stopes are mined out the primary stopes will have rockfill; correct?
A Primary stopes will have cemented rockfill.
Q Cemented rockfill. And the secondary stopes; that is, the areas between the primary stopes, will have -- what will those have when the mine is finished?
A Those will have limestone amended development rock.
Q So development rock from the development rock storage area is going to be put back into the secondary stopes with limestone?
A That's correct; yes.
Q Okay. And then you also talked in terms of the reclamation of the mine that it's going to be reflooded. Can you describe that process for us?
A It's not complicated. Kennecott would pump water out of a well and pump it down into those open drifts and allow it -- allow that water to drain down through those drifts eventually accelerating the reflooding of the mine.
Q And so the water that's going to be pumped down is going to -- is going to fill up the drifts, which are the

horizontal tunnels; is that right?

A That's correct.

Q And it will fill up the access -- did you call it the access ramp?

A The access ramp; it's also been referred to as the spiral ramp by folks.

Q The spiral ramp? Okay. I just want to make sure we've got the nomenclature correct.

A Sure.

Q And then --

MR. HAYNES: Your Honor, I'm sorry. Just bear with me for one second.

(Pause in dialogue)

MR. HAYNES: Your Honor, I apologize. I'm looking for page 78 of the mining permit application, volume one, which describes the reclamation of the underground openings and I want to read something to the witness but I want to make sure we've got it up on the screen. It's going to take me a while to find it. I apologize, your Honor.

JUDGE PATTERSON: Okay.

(Pause in dialogue)

Q Sorry, Mr. Donohue. We'll get there. Mr. Donohue, we've had put on the screen DEQ Exhibit 25. This is page 97 of the exhibit. Do you see the top paragraph on the page which says -- and I'm starting from the previous page: "In

addition Figure 7-2 shows the conceptual location of two wells that will be used for pumping clean water into the open workings to accelerate reflooding, thereby terminating sulfide oxidation of minerals in the exposed rock wall." Do you see that?

A Yes.

Q And Figure 7-2 is what we were just talking about; correct?

A That's correct.

Q All right. So when this text talks about pumping clean water into the open workings, the open workings include the spiral access -- the "spiral ramp"; is that what it's called?

A The access ramp.

Q The access ramp and the lateral --

A Drifts.

Q -- drifts; right?

A Yeah.

Q And also the mine itself; correct?

A Well, the mine is backfilled, so we're pumping it into those open chambers on the north side of the mine.

Q Oh, I see. And so when the text here talks about "terminating sulfide oxidation of minerals in the exposed wall rock," what does that phrase refer to?

A Well, just that; you've got a tunnel. Okay? All right? And that tunnel has a wall -- all right? -- and it's exposed

to the atmosphere during mining. When that's reflooded you cut off its exposure to atmospheric oxygen, thereby reducing and eliminating the oxidation potential for those sulfides.

Q So the "wall rock" refers here only the tunnels?

A Well, the entire mine is going to fill up. Okay? So the wall rock is anything -- any portion of the mine that's exposed to atmospheric oxygen.

Q I see. So this is -- so when the mine is done we're going to have -- and the stopes are refilled --

A Yes.

Q -- there will be exposed wall rock within the mine itself?

A There will be exposed wall rock in the drifts and the tunnels and those upper two mining levels -- or the upper part of the mine per the response to comments are going to be backfilled with cemented rockfill.

Q All right. But the wall rock here refers to wall rock not only in the tunnels but also in the mine itself?

A That's correct.

Q So some of the reflooding will actually go into the mine itself?

A That's correct.

Q Mr. Donohue, you were here when Dr. Blake testified, were you not?

A Yes, I was.

Q A week ago Friday I think it was.

A Yes.
Q And do you recall Dr. Blake testifying about the three cores that he received from Kennecott -- the photos of the three cores? Excuse me.
A I do recall hearing that, yes.
Q And did you assist in getting those cores to the Dr. Blake?
A I believe I e-mailed those to him is my recollection.
Q Oh, you did. And did you select the cores photos that were going to be e-mailed?
A No, I did not.
Q Who selected those?
A Mr. Andrew Ware.
Q You just facilitated the transfer of the core photos?
A That's correct.
Q Mr. Donohue, you described in your direct examination the potential for upgrading the power supply to the proposed mine; correct?
A Yes.
Q And that's going to involve -- what? -- running some underground power lines from Marquette; is that right?
A I don't know the exact aspect of the upgrade of the power line from Marquette up to Big Bay.
Q Who would know that?
A Other folks at Kennecott who are involved in that.
Q Any idea who that might be?

A I have not been involved in that aspect of the project.
Q Oh, I see. All right. And have you been --
A Does not involve environmental permitting, so I'm not involved in that.
Q Oh, I see. Okay. And you know, don't you, that Kennecott has proposed reopening the Humboldt Mine for some work in relation to this mine?
A Yes.
Q Have you been involved in that process at all?
A I've been involved in evaluating that site, yes.
Q And tell us what you've done and when you did it about --

MR. LEWIS: Objection; relevance, your Honor.

MR. HAYNES: Well, your Honor, it relates to the question of how the mine is going to be operated and certainly that relates to the environmental issues if we're going to have the Humboldt -- well, let me lay some foundation if I may.

Q Mr. Donohue, what's your understanding of what the Humboldt Mine area is?
A The Humboldt Mine area is an abandoned iron mine area. It was used as an underground iron mine and also as an open-pit iron mine.
Q And where is it located?
A Near the intersection of Highway 95 and US Highway 41, I believe.

Q In Marquette County?
A In Marquette County.
Q Near Negaunee?
A I believe it is west of Negaunee.
Q Okay. And how have you been involved in the Humboldt Mine issue as it relates to this proposed Eagle Mine?

MR. LEWIS: Objection; relevance, your Honor.

MR. REICHEL: Join.

MR. LEWIS: This is a separate facility; it's not subject to this permit. It's a distance away. It's in some form of planning stage. It has no relevance to this mine. It has no relevance to this permit application. It has no relevance to this contested case proceeding.

MR. REICHEL: Join in the objection.

MR. HAYNES: Your Honor, certainly the question of how the ore is going to be processed relates to the permit application, because that has to be described in the permit application and in the Environmental Impact Statement, so it's relevant. It's part of the -- it's part of the project.

MR. LEWIS: It's not part of the project. What the permit application says and what the permit says is that the ore will be transported offsite for processing. That's what's required to be set forth in the permit application materials and the permit and that is the fact. It is to be

transferred offsite for processing. It has no relevance to what's going to happen at this mine site. It has no relevance to the permits nor to this contested case. This is apparently a fishing expedition for discovery and it ought not be allowed.

MR. HAYNES: Well, to the extent that this is discovery, your Honor, of course you barred discovery, so the only chance we have for discovery is during this hearing. But certainly the cumulative impacts of this mine in the Marquette County area are relevant for this proceeding, for the environmental impacts.

MR. REICHEL: Your Honor, the environmental impacts of offsite mine processing whether this location or someplace else, Canada or whatever, are the subject of separate regulation wherever that facility is going to be located. It is not within the scope of the activity that is regulated under this mining permit issue here or contested here.

MR. HAYNES: Your Honor, I don't mean to belabor this, but I just want to point out the legal basis for the question. Under Part 632 in Section 63201, subsection H, "mining area" is defined as meaning:

> "An area of land from which earth material is removed in connection with non-ferrous metallic mineral mining, the lands on which material from that mining is

stored or deposited, the lands on which beneficiating or treatment plants or auxiliary facilities are located, the lands on which the water reservoirs used in non-ferrous metallic mineral mining processes are located, and auxiliary lands that are used in connection with the mine."

If there is a proposal here -- which the witness has testified there is -- to use nearby lands to beneficiate this ore, that's part of this mining -- that's part of the mining area that has to be discussed in the application.

MR. LEWIS: Your Honor, what Mr. Haynes just read defines a mining area and if and when Kennecott wants to develop, permit, seek to process ore in some other area not this area -- which is not on the table -- then that definition would apply, I believe. That would be defined as a mining area. What that means is that Kennecott would then have to go through the regulatory process, apply for the proper permits and the avenue for petitioners to contest that event, if it occurs, is through a different contested case proceeding as to a different permit. It is not this case.

JUDGE PATTERSON: I'm going to sustain the objection. I don't see how that's relevant to this particular mining project as applied for and as permitted.

MR. HAYNES: Your Honor, on that question for

purposes of the record I'd like to just lay some foundation with the witness, if I may.

MR. LEWIS: No purpose for anymore foundation, your Honor. The whole subject is irrelevant and there's been a ruling that it's not -- that it's not a proper subject of inquiry.

MR. HAYNES: Well, again, I have a legal argument that the use of the Humboldt Mine is beneficiating and I'd like to explore that with the witness for an offer of proof.

MR. LEWIS: Your Honor has ruled on this.

MR. HAYNES: I understand the ruling.

JUDGE PATTERSON: Well, go ahead.

MR. HAYNES: Thank you.

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S E P A R A T E R E C O R D

(At 11:07 a.m., Beginning of Separate Record)

Q Mr. Donohue, again, this is a separate record now that we're making, so I'll just for purposes of perhaps an appeal later on if that may happen.

A What do you mean by a second record?

Q A separate record is --

A A separate record.

Q We're exploring this subject to the judge's ruling on whether or not it's relevant. But the proposed Humboldt Mine area -- what's your understanding of how that would be used for the proposed Eagle Mine?

A How are you defining the "proposed Humboldt Mine area"?

Q I'm sorry. The Humboldt Mine area that is now in the works that may be used as part of the Eagle project.

A Okay. And your question to that is what?

Q Is what's the purpose of the Humboldt Mine area; how is that going to be related to the Eagle Mine?

A Kennecott has examined that for potential processing of ore.

Q All right. And processing ore is the same as beneficiation, is it no?

A That's correct.

Q And is the ore going to be treated there in any fashion?

A How are you defining "treated"?

Q Well, treated for water pollution, air pollution, that sort

of treatment.

A Well, I mean, the ore treated for water pollution and air pollution? I'm not --

Q Well, maybe the question is too vague. When you say "beneficiation" what do you mean by that?

A It would be ground up and milled and the economic minerals would be extracted from the ground-up material.

Q But there's -- is there a proposal to smelt the ore there?

A No.

Q Okay. So the ore --

A Well, there's no proposal to mill it yet either. I mean, there's nothing on the record as -- relative to milling ore there as well.

Q But it's been explored as a potential; correct?

A It's been explored.

Q All right. And --

MR. LEWIS: Your Honor, I want to add -- place another objection on the record. I understand this is now being fostered in the context of an offer of proof, but Mr. Haynes is inquiring about matters which have no significance to this hearing. And, furthermore, I think he's inquiring as to matters which may in fact be confidential, proprietary to Kennecott and that's another additional reason I don't think this Court ought to allow this inquiry to be

conducted.

MR. HAYNES: Well, your Honor, as to the confidentiality, the Humboldt Mine proposal has been scattered around the newspapers for the past couple of months. So that proposal is hardly confidential.

MR. LEWIS: The basis of my objection, he's proceeding to ask this witness various questions as to various details about what Kennecott's plans may or may not be, and that does get into the area of confidential and proprietary information and I think that this is for an improper purpose, your Honor. And in addition to the relevance, I think this is a very serious issue and keeping in mind the context here, the petitioners in this proceeding have publicly and forcefully opposed this project from day one. They have every intention based on, as you're seeing here, to oppose any further projects that Kennecott may propose and that is the point and nature of the inquiry. And again, they ought not be allowed to probe through this witness into the confidential, proprietary plans and discussions, whatever they may be, that Kennecott may be having as to some future plans which have no relevance whatsoever to this proceeding.

MR. REICHEL: I might also add, Judge, that the ostensible purpose of this offer of proof was to elicit

testimony to relate possible activity of this Humboldt site to the term "beneficiation." That's already been asked and answered as a part of this offer of proof. Pursuing this further is just going further afield in issues that are simply not relevant in this proceeding.

MR. HAYNES: Your Honor, a brief response. It is true that the petitioners have opposed this mine project, but they have opposed it with the same vigor that the proponents have advocated the project. So our opposition is frankly as opposition irrelevant to the proceedings. You know, they propose it; we oppose it. That's neither here nor there. I think I've gone far enough with the witness for purposes of the offer of proof and I'll stop the separate record.

JUDGE PATTERSON: Okay.

MR. HAYNES: Thank you.

JUDGE PATTERSON: Thank you.

(At 11:11 a.m., End of Separate Record)

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Q Mr. Donohue, in terms of the TDRSA, did you yourself work on Appendix G to the mining permit application for the TDRSA, or is that someone else at Foth?
A That would have been someone else at my company, yes.
Q Who?
A Which appendix?
Q It's Appendix G. Again, this is not a memory test; I just want to make sure --
A I just want to make sure I'm looking at the right one.
Q Sure. So do we.
A I believe that would have been Mr. John Starke.
Q Okay. So if we wanted to find out about the details of the TDRSA design and operation, we should talk with him; correct?
A That's correct.
Q You testified on direct examination that in your opinion Kennecott put forth a substantial effort to comply with the statutes and it was an exhaustive effort and you believe that Kennecott complies -- the application and its appendices and various documents comply with Parts 632 and 31. Do you recall that testimony?
A Yes, I do.
Q Now, that's your belief; that -- you aren't trying to express a legal conclusion, are you, that Judge Patterson might make in terms of compliance?

A That's correct.
Q And you testified that Kennecott is committed to minimizing environmental impacts. Do you remember that testimony?
A Yes.
Q And Kennecott is willing to go the extra yard and be proactive to minimize the environmental impacts; correct?
A That's correct.
Q But you aren't saying, are you, sir, that Kennecott will be a hundred percent effective in preventing environmental impacts?
A How are you defining that?
Q Well, are you -- can you say with a hundred percent certainty that there will be no environmental impacts from this proposed project?
A No, I cannot.

MR. HAYNES: Nothing further at this time. Thank you.

CROSS-EXAMINATION

BY MR. WALLACE:

Q Mr. Donohue, my name is Bruce Wallace; I represent Huron Mountain Club. I want to ask you a few questions about your testimony yesterday regarding Flambeau. And you put up an exhibit that made reference to the Flambeau Mine and some environmental issues that had occurred there. One of them was -- referred to a bioassay?

A Yes.
Q What happened there, sir?
A It's a bio -- a test that is completed on a sample of the wastewater effluent where they're looking at in essence the survivability of an aquatic organism in a sample of the wastewater and it didn't pass the criteria.
Q It did not pass the criteria?
A That was correct; that one sample.
Q Okay. And that was wastewater that went where from the mine?
A That would have been wastewater that is being discharged into the Flambeau River.
Q Okay. You also -- and what year did that wastewater that did not pass go into the Flambeau River?
A I do not have that off the top of my head.
Q Did it go directly into the Flambeau River or did it go into a tributary?
A The discharge point for the water from that mine site, from the wastewater treatment system was to the Flambeau River.
Q Okay. Do you recall what contaminants were in the water that went into the Flambeau River from the mine site?
A Well, I believe what the issue was there was not enough organic -- natural organic material in the water that was needed for the survivability of those organisms. And there was actually a paper published to that effect that's been

presented at several conferences. And as a result of that test I believe they modified the bioassay process to include the addition of a small amount of organic material, natural citrate into the sample for that specific purpose.

Q Okay. But in any event, the discharge at the time violated the standard that you were required to meet; is that right?

A That constituted a status of noncompliance for that one sample.

Q Okay. You also mentioned a problem with total suspended particulates; correct?

A That's correct.

Q Okay. And what are total suspended particulates?

A Dust in the air; fugitive emissions, things like that. They had an air monitor across the highway, I believe it was, from the mine operation and they had to monitor that periodically and the total suspended particulates that was collected in a certain sample was above what was required in the permit for that one sample.

Q Okay. And what were the constituents of the particulate that exceeded the levels you were required to meet?

A I don't believe there was a standard for specific constituents. It was a TSP or total suspended particulate standard.

Q Now, both of these mistakes -- if I can call them that -- were the result of design problems or human error?

A They were situations that occurred.
Q Okay. Because human beings operating the mine made mistakes regarding what they were allowed to discharge into the air and the water?
A Well, in the case of -- yeah, in the case of the bioassay, I don't know if it was because there was a human error there or if it was because of the test protocol itself being appropriately, you know, geared towards that type of effluent. In the case of the TSP exceedence, it could have been due to the mine; it could have been due to some other fugitive source of emissions that were passing through that area at that time.
Q Okay. The mine got blamed for it because it was right across the road; right?
A That's correct.
Q Okay. You also had a problem with spilled ore at the site; correct?
A Yes.
Q Okay. And when was this ore spill and where was it spilled, sir?
A Where are you talking about? I mean, --
Q Well, I'm -- I think you probably know better than I do, but let me start with -- was there a spill that resulted in ore or ore dust on the rail spur at the site?
A Yes. I don't know if I'd categorize it as "spilled ore."

There was a issue relative to residual ore present in what is referred to as the industrial outlot at the site. Now, the history behind that is that area was originally proposed to be reclaimed as part of the reclamation plan for the project. That area contained the office buildings, the wastewater treatment building, it contained a rail spur. It's a very small portion of the site. And prior to reclamation of the site the local community: business leaders, elected officials came to Kennecott and asked them, "Would you leave that -- those -- that infrastructure in place so that we could lease those buildings and that infrastructure from you?" And I believe they leased it from Kennecott for a very nominal fee and then turned around and leased it out to businesses that we could attract to the community for local business development.

And Kennecott considered not doing it because they wanted to reclaim that area and get all the materials out of there. Now, they elected to accommodate local interest to not reclaim that area, leave that material there, leave those buildings there, leave the infrastructure there for the benefit of the local community. As a result of that, they didn't go in as part of their original reclamation plan and scrape all that material out. They recognized after reclamation was complete for the rest of the site and that area was being leased out to the local business community --

they realized through their monitoring that they had some elevated copper coming from the runoff, from the rail spur, from the parking lot area. In that area they were -- the DNR noticed that; other folks who have reviewed the project noticed that. Kennecott noticed that. There was a series of studies that were done to go and pinpoint where this stuff was coming from. And ultimately, it led to the rail spur being removed. That rail spur contains ballast material for the rail spur and when the haul cars came out of the site they did spill a little bit of ore there and that was the source of the copper. Kennecott went in and they scooped all that stuff up and took it out.

Same thing with the parking lot area. There was a little bit of ore spilled there because that's where they crushed it. They went in there and they scooped all that stuff out and took it out as part the subsequent reclamation at the site. So that's the history of that particular issue.

Q Okay. I think the term "ore -- spilled ore" was the term that I read off of your exhibit yesterday.

A Okay.

Q Would you agree with that?

A Okay.

Q Okay. And this is ore that spilled that consistent -- the same kind of ore that we're going to have at the Eagle Mine

if that's allowed to go ahead; right?
A That's correct.
Q It's sulfide mining?
A That's right.
Q Okay. And it contains copper and nickel and sulfates?
A That's correct.
Q Okay. And do you have a sense of how long this ore had been on the site and had been draining offsite before you discovered it?
A Well, during operations the water from that area was drained to the water treatment system, so it only was noticed after reclamation was complete on the main site. And so it was probably a number of years that it took of monitoring and study to notice that.
Q Well, you closed the mine in 1998?
A That's correct.
Q Okay. And the date you indicated for the ore spill on the exhibit yesterday was 2006?
A I believe that's when they completed the last reclamation on the outlet area; that's correct.
Q Okay. So this spilled ore was creating environmental problems for a period of -- what? -- some eight years, sir?
A I fail to realize -- I fail to understand how you're defining "environmental problems."
Q Well, didn't some of this copper actually get into a nearby

creek?

A Well, the water from the outlot area drained into a biofilter and the purpose of that biofilter was to settle out suspended particulate and things like that. And relative to what was going into the biofilter and coming out of the biofilter, the biofilter was doing a pretty good job of that. We did measure copper concentrations on the outlet. We also monitored copper concentrations along drainage ditches on the highway a mile north and a mile south of the site and the copper concentrations along the highway and coming out of the biofilter -- my recollection is they were pretty similar. So the biofilter was put in place as part of a stormwater management plan for the project and it was functioning in accordance with the best management practices that had to be implemented for that plan for the project.

Q Okay. You don't recall measurements of as high as 10,000 micrograms per liter of copper in runoff water at the site?

A Not coming out of the biofilter; no.

Q Okay. Do you know what Stream C is, sir?

A Yes, I do.

Q Okay. What is Stream C?

A That's an intermittent stream that the biofilter drains into.

Q Okay. And Stream C was contaminated by this runoff, was it

not, sir?
A I would not -- it received discharge from the biofilter.
Q Did you sample the surface water at Stream C to determine whether copper had gotten into it off the mine?
A We sampled water going into the biofilter, coming out of the biofilter and in Stream C.
Q Okay. And when you sampled Stream C you determined that copper had gotten into Stream C from the mine site through this runoff, did you not, sir?
A There was copper present in the water in Stream C.
Q Okay. At unacceptable levels; correct?
A I'm not sure how you're defining "unacceptable levels."
Q Well, in violation of surface water standards in Wisconsin.
A There was no violation of a surface water quality standard per the permit.
Q You were not charged with it, but did not the water in Stream C contain elevated levels of copper above surface water standards?
A I'm not sure what surface water standards you're referring to, because there were no surface water standards in the permit applicable to that stormwater management plan.
Q Now, Stream C is a small stream, is it not?
A It's an intermittent stream that is periodically dry.
Q When did -- did you have to reclaim the -- or did you reclaim the streambed or any aspect of Stream C after the

cleanup of the ore and the ore dust?

A It's a dirt ditch is what it looks like and it's an intermittent stream by definition in the state. There was a biological survey done and there's never been anything to find in that stream.

Q It was never dug up and reclaimed?

A There was nothing to dig up.

Q And when did the completion of the parking lot reclamation occur then, sir?

A That was in 2006 is my recollection.

Q Have you ever estimated or calculated or been privy to calculations or estimates as to the value of the -- value to Kennecott -- potential value to Kennecott of the ore in what is currently proposed to be the crown pillar?

MR. LEWIS: Objection; relevance, your Honor.

MR. WALLACE: The relevance is I think we're going to discover that we've -- after learning that there is a potential plan to mine the crown pillar later on that it has tremendous potential value and I think that would be relevant to the likelihood that it will be mined.

JUDGE PATTERSON: I'll allow you to pursue that.

A Could you rephrase the question or re-ask the question?

Q Yes. Are you privy to estimates or calculations as to the value of the ore in the crown pillar that you propose to mine if you get an amendment to the mining permit later?

MR. LEWIS: Also, your Honor, again -- once again, they're probing into information that is straightforwardly confidential and proprietary of Kennecott. It's totally improper for this inquiry. It's not relevant to any issues in this contested case, number one; but number two, you would be allowing them to through this avenue obtain confidential and proprietary information which they're not entitled to obtain.

MR. REICHEL: Judge, I'd like to join in the relevance objection and reiterate, again for the record, that this question presupposes an activity that will require additional permitting under Part 632. It is not authorized by the permit that is subject to this contested case. The testimony simply indicates that there's a possibility under certain conditions that Kennecott may seek authorization beyond that in this permit to mine above that specified elevation. But critically to the context of this case the issue here is the issuance of the permit for the areas that are covered by it, not some expansion beyond that. That would be a separate hearing.

MR. WALLACE: Well, your Honor, let me explain why this is of such great concern to us. We have the statute which required Kennecott to describe an entire mine plan for public review -- for a series of public reviews and finding an opportunity to be exposed to perhaps a contested case

hearing as we're having now. And as this case has proceeded we've learned that much of the critical information that we expected to be in the mine plan for our review is to be determined later. And at each point when we've hit on something that is of great environmental potential significance we've learned that the solution to that will come later after this process is over. There's no additional, you know, public input, monitoring, access to in situ subsurface test results or to plans to mine the crown pillar that we learned are quite likely plans. And so at least I'd like to make a record of how likely these plans are. And if there's a billion dollars worth of ore there I think that one might assume that the plans are very likely and that should be part of this record.

MR. LEWIS: That's absolutely not relevant to what Mr. Reichel just stated in terms of -- that it's nothing more than some possibility. It's not part of this permit. It's not part of this contested case. Further, as this Court has already been told, if and when Kennecott gets to that level and based on all the information, it will require an amendment of the permit. So there is another opportunity there for public participation; there is another opportunity there I believe for a contested case. And finally, I cannot overstress the fact that this is an improper attempt to probe into Kennecott's confidential and proprietary

information and I want this Court to understand that that information tomorrow would in all likelihood be broadcast in the various publications and fliers and so forth that these petitioners witness -- these petitioners circulate in their anti-mining materials. So please know if you allow this testimony that's what's going to happen with it, and it's absolutely improper.

MR. HAYNES: Your Honor, if I may be heard for just a moment, I'd like to read into the record in relation to the question that was asked and the objections Condition E -- a portion of Condition E-8. This is found on page 7 of the mining permit:

> "In addition, the Permittee shall not advance mining above elevation 327.5 meters MSL unless reviewed and approved in writing by the MDEQ based on additional diamond drilling to provide geologic, geotechnical and hydrologic data to supplement the 3-D physical model."

By my reading of the permit, it does not say that mining above 327.5 requires an additional permit. It just requires in writing an approval by the DEQ. It doesn't sound like an additional Part 632 permit to me. So that portion of the objection is wrong. And so the idea that there will be this additional permit applied for doesn't sound like it to me. They just have to send a letter to the DEQ with some additional data, and DEQ will say "yes" or "no." And

there's no permit process, no public comment, not even an opportunity for a contested case because that may not be -- even be an action of the Department that could be subject to a contested case hearing. So there will not in fact be an additional permit granted.

MR. REICHEL: May I speak to that, Judge?

JUDGE PATTERSON: Uh-huh; sure.

MR. REICHEL: I believe certainly the DEQ's understanding that what this hypothetical advancing the mine beyond the area authorized by the permit would require not only a proposal as contemplated by the language that Mr. Haynes just read but as a matter of law an amendment -- a formal amendment to the Part 632 permit that's at issue here, which by statute would itself be subject to public notice comment participation.

MR. WALLACE: Well, I'm glad Mr. Reichel said that, because one of the issues your Honor has before the court is an amendment -- a so-called amendment to this mining application that was a letter written after public comment was over and to which we never had a chance to address our concerns. So I agree with Mr. Reichel that's the way it should go, but that's not how it's gone with respect to this permit so far. And I don't see any mechanism for getting at a range of essential issues in this case and with respect to this permit that have been pushed

off to the future to apparently avoid our scrutiny other than doing it in this hearing, starting with -- and I didn't bring up the concept of mining into the crown pillar. Mr. Donohue did yesterday in connection with discussing a diagram. That's where it came up.

And he discussed, you know, a possible amendment to allow them to do that. We're not surprised by this, because there's valuable ore in that crown pillar, and that's why it was proposed to be so thin in the first place. But, you know, it's -- I think it's now or never, your Honor.

MR. LEWIS: Just one more thing, your Honor.

JUDGE PATTERSON: Okay.

MR. LEWIS: I think fundamentally, you know, what's already known and understood is there is a possibility in the future that mining could progress above 327. We know that that's only going to occur if certain conditions are met, as you've heard us talk about the permit conditions. So there is this possibility. Now, apparently the Petitioners take the point what they want to do is probe what -- how possible it may be. That seems to be the point of this. And that justifies probing into Kennecott's, you know, personal confidential proprietary information.

And I don't see as a matter of legal relevance, your Honor, why it would may any difference to the decision

in this case to assign some, you know, arbitrary subjective incremental level to what we already know; that it may be possible if those conditions are satisfied. It certainly does not constitute anything that's materially important or relevant to the decision in this case. And it just ought not be allowed. The prejudicial effect of this far outweighs any potential relevance it would have.

MR. WALLACE: Well, I think if trade secret information is implicated by any of these questions, we probably could come up with a mechanism of in camera testimony that would address that. But I mean, I've read -- we've all read newspaper articles about whether this is a $7 billion ore deposit or a $4 billion ore deposit. The orders of magnitude are known. I'm just asking about the value of this crown pillar or that they may or may not seek to mine in the future.

MR. LEWIS: One more reason we don't need to go into it. They already know the relative magnitude; seems to me there's no reason to probe for more details and get into Kennecott's books.

MS. HALLEY: Your Honor, may I add one comment here?

JUDGE PATTERSON: Yeah; sure.

MS. HALLEY: It sounds as if Kennecott and the DEQ are indicating that an amendment, which would include --

could include potentially at some point the mining of the upper levels of the crown pillar, would somehow require another public comment process, and that's not the case. According to the statute, the DEQ at that point would have the discretion about whether to determine whether that amendment is minor or major. And if they determine that it's a minor amendment, then the process does not go through a public comment series like it has so far. So that would be completely up to the DEQ discretion, and the public may not have any opportunity to have input at all.

MR. WALLACE: And finally, your Honor, the entire record so far in this case has been that the crown pillar would be unsafe at a thickness less than 87.5 meters. That's why it's somewhat alarming to us to hear there's a plan, in light of the data we've received from Wilson Blake and Dr. Sainsbury that they may nonetheless mine it based on information we'll never have access to.

MR. LEWIS: That's been in the permit, your Honor. There's no surprises there.

MR. REICHEL: And I think Mr. Wallace's comment mischaracterized the nature of the testimony, but I'm not going to argue that. The point and -- is that the statute provides for a mechanism for amendment of the permit. And as has been acknowledged, the statute provides a mechanism for public participation in any modifications of the permit.

I think it strains credulity, given the nature of the comment today, the fact that -- to suggest that an amendment to the permit authorizing advancing above the currently specified limit would be treated by the DEQ as a minor modification.

MR. LEWIS: If I might refer to the court, also, again, in my view, this is not relevant whatsoever. Secondly, it is a very serious issue about probing into confidential proprietary information. But just one further reference to the court would be the Michigan Rule of Evidence 403, which is the other thing I mentioned, that:

> "Although relevant, assuming it was relevant, evidence may be excluded if its probative value is substantially outweighed by the dangerous of unfair prejudice, confusion of the issues or misleading the jury or by considerations of undue delay, waste of time or needless presentation of cumulative evidence."

Clearly this has -- if it has any relevance, it is that it's extremely marginal. But it does -- this -- the nature of this questioning will in fact, as a matter of fact, cause a substantial prejudice to Kennecott.

JUDGE PATTERSON: I think what we're dealing with here is speculation as to what might happen after the mining progresses to the extent permitted. So far as the -- I don't even know if this witness knows the value. But so far

as that, I agree with counsel that -- I know why you want to ask that, and it would be -- obviously go, I think, to the incentive to go further with the mining. But the value of that ore I'm not sure is relevant at this point. And again, based on counsel's argument that it may invade proprietary information of Kennecott, I do feel, at least as far as the inquire as to the value of that ore, that's overly prejudicial under the Rule cited. I will sustain the objection.

MR. HAYNES: Your Honor, just so the record is clear, you're not precluding us from inquiring into the process, the possibility, --

JUDGE PATTERSON: No.

MR. HAYNES: -- the geotechnical issues of mining above the currently permitted level?

JUDGE PATTERSON: No.

MR. HAYNES: Thank you.

MR. WALLACE: Thank you, your Honor. I will move on.

Q Sir, are you familiar with what subsurface testing would occur to determine further geophysical conditions that might permit such mining later?

A Only in a very general sense.

Q And what generally do you understand about that?

A Over-coring of rock, things like that. But that's not my

particular area of expertise.

Q I think Dr. Blake testified that he considered these subsurface methods expensive and not reliable. Were you here for that testimony?

MR. LEWIS: Objection to form. I don't recall that testimony at all, your Honor.

MR. WALLACE: Well, I'm asking -- you know, I have the transcript.

Q But do you recall such testimony, sir?

MR. LEWIS: Objection to form, your Honor. I think the counsel is misstating and mischaracterizing the testimony.

JUDGE PATTERSON: My recollection of Dr. Blake's testimony --

MR. WALLACE: I'll ask another question.

JUDGE PATTERSON: -- was something close to that.

MR. WALLACE: It was.

JUDGE PATTERSON: I'll overrule.

A Your question again, please?

Q I'll ask you a slightly different question. What do you know about the reliability of the methods that might be used to determine whether it will be safe to mine the --

A Yeah. I can't opine on that, because that's not my area of expertise.

Q Okay. You do know that both Dr. Sainsbury and Dr. Blake

thought it was not prudent to mine the crown pillar to a thickness less than 87.5 meters; correct?

A Yes.

Q And you don't have any --

A I recall them saying that that was a safe crown pillar. That's what I recall them saying.

Q And thus far, you at Foth haven't developed any further data that would suggest that it was safe from a mining standpoint or environmental standpoint to mine a crown pillar to a thickness less than 87.5 meters?

A We have not done anything like that.

Q Have you ever been involved in a mine seeking to extract an orebody from directly beneath a body of surface water?

A No.

Q Do you have colleagues at Foth that have ever been involved in such mines successfully, if you know?

A Not that I know of right off the top of my head, no.

Q In connection with your responsibilities for the Eagle Mine, have you sought out individuals that had successfully mined directly -- mined an orebody directly under surface water such as the Salmon Trout River? And if so, who would that be?

A Well, we certainly looked at the work product and the abilities of the various folks that contributed technical documents to the permit applications. But as to whether or

not we -- as to whether we sought anybody specifically that's mined under a water body, no, we did not.

Q So you don't know that anybody involved in the mix of people that you were coordinating has that experience or that successful experience at all?

A I do not.

Q Did you ever go to the Ropes or the Athens mine site yourself?

A No.

Q You know what happened at those sites?

A Yes, I do.

Q And was that factored into any decision making or steps that you've taken in connection with your responsibilities for the Eagle Mine?

A Our -- the technical team that works on the -- has worked on those aspects of the project does not agree with the extrapolation of conditions at those sites to what's going to happen at the Eagle site.

Q It looked like part of the closure plan was to seal the portal; is that correct?

A That's correct.

Q Does that mean there would be no access to the mine workings after that occurred?

A That is correct.

Q After that step has been taken, there will be no way to test

subsurface-induced stress levels or otherwise further understand what might be happening geologically?

A You'd have to -- that's not my area of expertise to opine on it. So as to whether or not the folks working for Kennecott that put those aspects of the project together as the mining progresses, as to whether that -- certain tests can be completed and continued to be monitored after reclamation, I don't have an opinion on that, because that's not my area of expertise.

Q Well, do you know of any way that further subsurface testing can occur -- subsurface testing can occur in the years following closure?

A As I've stated, that's not my area of expertise.

Q I'm trying to understand, and I'm referring to what was slide 25, but maybe we can just talk about this. If you're testing, sampling for something like specific conductance --

A Uh-huh (affirmative).

Q And you begin by doing that daily; correct?

A I think we're doing it continuously.

Q Continuously. Okay.

A Yeah; a meter that's continuously monitoring the specific conductance of the effluent as it leaves the water treatment system.

Q Okay. But as I read your exhibit and heard your testimony, it sounded like at some juncture you switched to doing that

weekly and then monthly.

A No; no. What happens there is the specific conductance is continuous monitoring all the way through the operation. The daily monitoring that I referred to is, if you look in the groundwater discharge permit, there's the initial start-up period that lasts for approximately 90 days. And in addition to the continuous specific conductance monitoring that goes on during that period of time, there is also, I believe, daily measurements of samples of water from the water treatment system that have to be analyzed for metals. Okay? And that stuff is reported to the DEQ on a monthly basis, and there are standards associated with all of -- with specific metals that have to be measured in those samples.

After the 90-day period is over, that initial start-up period, then the specific conductance monitoring -- the continuous specific conductance monitoring of the effluent continues. The daily monitoring of samples for metals moves to weekly, so that's what changes from daily to weekly.

Q And what's the significance of the information that you're gathering on a daily basis for the first 90 days?

A It's just to do a very intensive monitoring of the water treatment system to make sure that it's functioning.

Q And why after 90 days do you study that less intensively?

A That would really be a question for the DEQ, because they wrote that condition. But, you know, in -- so I'll leave it at that.
Q Let me ask you a question related to that. Did Foth or, to your knowledge, Kennecott have any input into the conditions that were imposed on this mining permit?
A We certainly had discussions on conditions, and my recollection is the DEQ always went much more stringent than what we would have liked or what we thought was in the rules. They went much more stringent.
Q And you negotiated; correct?
A We did not negotiate.
Q Did you know what these permit conditions were going to be before they came out?
A I believe there were drafts of the permits that were submitted to Kennecott that we did review.
Q Okay. And were you permitted to comment on the draft permit conditions? I mean, was Foth involved in that?
A We certainly -- where there were things that -- you know, based on our understanding of the design of the treatment system, et cetera, since we did have a specific hand in that, that didn't make sense, we certainly provided that information back to the DEQ.
Q You've talked quite a bit about reclamation.
A But to be clear, --

Q Sure.
A -- as far as setting specific numeric standards, we did not have a role in that other than supplying to the DEQ the data upon which those standards are based.
Q You've talked about various forms of reclamation. What reclamation plan is there if there's said crown pillar failure, a collapse?
A The objective of the mining operation is to make sure that that doesn't happen.
Q I understand. I looked at your checklist of the many problems addressed by reclamation. But would you agree with me that there is no contingency plan for a plug failure or a crown pillar failure?
A In what sense? Our contingency plan addressing what?
Q In the event of a crown pillar failure --
A Uh-huh (affirmative).
Q -- or a crown pillar collapse like Athens, like Ropes, like other mines we've seen, what is the plan to save the Salmon Trout River?
A The process of mining the underground orebody is such that there's going to be very extensive testing and monitoring that's going to be completed on the geotechnical characteristics and the stability of the mine so that that doesn't happen.
Q So the answer is, you're betting on the impossibility of

that happening?
A I believe that our -- the technical team that's worked on this permit does not subscribe to the notion of a plug-type failure.
Q So the answer is, there is no plan if it does happen? Is that fair to say, sir?
A You're trying to extrapolate a plug-type failure that occurred at one mine site to this particular mine site, and we don't --
Q I wasn't limiting -- excuse me. I'm sorry.
A Okay.
Q I wasn't limiting my question to plug failures. I'm --
A I thought you referred to Athens.
Q I did, but my original question was, any kind of crown pillar failure, a total failure, is there a plan to deal with that? Because I saw none.
A Again, our -- okay. In a slightly different manner, our technical team does not subscribe to the notion that there's going to be a crown pillar failure of the nature that you're describing, given the type of mining methods and backfilling methods that are proposed for this project.
Q And for that reason you have no reclamation nor mitigation plan for that contingency. Is that fair to say?
A The plan is to monitor the conditions underground as the operation is occurring to not -- to preclude that from

happening.
Q And I guess I'll --
A And that can be accomplished by how you progress the mining; how you do the backfilling and things of that nature.
Q Well, we that -- because it's happened at Flambeau, that human beings make mistakes carrying out plans; correct?
A What mistakes are you referring to?
Q Mistakes in measurement; mistakes in determination of crown pillar fragility; mistakes; human error.
A Those are your words. Okay.
Q Okay. I mean, that's why you have contingency plans for various problems that might occur; right?
A And that's why you also do very stringent monitoring and contingency plans within how you mine and how you develop the orebody. That's where the contingencies are.
Q Well, is the company that's done the only calculation we have about a crown pillar thickness of 87.5 Golder?
A Yes.
Q And this is the same Golder that said two other thicknesses would be safe and have been completely disproven; correct?
A Well, that's your interpretation, but I understand your interpretation.
Q Okay. But that's -- the same company, same people are telling us that 87.5 is safe now; correct?
A They're the ones that have authored the Appendix C-2 and C-3

of the mine permit application in the July 2006 memo on the 87-meter-thick crown pillar.

Q You heard that Wilson Blake said that he thought that Jack Parker and Dr. Bjornerud and Dr. Vitton had raised legitimate concerns about the crown pillar, did you not, sir?

A I heard his testimony to that effect.

Q Sir, I'm trying to relate from -- and this was from slide 40 -- the tens of square miles of watersheds referred to with regard to the potentially affected areas with the area that was actually studied for terrestrial wildlife, which is 92 acres.

A I believe the tens-of-square-miles reference that I had was per the hydrologic studies that were completed.

Q Were tens of square miles studied for any wildlife at all, sir?

A No.

Q Were any wildlife studied for twelve consecutive months in a year?

A The baseline studies that are completed are included in the EIA, and I -- you know, they were completed over the -- I believe in 2004 is when those studies were completed.

Q And they covered seven or eight months in one year; correct, sir?

A They covered the period of 2004.

Q But did they not cover a limited number of months and only one year?
A They did their assessments over various seasons in 2004, targeting specific populations of wildlife that were occurring, say, in the spring or in the summer or in the fall. So for instance, the way you do frog surveys is you go out, and you listen for them singing in the spring when they're mating. So those types of studies were done then. Other bird population surveys were done during the breeding period during certain migration periods, et cetera.
Q For seven months?
A Well, for whatever were the appropriate months during that particular year, yes.
Q Well, you were involved in the design of the -- some of the checklists for compliance with the requirements of the statute and the regulations. Do you recall a checklist that said, "Be sure to do two years of wildlife studies and twelve months each year"?
A I believe that they said two years of data collection, of which one year might -- must be site specific, and one year can rely on other data and other literature citations. That's my recollection of that particular rule.
Q That's what you recall?
A Yes.
Q So in any case, it was the plan actually all along to only

do one year and to not do twelve full months?

A Well, it was -- the plan was to collect what collectively the technical team thought was an appropriate amount of data to do the assessment and also to comply with the rules.

MR. WALLACE: I have nothing further. Thank you.

JUDGE PATTERSON: That will be a good time to break. It's noon.

(Off the record)

JUDGE PATTERSON: Mr. Eggan?

MR. EGGAN: Ready when you are. I'm ready.

JUDGE PATTERSON: Ready.

MR. EGGAN: Are you ready?

MR. REICHEL: Yes.

MR. EGGAN: Good afternoon, Mr. Donohue.

THE WITNESS: Good afternoon.

MR. EGGAN: I don't think I have many questions for you, but bear with me while we go through a few of the questions that I have.

CROSS-EXAMINATION

BY MR. EGGAN:

Q I think we may be able to begin on a subject on which we can agree, and that is I think my notes reflect that yesterday you indicated that the rock at the development rock storage area is reactive. It is reactive, isn't it?

A It's got sulfides in it that can oxidize. That's correct.

Q Yes. And what would happen when they're -- when it oxidizes?
A As part of that oxidation process, you'll generate sulfate, the release of metals and the generation of some acidity that can be neutralized by the neutralizing --
Q I understand.
A Okay.
Q I think where I'm going with this is we have the potential for acid?
A That's correct.
Q The rock that we're dealing with here is -- has the potential to create acid mine drainage?
A That's correct.
Q That's right. And as a result, the mitigation measures that have been taken at this site are extremely important. I think we can agree on that?
A Correct.
Q Now, one of the things I wanted to ask you about from yesterday is, I think I heard you say that how much water that is going to flow into the mine, that's a very important issue, isn't it?
A That is correct.
Q That's a very important issue in any mine?
A That's correct.
Q Clearly, the amount of water that is going to flow into the

mine and then is going to have to be pumped out of the mine is important for pragmatic reasons for mining operations?

A Correct.

Q It was also important -- the amount of inflow was also important in terms of sizing the contact water basins, wasn't it?

A Correct.

Q And the amount of predicted inflow was also very important in terms of sizing the wastewater treatment plant; am I right?

A Correct. It was a component of that. It was a factor that went into that.

Q Well, the wastewater treatment plant was designed on the basis of a maximum of 350 gallons per minute. That's what I read in the permit application. Isn't that what it says?

A That's the design capacity of the treatment system.

Q Okay. And it's also important in terms of the design and sizing of the TWIS. That too -- the inflow was important to that?

A Is that a statement or a question to me? I didn't --

Q It is a question.

A Okay. Yes.

Q Okay. Water quality, the quality of the water that is coming into your treatment system, that's also important?

A The characteristics of the water, the composition of metals

anions, things like that are factored into the overall treatment components of the treatment system.

Q Of course. And I think what I read on your slide is you say -- and I'll give you the first part of it too. You say, "This is a state-of-the-art treatment system tailored to the water." That system was tailored to the water, isn't it?

A Tailored to the different suite of potential constituents that are going to be in that water, --

Q Understood.

A -- cations such as metals and anions such as sulfate and anions such as chloride.

Q And you went through a process of predicting exactly what that water was going to look like. And as you say -- I'm using your words -- it was actually tailored to that.

A Tailored to the composition -- compositional characteristics of the water.

Q Of the water itself?

A Correct.

Q Another word for that water quality? Okay?

A I understand your statement.

Q All right. I'm just making sure that we all agree that your system, your wastewater treatment plant, your treatment system for this water is based on a couple of very important predictions.

A Correct.

Q And those predictions were stated in your application?
A That's correct.
Q And they are inflow rates? They're based on -- we know that the design of a -- of the components was based on inflow rates?
A Yes.
Q And on water quality?
A I don't know if you're making a statement or asking me a question. And I'm not trying to be --
Q I'm asking you a question, yes.
A Yes.
Q Okay. Now, a question about the wastewater treatment system itself. And you talked about it this morning, the reverse osmosis system; the various components within the wastewater treatment plant itself. You indicated that each of those individual components are well tested and well understood. You even said that reverse osmosis is used in people's water systems at home?
A Correct.
Q Are you aware of any other place in the world where all of these components have been put together to treat this kind of acid -- this kind of water from a mine like this, a sulfide mine?
A I am not personally aware of that?
Q Has anybody told you who is involved in this process that

they're aware of that?
A I don't recall that specifically. I just -- I mean, it may have; it may not have. I just don't have a recollection of that.
Q Well, you're the project director, though.
A Uh-huh (affirmative).
Q I mean, I would assume that, since you gave us this long talk this -- that that would be something you would know.
A I don't have a recollection that the folks that designed this have seen each one of these put together sequentially before.
Q In this particular kind of wastewater treatment system?
A Correct.
Q With this particular kind of water?
A Correct.
Q With this particular kind of flow?
A Correct.
Q Okay. It sounds to me like you didn't go to other mine sites in the Upper Peninsula to take a look at those mine sites to see what happened?
A Could you clarify your question?
Q Sure. That wasn't a very artful question. Did you go to the Mather Mine there in Ishpeming?
A No.
Q Did you go to the White Pine Mine?

A No.
Q Did you go to the Athens Mine? I think you said you didn't go to that one?
A No.
Q What about the -- are we saying -- am I saying this right, the Ropes Mine?
A Correct.
Q Those are means generally in the vicinity of this particular proposed mine. You didn't go there?
A No.
Q Did anybody that you know of go there -- anybody involved in this project go there and study those --
A Well, I'm not --
Q -- what happened at those mines?
A Yeah. I'm not sure that, at the time we were working on these projects, that those mines were operating.
Q Well, I suspect they were not operating.
A Uh-huh (affirmative).
Q But my question is, did anybody go there and look at the characteristics of those mines that you know of?
A No, we did not do that.
Q Let's talk for just a second about that -- those contact water basins. Okay? And we have two -- apparently two that are going to be utilized here.
A Well, there's two cells to one basin, yeah.

Q Okay. If the hearing officer or if Director Chester decided that there was a need for additional capacity, that's certainly doable, isn't it; that the company could certainly design another cell or another two cells for that particular contact water basin strategy?

A I suppose they could, yes.

Q Okay. And the design capacity of the wastewater treatment plant, again, if the hearing officer or if Director Chester decided that it needed to be resized on flow or characteristics of the water, it's certainly doable, isn't it, to redesign it, upgrade it?

A I suppose it could be, yes.

Q Likewise, the TWIS. If there was a decision by our hearing officer or by Director Chester to redesign the TWIS to give it more capacity, that's certainly doable, isn't it?

A Sure.

Q And how long -- this is going to sound like a history question, I guess, or a question that you might hear in one of your exams that you took in college. But how long has that orebody been there, do you think?

A Probably on the order of one to two billion years.

Q Yes. And so obviously that's not going anywhere?

A Correct.

Q So it's clear that this is all something that can be done. You want to get this thing underway, and I understand that.

But it is clear that this can -- that all of these could be done if they were ordered by this hearing officer or ordered by Director Chester?

A Sure. I'd want to know what the basis for that was.

Q Of course; of course.

A But, yeah, theoretically it could be done.

Q Absolutely. And I'll give it that you don't think it needs to be done, I suspect?

A That's correct.

Q But others might think it needs to be done?

A That's correct.

Q And well-meaning people on your side of the equation may have made mistakes in terms of calculations and that sort of thing?

A Well, that's your interpretation that there may have been mistakes made.

Q Right. But well-meaning people, maybe on our side of the case, could make mistakes as to what the inflow might be at this particular facility?

A Understood.

Q And the key, of course, is to collect data and to properly analyze the data. That's critical in all this?

A Correct.

Q Okay. A question about -- a couple of questions, actually, about the mine portal itself. Now, my understanding is that

the mine portal is right there at the base of Eagle Rock.

A Well, it actually penetrates the rock a little bit in front of what you currently see as the base of what you described as Eagle Rock.

Q Okay. And I think you said it's going to be somewhat underground --

A That's correct.

Q -- so that the trucks can go essentially under Eagle Rock?

A That's correct.

Q All right. We can agree, can't we, that access to tribal members to Eagle Rock during mining operations is going to be restricted?

A Well, I don't know if I can opine on that, because I have heard of discussions about potentially giving tribal members access to the rock during periods of time on weekends, et cetera, when the mine might be operating but --

Q When the mine -- when Kennecott decides, they may decide to allow the tribe to have access to this site?

A That's correct.

Q My understanding is that, at least as of right now, that area is going to be fenced?

A Yes, there is going to be a fence around the main surface facility.

Q And that main fence is going to encompass all of Eagle Rock?

A That is correct.

Q Were you aware that there was to be a meeting with representatives of the tribe to discuss the cultural and religious significance of Eagle Rock?
A When was that meeting?
Q Well, I -- and, look, I'm -- if this is new information to you, you need to just tell us, and I'll move on.
A Uh-huh (affirmative).
Q But my understanding was that Mr. Cherry of Kennecott was going to be meeting with representatives of the tribe at one point to discuss the cultural and religious significance of Eagle Rock.
A Uh-huh (affirmative).
Q And that meeting was canceled and then never -- it never -- it was never held.
A Yeah. I've only got general knowledge about efforts by Kennecott to try to make overtures and have meetings with the local tribal community there, but I do not know the specific details of those issues.
Q Okay. Once I get in through the portal, I'm going to be driving -- it sounds like I'm going to be driving to the west for some distance, and then I'm going to loop back to the east. Does that sound right? Or am I driving east and then looping back to the west?
A Your latter description is correct.
Q Okay. I'm driving east, and then I'm going to loop back to

the west?

A That is correct.

Q Why is it -- why was it that you drive that period of distance to the east and then back to the west?

A Well, that decline can only be so steep for the equipment to operate as it's hauling ore up out of the mine for that long distance. And so there's a specific decline that's got to be taken into account to -- for design purposes and operating purposes. And so, based on that where you want to get down to your mining levels over by the orebody, you just kind of do the math and back up. And you're going to need a certain distance, and you're going to need that dimension, if you will, to get to your access point over by the orebody.

Q And the truck has -- you have to make it such that a truck can make it around that corner and all of that?

A Yeah; that's correct.

Q Is there any thought that has been discussed with you to extend the actual mining operation to the east right there at that intersection? Has anybody discussed that with you?

A No.

Q That has never been the subject of any discussion?

A No.

Q Isn't there some testing and drilling that's going on to the east of the orebody right now?

MR. LEWIS: Objection, your Honor, as to relevance; also the same objection I placed earlier. It's getting into information that may well be confidential and proprietary to Kennecott; has no relevance to these proceedings nor to this permit.

MR. EGGAN: Well, if there's drilling going on in an area that has been referred to, I think, as Eagle East, maybe it somehow relates to permit-related issues. I guess I'm interested in knowing that.

Q Does it relate?

JUDGE PATTERSON: I'll allow you to --

MR. EGGAN: Yeah.

Q Does it relate to --

A Can you rephrase your question so I understand your line of thought?

Q Sure; sure. Isn't there some drilling going on right now to the east of the orebody in the general direction of the -- of this portal area?

A I am aware that there is additional exploration taking place in the vicinity of the outcrop up there, yes.

Q Okay. And that exploration has to do with the potential for another orebody?

A I'm assuming they're looking for additional regions of zones of mineralization, correct.

Q And so if they find them, have they discussed with you the

possibility of developing that area?
A I have not had any discussions on potential mine plan development or anything like that for that.
Q And no one has mentioned to you the possibility that that incline that goes there initially to the east could be a direct portal to another orebody?
A Your theory is the first time I've heard that. Right now is the first time I've heard that theory.
Q Well, I think it's a good theory, don't you?
A I haven't heard that. You asked me if I've heard anything like that or had any kind of discussions like that. I've never had a discussion like that with anybody.
Q Okay. But there is exploration going on off to the east?
A Sure, there is exploration going on up there.
Q When the mining operations begin, it's going to take a lot of equipment. A lot of activity is going to occur initially as this mining operation gets underway; am I right?
A Correct.
Q And there's going to be a lot of people from the community that are going to be involved in working at the mine facility? I think that's one of the ways that -- one of the reasons for this particular development, is economic development in the community?
A Correct.
Q So there's going to be people working. There's going to be

equipment there. There's going to be all kinds of activity going on. That's going to make -- stopping the process to redesign the wastewater treatment plant or to redesign the TWIS, that's going to make that kind of hard after mining operations begin, wouldn't you think?

A I'm not sure I understand your question, when you --

Q Fair enough; fair enough. You understand that our side of the case believes that the capacity of the contact water basins need to be increased. You understand that?

A Correct.

Q And you understand that we think that the wastewater treatment plant needs to be redesigned?

A Correct.

Q And that the TWIS needs to be redesigned to be resized?

A Understood.

Q And even reconfigured, reoriented?

A Based on the proposed project is my understanding of what you believe there.

Q That's right.

A Okay.

Q And so from our perspective, that needs to be done. And at least some of the cross-examination of our witnesses has suggested that this can happen after mining operations begin or after things begin, but you, as project director, know that's pretty impractical, isn't it?

A For what? Redesign of facilities?
Q Redesign of the facilities.
A No. Facilities can be redesigned. They may have to be re-permitted, but they can be redesigned.
Q Are you willing to go back and give a new permit if they need to be redesigned?
A I think -- can you be more specific? I mean, we're --
Q Sure. My specific question is, isn't it prudent to get this -- to get any redesign that needs to be done now before mining operations begin? That's my question.
A I think we would both agree that it's prudent to have a good estimate of what the inflow and what the conditions in this mine are going to be upon which to base the design of these facilities.
Q Understood. And if the predictions that you made are incorrect, it would be important to go and redesign these facilities now as opposed to waiting until after mining operations begin?
A In response to your question, I'm not agreeing with your assessment that the predictions may be so wildly off that the design of these facilities is under designed.
Q Understood. But it would be prudent, if they were off, if they were incorrect and redesign is necessary, to do it now rather than wait until after mining operations begin?
A Correct.

Q Okay. With respect to the groundwater discharge permit application, did you review the groundwater discharge permit application --

A Yes.

Q -- and all of the attachments?

A Yes.

Q Did you also review the reports and documents that were submitted by the subcontractors that you utilized as part of that process?

A I think most of the people that we worked with on that outside of Foth were consultants directly to Kennecott, so they weren't sub-consulted to us in terms of a contractual relationship that you're referring to.

Q Okay. I guess what I'm getting at is, you indicated to Mr. Haynes this morning that, when it came to the mining permit, you generally reviewed documentation, but I want to make sure that that's what you did with this. You generally reviewed documentation supportive of the groundwater discharge permit application also?

A Correct.

Q Generally as opposed to going through all the calculations and analyzing them yourself?

A Yeah. I did not redo every calculation that's contained in those permit applications.

Q When you were involved in the work on the environmental

impact assessment, you indicated that one of the matters that you were supposed to review was the cultural, historical and archeological resources in the vicinity?

A Correct.

Q Did you walk to the top of Eagle Rock and see whether there were cultural, archeological or historic uses of the top of Eagle Rock or Eagle Rock --

A I certainly walked across that site. I walked to the top of the rock and walked across it, yes.

Q Okay. And my guess is you have seen evidence on the rock itself that it is used for cultural and historical uses?

A What evidence are you referring to?

Q Well, have you seen things tied to trees up there?

A Not when I was up there, no.

Q Are you aware that people do that as part of their religious activities?

A I've heard that there has been recent utilization of the site for those purposes, yes.

Q Your condition is that they just started using it so they could somehow interfere with the mine?

A No. My position is, when I was up there, I did not see evidence that you referred to.

Q When were you up there?

A I've been up there -- I was up there in July of 2006. I was up there, you know, a few times before that, but I haven't

been up there since probably July, August of 2006 actually at the site. When I was up there in July 2006, I know the evidence to which you referred to, I did not see that up there.

Q Okay. If it was there, you didn't notice it?

A I didn't see it.

Q I do have one question for you.

MR. EGGAN: Could you please show me DEQ Exhibit 25?

Q Mr. Donohue, my question is this: We -- this is figure 7-3. It's called the "post-reclamation groundwater quality monitoring plan."

A Uh-huh (affirmative).

Q That's what it is a figure of. And what I am looking at is this black line on this document.

A Uh-huh (affirmative).

Q And I'm showing you this black line. And I'm wondering if you can tell us exactly what that black line represents?

A That black line represents a plan view outline of the major -- of the mine and the mine workings that are going to be developed for the mining project. So if you were to look down into the ground, look at the access ramp and all the drifts, the backfill plant and all that kind of stuff and then draw a line around that, that's what that line is. So in essence that's a footprint of the underground mine.

Q The whole mine?
A Yes.
Q Because as I have looked at this in the past, I did not know that it extended this far over to the east or this far to the west. I guess I'm confused by this.
A Well, again, you know, there's a number of graphics that went into the generation of that line, but that includes the spiral ramp, the drifts and things like that that are used to access the orebody. Specifically what's causing that black line to extend a little to the west of the red line, I'd have to go back and look at that.
Q Okay. You're not sure?
A At this point in time, no.
Q Okay. The peridotite is in this area, I believe, to the east. Is there a plan to mine out the peridotite?
A No.
Q This will be an area that we may want to explore with others, but what -- note 7 on this document -- and you probably can't see it -- is -- note 7 says this is -- describes this as, "The limits of underground mine includes all mine workings except the decline. Includes limits of peridotite." So does that help you?
A Yeah. Then that may be why the black line extends out to the west.
Q Well, why would the black line -- if we are working on the

orebody --

A Uh-huh (affirmative).

Q -- and we intend to include the mine workings, why would it be important for this area to extend in the area of the peridotite?

A 'Cause the peridotite contains the host ore. That's --

Q Okay. So you view that as the confines of the peridotite, then?

A With regards to how we developed that black line, yes.

MR. EGGAN: That's all the questions I have. Thank you very much, Mr. Donohue.

THE WITNESS: Thank you.

MR. LEWIS: Back to me?

JUDGE PATTERSON: Back to you.

MR. LEWIS: All right. Just a couple things, Mr. Donohue.

REDIRECT EXAMINATION

BY MR. LEWIS:

Q There was some discussion earlier about the time in which the flora and fauna studies were done I believe as a part of the environmental impact assessment, and I believe you indicated they were done in 2004. Do you recall that?

A Yes, I do.

Q Were there subsequent studies?

A Yes, there were.

Q When were those?
A There were subsequent studies done on wildlife and aquatics and biological resources in 2006 and 2007.
MR. LEWIS: That's all I have. Thank you.
MR. REICHEL: I have no questions.
JUDGE PATTERSON: Last chance.
MR. HAYNES: Nothing further, your Honor.
MR. WALLACE: I have a question based on a question Mr. Eggan had.
JUDGE PATTERSON: Okay.

RECROSS-EXAMINATION

BY MR. WALLACE:
Q The access tunnels, that begins at the portal, and you said a truck would drive underneath basically Eagle Rock? That's the --
A Correct.
Q And what's the -- what are the dimensions of these tunnels roughly?
A There I believe the tunnel is about 15 feet in diameter, is my recollection, but I'd have to go back and look at the application.
Q Is that basically the tunnel diameter for the entire mine workings?
A The diameter of various openings varies, so obviously the decline is going to be larger than some of the drifts and

the crosscuts going into the actual orebody.

Q And how large -- how long are the total tunnels?

A I don't have that number off the top of my head.

Q Is it some miles total?

A I assume it would be.

Q Are these tunnels going to be backfilled when the mine is closed?

A No; only where I indicated on the diagram that I had in the PowerPoint presentation.

Q So there will be several miles of void, 15 by 15 or whatever, maybe larger, maybe a little smaller, with no backfill in it after the mine closes?

A That is correct.

MR. WALLACE: Okay. Thank you.

JUDGE PATTERSON: Thank you.

(Off the record)

MS. HALLEY: Petitioners call John Coleman.

REPORTER: Would you raise your right hand? Do you solemnly swear or affirm the testimony you're about to give will be the whole truth?

DR. COLEMAN: I do.

JOHN COLEMAN, PH.D.

having been called by the Petitioners and sworn:

DIRECT EXAMINATION

BY MS. HALLEY:

Q Dr. Coleman, would you state your name and spell your last name for the record, please?
A Dr. John Coleman, C-o-l-e-m-a-n.
Q Where do you live, Dr. Coleman?
A I live in Madison, Wisconsin.
Q Could you describe your education after high school for us?
A I started my college career in University of Maine in Orono. I got a degree -- undergraduate degree in wildlife and forestry at the University of Maine. And then I went on to Virginia Polytechnic Institute and State University in Blacksburg, where I got a degree in wildlife science and fisheries, and that was in 1985, I believe. And then I went on -- after that I went on to get a Ph.D. at the University of Wisconsin in Madison; got a degree in wildlife ecology with a minor in statistics.
Q And did you do some research projects for your Ph.D.?
A Well, for both my master's degree and Ph.D., those programs required multiple years of research and theses, so I did -- my theses focused on resource distribution, modeling and analysis of resource distribution used by wild animals and modeling and analysis of the movements of those animals to use resources, so that involved both using existing software programs for conducting those kind of models and developing software programs of my own in Fortran and Pascal and Basic.
Q Did you conduct sampling design as part of your Ph.D. work?

A Yes. Both my master's and my Ph.D. program involved sampling, both random sampling design programs and stratified sampling for natural resources that animals were using and sampling of animal activities, so there were a variety of sampling programs during both those research projects.

Q Did those encompass the use of parametric and nonparametric data analyses?

A Yeah. Animals have the unfortunate tendency to not act in totally predictable ways, and so some of the data sets that we collected had to be analyzed using nonparametric methods. Also in some cases the sample sizes were relatively small, and some nonparametric methods are better for small sample sizes. But most of the analysis was using standard parametric tests, which assume certain distributions underlying the data sets.

Q Before we talk about your current position, you did some work in Florida, I think -- I believe after your master's degree. Could you describe that?

A Yeah. For a little bit over a year, I worked in Florida for the Florida DNR. There was a project to restore the Kissimmee River, which is the river that flows into Lake Okeechobee that feeds the Everglades. It was part of the broader Everglades restoration effort. And that program was to redirect the flow of the Kissimmee River. It had been

channelized by the Army Corps of Engineers and -- to redirect that flow back into the flood plain. And our -- my part of the project was to look at the change in vegetation due to change in hydrology due to this re-flighting of the flood plain.

Q And who do you work for now?

A I currently work for the Great Lakes Indian Fish and Wildlife Commission.

Q And what does the Great Lakes Indian Fish and Wildlife Commission do?

A It's a natural resource agency. It's an agency of 11 Chippewa tribes that have hunting, fishing and gathering rights in what is called the Ceded Territories, which are lands in Michigan, Wisconsin and Minnesota that were ceded to the U.S. Government back in the 1800's. During those treaties the tribes retained the rights to harvest a number of resources within those Ceded Territories. The Kennecott Mine is in the Ceded Territory of 1842, and so our member tribes have rights within that Ceded Territory and have concerns about activities within that Ceded Territory.

Q And did you go to work for GLIFWC immediately following your completion of your Ph.D.?

A Yes. I started working for GLIFWC in 1994 working on analysis of models being used in the Crandon Mine project proposal.

Q And how long were you in that position? How long did you do that?

A Well, I've been working for GLIFWC since then, but that initial position was titled a mining specialist, and it focused very closely on hydrologic models at the Crandon site, and that was my primary responsibility during four years working for GLIFWC. After that I got a position as the environmental section director at GLIFWC, and I thought that there would be a shift of responsibilities, but in fact it was just additional responsibilities were added. So I continued my work on mining and took on some -- I ended up supervising several employees working on various environmental issues.

Q Can we talk a little bit about what you did in your reviewing of the Crandon project? How did you go about that? What were your responsibilities related to reviewing that mine?

A Well, that project actually initially started back in the 70's. Then it went dormant for a number of years and then was restarted in the early and mid 90's. So there was a great deal of documentation when the project restarted in the early 90's, about '94. There was a lot of historical documents that needed to be reviewed to get up to speed on that project, and so I was asked to review that -- those historic documents from the previous permitting effort.

Then during the permitting effort between 1994 and 2003, there were thousands and thousands of pages of documents -- technical documents primarily that I reviewed.

Any primary focus during that period was looking at hydrology, both groundwater and surface water hydrology. But I also -- because of significant tribal concerns about environmental issues in general, I also looked at most of the documents related to that mine project.

Q Did you work in conjunction with the USGS on groundwater modeling?

A Well, there was -- with that project there were a number of modeling efforts. The permit applicant submitted some groundwater models. I developed some groundwater models to better understand the models that were being submitted by the permit applicant. The USGS and the DNR in Wisconsin developed some models or some sub-models of what had already been developed. And during that process I worked with the staff that were working on those models to come up with potential parameter sets to use in the models or ideas on -- particularly on how to help interactions between surface water and groundwaters.

There was some real question about impacts to lakes. And so it was kind of a tricky issue to adequately model interaction between the water in the lake and the groundwater. So I worked pretty closely with a couple USGS

modelers on those issues. They were their models, but they were open to working together with me on what were appropriate data sets. I did some intensive modeling of some lakes at the site, and they ended up using some of that -- the output from that modeling as inputs to their models.

Q And how about wetland characterization?

A Most of the work I've done on wetland characterization has been related to hydrology. We had -- at the Crandon site there was also a program for looking at water levels in lakes and adjacent wetlands because of the concern I mentioned about impacts to those. And we had a cooperative project with -- towards the end of that whole permitting sequence, a cooperative project with the USGS to measure water levels in wells at lakes and wetlands in the area. And we continued some of that work -- when that project terminated, we continued some of the work that we had begun with the USGS, looking at water levels in wetlands and lakes with the idea of trying to restore some historic hydrology in those that had been modified early in the century.

Q And did you also develop service water models looking at runoff and discharge?

A Well, there was -- you know, that project tried to integrate groundwater impacts with surface waters in the forms of lakes and in wetlands and also how groundwater impacts from

the mine and might interact with stream flows. And so the EPA developed a surface water flow model for the streams in the area, and we assisted by providing topographic data for that modeling effort. We reviewed their models very closely and worked with the EPA on that modeling effort so -- and then, for my own analysis of things like runoff from the tailings management area, there was going to be a large landfill-type aboveground storage of tailings. We did some -- used GIS and some other models to look at stream flow off of those tailings piles so -- and those were relatively small models compared to the EPA's effort to do an extensive stream flow model in the area.

Q All right. Now, what did you say your current position is at GLIFWC?

A Well, my current position is I oversee the environmental section for the Great Lakes Indian Fish and Wildlife Commission. We look at a variety of environmental issues primarily related to contaminants. We have a program for sampling fish across the three states looking at mercury in inland lakes. We have the largest data set on mercury in the country. And we also look at other contaminants in Lake Superior. We don't do a whole lot of work in Lake Michigan for sampling fish, but we do have extensive database and sampling program from Lake Superior. We also have in the past sampled -- water sampled and sampled plants and fish in

watersheds that we identified as potentially subject to mineral development. We had a program a number of years ago where we tried to use what geologic data was available to identify potential sites for mineral development. And I'm sure our methods were not as good for identifying those sites as the mineral companies, but we tried to make some best guess and collect baseline data so we'd have baseline if those projects moved forward. So we had water sampling, wildlife sampling. We sampled crayfish and walleye for contaminants -- not for contaminants which we were establishing baseline but to get some baseline data. And then, at the Crandon project, we had a very extensive sampling program that primarily was under my stuff that I did myself physically. But a couple of the other people in the environmental section sampled water. At the Crandon site we had 22 sample sites that we sampled quarterly, and that was a very close cooperation between the DNR and the USGS, where a part of the sampling was funded by us. Part of it was funded by the DNR, but we all went and out and collected together. It was low-level metal sampling for -- to detect the low levels of metals that occur in naturally -- natural stream. And we had a particular focus on mercury that required some techniques that had been developed by the USGS offices in Wisconsin for sampling mercury at very low levels.

Q Now, as the environmental section leader, do supervise staff?

A Yes. The staff levels sort of go up and down depending on resources available. But we currently have three staff in the environmental section. We had six staff on until fairly recently. And they do a variety of things, including, well, this walleye sampling program. We also have -- they participate in development of regulations or guidance for regional approaches to reducing contaminants to Lake Superior. Lake Superior is a big concern for our member tribes, so we have a representative on national and international working groups for reducing contamination to Lake Superior. We also have a person that works on spatial analysis. He does -- uses GIS and other spatial models to look at natural resources. He now is spending a lot of time on mining and spatial analysis of mining projects, because mining is moving forward in a lot of places, particularly Michigan and Minnesota.

Q Okay. What are your responsibilities in your current position related to mining?

A Well, I have a number of responsibilities. The mining seems to have taken over 99 percent of my time. I have, you know, supervisory responsibilities, but I'm almost 100 percent at this point doing mine review. I review several projects in Minnesota, mine projects; a taconite mine coming up for

renewal of its water discharge permits, working very closely on that with the state out there. But probably the biggest responsibility other than the Eagle project here is a large sulfide mine that's being proposed near the iron range, the Polymet project, which is very large. And that takes many, many hours and I spend a lot of time meeting and conference calls with state staff out there, the Army Corps of Engineers, the National Forest Service, the Minnesota DNR and the Minnesota DEQ are all involved and have multiple staff working on that project. And we have regular meetings to discuss that project. There are hundreds of -- over a hundred technical documents that we are reviewing. So that's one of the being responsibilities. The other big responsibility I have is reviewing environmental documents and environmental issues related to the Eagle project.

Q How about supervising or running sampling projects? Do you collect baseline samples still?

A We have -- we currently have a sampling project for water quality in the Yellow Dog Plains area. We've -- as I mentioned, we've had other water quality sampling programs. We don't currently have any in Minnesota. I guess we don't have anything right now going on in Wisconsin. Primarily our sampling has been -- water quality sampling has been related to either proposed mines, active mines or potential mines. But right now I think our only sampling program is

in the Yellow Dog Plains.

Q Okay. And what about GIS, or global information systems? Do you work with that as well?

A That I don't do as much as I -- that's something I enjoy doing, because it's very spatially oriented. It uses my computer skills. And I don't do as much as I used to. We have another staff person that does a little bit more of that. But I still use it for analysis of spatial data related to mines. For example, I just recently for the Eagle project was looking at the access workings, the different layers of access workings at the site and was able to use GIS to show how they overlay with other resources or other features, such as wetlands or streams at the site. So I use GIS fairly frequently for analysis on mine projects. But I don't make fancy maps a whole lot anymore, which was fun. You get to do a lot of sort of artwork on it.

Q All right. How long have you been reviewing mining applications?

A Since 1994 it's been most -- almost 100 percent.

Q Now, do you have experience characterizing surface and groundwater flow and mine dewatering impacts?

A Surface and groundwater flow and mine dewatering impacts? Yes. Maybe I'll try to -- remind me if I miss something, because those are, you know, multiple things. Groundwater mine dewatering impacts, the Crandon project, an extensive

program as I mentioned, to model potential impacts from the underground mine at Crandon. So as I mentioned, I developed scoping models for my own use during that project. I reviewed other people's models for that project. I'm also in the process of reviewing and have begun to review groundwater models for the Polymet project in Minnesota and have reviewed the groundwater models for both the mounding at the TWIS and the mine inflow at the orebody for the Eagle project. I developed a couple models of my own for the TWIS and the orebody, a scoping model, simply to better understand what was happening at the site and better understand the models that were being presented by the applicant.

Q Over your years of experience, about how many models have you developed yourself?

A I would guess 15 to 20.

Q All right. And how many mines have you been involved in reviewing?

A Well, this Eagle project obviously, the Flambeau Mine in Wisconsin. I spent quite a bit of time reviewing that. The Polymet Mine in Minnesota, the Minntac iron mine in Minnesota, and the Crandon Mine. Did I mention that? So five, maybe six. I mean, those are the ones that I've worked, you know, hundreds of hours on each.

Q All right. Okay. And how about experience reviewing

geochemical data?

A Well, I'm not a geochemist, but I spend a lot of time looking at geochemical data, because that is a lot -- with the sulfide mines, that's a major component of the environmental concerns, what kind of leachate might be derived from the waste rock or the ore. So I've looked -- I've spent I hate to think how many hours reviewing leachate data from the Crandon Mine that -- I think Foth and Van Dyke developed that leachate data. And I'm currently reviewing leachate data, geochemistry data from the Polymet Mine in Minnesota. I've looked at the data for the Eagle project. But, you know, what I'm looking for is are there -- you know, my experience is in statistics and data analysis and looking for outliers, things that look different than other data sets is really what I'm looking for in those things.

Q Okay. And how about your review of hydrological data? Have You had occasion to do that in looking at mines?

A Well, you know, you can't develop models for a surface water and groundwater without looking at hydrological data, at least I would hope not. And so I have looked at a huge amount of groundwater and surface water data. At the Crandon project there were over 350 wells drilled at that site for characterizing the water levels in the aquifers. That was used in both GIS models and other things like MODFLOW where characterizing the aquifers. At the Eagle

project have looked at the borings and the well data. So, yeah, I've looked at an awful lot of data.

Q How about water chemistry data?

A Water chemistry data? Well, we have sampling programs, so I clearly look at our own data. I've looked at water chemistry data for all of these projects. The iron mine project out in Minnesota, that's mainly a water chemistry issue because the project's been operating for many, many years. But it's got water -- well, high levels of sulfate and some other things in their discharge water that's adversely effecting and has killed off wild rice in a number of lakes in the area. So our member tribes are real concerned about that. And the company's making an effort to reduce their discharge levels. So I've looked at a lot of the chemistry data there, too.

Q All right. Now, how about designing water quality sampling programs? You mentioned that you've done that at the Eagle site. Could you describe a little bit about what you've done there?

A Well, we, you know -- I mentioned that we had a water quality sampling program at Crandon and we sampled at potential mine sites at the Eagle site. We have been sampling trying to get a handle on baseline for particularly metals, but some field parameters at tributaries to the Salmon Trout River. We are also interested in whether there

is variation across the water -- subwatersheds of the Salmon Trout River. So we currently have I think 12 sample sites across the area where we four times a year collect water samples for analysis.

Q Okay. Could you go over to the map and just point out the general vicinities of where you're collecting data? And so when did you start collecting this data?

A We started collecting -- well, 2006 we collected a little bit, but our real sampling program didn't start until 2007.

Q And how is that work funded, Dr. Coleman?

A We have a grant with the Fish and Wildlife Service. We got some funding from them to do the sample collection and analysis. So this is not the map that I typically like to use, but I guess this is what we've got. So, oh, my goodness. Where -- this is not --

Q Well, the red outline in the middle is the proposed mine site.

A Yes. All my maps emphasize the stream, particularly the Salmon Trout River, which is right through here (indicating), so and the Triple A Road which is across here. So we have sample sites on the Northwest Road runs through just northeast of the mine site. And so we have a number of sample locations along the Northwest Road. And then we have some sample locations that are slightly upstream in some of these tributaries. So most of our sample sites are in these

smaller tributaries that are downgradient of the proposed mine with the idea that it's a good idea to have some baseline for groundwater discharging to the surface downgradient of the mine.

Q Okay. Now, in addition to developing and implementing this water quality sampling program at the site, have you also developed hydrological models of the area and the mine site?

A Well, I think I mentioned earlier that I did some scoping modeling of the TWIS to better understand what was being done there, and some scoping models of the mine. Well, I actually first went -- I mean, to do that at the mine, developed the MODFLOW model of the aquifer, the surficial aquifer, across the whole mine site, so a fairly extensive area, not as big as -- not an area as big as that, but covered 90 percent of the Yellow Dog Plains and used what well data was available to try to characterize the water table. And then to see what effect the mine might have on the water table, did some scoping modeling on putting some well in the modeling. I put wells -- what are called well nodes in the bedrock to see what effect the mine might have. I wanted to do more at that point, but there wasn't really enough data about the characteristics of the bedrock to come up with a really good model for how water might flow into the mine. I felt I couldn't really do an adequate modeling job. So that was probably about a year and a half ago I

stopped working on those models because I didn't feel like I really had the materials that I wanted to really go much farther than what I had already done.

Q So are you saying that the application didn't provide the data that you felt would be necessary to develop some sort of definitive model?

A I didn't feel comfortable with -- I didn't feel it was worth my time or feel comfortable with coming up with some sort of final product or even close to a final product with the amount of information I had, particularly on the bedrock.

Q Okay. Now, Dr. Coleman, are you familiar with Michigan's rules that govern metallic sulfide mining?

A Yeah.

Q And how did you become familiar with those?

A I spent over a hundred hours -- it seemed like 5,000 hours -- but in work group meetings developing those rules, participated in all those meetings that were held for the 625 rules.

Q All right. Now, in your participation with that work group, was the rule development a consensus process?

A No, I wouldn't -- I wouldn't characterize it exactly that way. There was a lot of discussion, but ultimately some of the things that went into 625 were certainly not consensus. In fact, there were some things that we thought were consensus and ended up -- the rules ended up different than

what my impression was. Well, GLIFWC had a couple representatives there, and that's why I say "we." We thought there was sort of agreement between the participants in that work group on certain things that ought to be in the rules. And that work group had all sorts of representatives, consultants, mining industry, environmental groups and tribal groups. And the rules turned out a little different than we thought the consensus was on some issues.

Q All right.

JUDGE PATTERSON: Doctor, you're referring to 625?

THE WITNESS: Yeah.

Q We just need to clear that up. It's Part 632 is the statute. I think you're referring to --

THE WITNESS: I'm sorry, sir. 625.

Q -- the rules are --

A 625.

Q No. The statute is Part 632, but the rules are 425. So --

A Okay. Yeah. But yes.

Q That's okay. Just so the record's clear.

A Okay.

Q You're talking about the rules, not the statute?

A I am, yes; the rules.

Q All right. Okay. Dr. Coleman, in working across the Midwest on mining issues, have you had occasion to compare the regulations in Michigan to the regulations in the other

states in which you work?

A Well, across the Midwest -- I would say quite across the Midwest. I don't work in Missouri that's got some really mining -- interesting mining problems. But I do work in Michigan, Wisconsin and Minnesota. And things are very different between the different states. Right now we're involved in an EIS process for the Polymet project. We're part one -- there are a number of cooperators on that EIS. I think I listed them before; the Army Corps of Engineers, the state DNR and DEQ, and the forest service. And one of our member tribes is a cooperator on that EIS also. So we represent our member tribe at those meetings and are involved in reviewing the documents, writing early drafts of EIS chapters. So we work very closely. In fact, it's exhausting working on that project, because we're so involved in that project. At the Crandon project we work closely. We weren't cooperators on the state EIS process, but we were cooperators and there was a parallel federal process overseen by the Army Corps of Engineers. And we were -- represented our member tribes as cooperators in that EIS. And we're involved in writing draft chapters that EIS, which eventually didn't happen because the project was withdrawn. And then --

Q So my question is how the rules and regulations themselves compare to each other.

A Rules and regulations compare?
Q I mean, it's been said that Michigan's statute is the best in the nation.
A You know, the --
Q And I'm just wondering from your perspective.
A You know, between the three states, to be honest, you know, they all three states have good aspects to their rules. But, you know, ultimately what we found over and over again it all depends on who's enforcing the rules. And you can have great rules and, if they don't get enforced, then it doesn't matter. Wisconsin, I think some of their rules are not as great as other states, although they've got some good aspects. But they had some very rigorous staff that were working on making sure that those rules that did exist were followed to a T. And I think that meant the project there that was proposed had to meet some very high standards. Still, sort of getting a feel how the rules in Minnesota are going to be implemented, but it looks like the regulators there are very interested in making sure that the rules are followed to the letter and the environment's very closely protected. So, you know, I think Michigan's rules are good in many aspects and have some real good points in them. I'd hate to think that they didn't after spending so many hours in the work group. But like I say, it really depends on how they're enforced and if there are adequate resources to

enforce them, for that matter.

MS. HALLEY: I move to admit Petitioner's Exhibit 121, which is Dr. Coleman's resume.

MR. LEWIS: I think it's already been stipulated, but no objection.

MR. REICHEL: No objection.

Q Dr. Coleman, have you reviewed the mining permit application for the Eagle project?

A Yes, I have.

Q How about the EIA?

A Yes, I have.

Q How about the documents that --

A Appendices?

Q -- were submitted later?

A Yes. I've submitted what -- all the documents that seemed relevant, looked at -- the DEQ submitted a list of 91 questions to the applicant. Kennecott responded with responses to those 91 questions. I reviewed that. I reviewed DEQ's responses to public comments that came out in 2007.

Q All right. And you referenced the appendices. You've read the appendices that are relevant to your testimony today?

A Yes; yes, I have.

Q And you said that you've been to the Yellow Dog Plains. I wonder how many times do you suppose you've been there?

A I would say ten or so, maybe a little bit more than that. I was last there April 10th or 11th, 12th, and plan to go back fairly soon. I'd be there now if I wasn't here, I guess.

Q Okay. Now, what do you normally do when you're there?

A It's varied over the years, but initially was primarily to get an understanding of the lay of the land, the topography, where the project would be, what are the natural features in the area. We had a botanist that came to the site with me and looked at some of the botanical resources in the area and I believe submitted comments maybe on the mine project on his own. But so a lot of it was early, was just survey work, looking where wetlands occurred, looking where streams occurred. More recently, as I said, we've been doing our water sampling program to characterize the water in the Salmon Trout River.

Q Okay. Now, are you familiar with the development rock backfill plan?

A Yes. And I think that's section 4.6 of the mine permit application. I've read that, although it's not a terribly extensive section.

MS. HALLEY: Okay. Now, an exhibit is on its way here, which is 25, Figure 4-31.

Q Could you describe for us what this diagram is representing generally?

A Okay. You know, I haven't been to all these hearings, so I

hope this isn't too redundant. But this diagram here shows an example of some of the stylized example of the stopes, some of which are backfilled. These are the stopes that have been mined out and backfilled with primary backfill, these here (indicating), every other series of stopes. And this one is in the process of being backfilled. And here is the backfill process for primary backfill, which is cemented aggregate. That cemented aggregate -- or cement mixed with aggregate is hauled to the top of the stope by a truck and then dumped into the stope where it then solidifies. The process for the secondary backfill is a little different here. The alternate stopes are filled with secondary backfill. Here in this diagram one is shown as filled in. It's a very similar process to this except that the -- it's not a mix of cement and aggregate, but it's a loose development rock that is dumped in by the trucks from the top of the stope until the stope is filled up.

Q Okay. Thank you. Now, what exactly would be going into the secondary stopes pedicularly?

A Well, the secondary stopes, as I mentioned, will hold development rock, although I think there's a plan if there's not enough development rock available a little bit of aggregate could be used towards the end of the mine project. And that development rock is rock that's been mined out of the -- mined out of the surrounding rock around the orebody

to gain access to the ore. And I think there have been some -- I think Mr. Donohue showed some diagrams showing those access workings. And so that's the rock, these tunnels -- 15 foot diameter tunnels I think he mentioned would be -- that rock would be hauled to the surface initially and stored in the temporary development rock storage area. And then for about the first four years when the development rock is needed, it would be hauled back down underground to be used in the secondary stopes. Some of the development rock would never be stored above ground, but backfilled directly into the secondary stopes. There's additional sum of the development rock would be used for roads in the underground mine.

Q Okay. Now, we've heard some testimony talking about the terms "leachable" and "acid generating." Could you just give us a brief summary of what those two terms mean?

A Well, leachable is just a material that will -- constituents will shed -- it'll shed constituents into the surrounding water when exposed to water. So it happens with a lot of materials. Some materials are more leachable than others. Acid generating is material that when exposed to air and water, if there's a sulphur content that the sulphur reacts with there in the water to create acid conditions which facilitates the leaching of certain metals.

Q Okay. Now, based on the application, is the development

rock that would be put back into the secondary stopes leachable and acid generating?

A Yes. According to the application -- and there's a diagram here that development rock consists of two classes of rock. Country rock here is shown as -- and it's a diagram where the various samples represented by these black dots are categorized as either nonacid generating of uncertain generating capability, or acid generating. And the majority of the country rocks were classified as acid generating. 37 of those samples were. If you'd go on to the next page?

MR. REICHEL: Excuse me. Counsel, just for clarity of the record, could you identify what's being displayed?

MS. HALLEY: Yeah. This is DEQ Exhibit 28, Appendix D-2, pages 20 through 22.

MR. REICHEL: Thank you.

A And then this is the intrusive rocks, which is the other category of rocks that would be development rocks. And again, the majority of the samples of those were classified as acid generating. So they're both leachable and acid generating, at least the majority are acid generating.

Q Thank you. Now, after the backfilling process with this development rock characterized as acid generating and leachable, what would happen in the mined out area?

A Well, the mined out area I think was covered earlier by Mr.

Donohue would be -- would flood with groundwater. And so that area would be saturated with groundwater.

Q Okay. Now, what does the application say the quality of the groundwater would be in the reflooded mine?

A Well, application indicates that there would be some -- there's analysis of that in I think it's Appendix D-5 of the mine permit application. And it indicates that some parameters, particularly nickel and iron would exceed groundwater standards in the reflooded mine.

Q And why would that -- does that surprise you that --

A No. You know, I think in a sulfide mine you'd expect constituents to be significantly higher than background when you mix development rock, which is leachable and potentially acid generating, with water. You would expect constituents to be quite a bit higher than background.

Q Okay. Dr. Coleman, this is DEQ Exhibit 29, Appendix D-5. And we're going to look at page six.

A Okay. And this is just the results that I was talking about. Do you have a particular question related to this?

Q Well, I'm wanting you to talk about nickel and iron, since those are the parameters you brought up.

A Yeah. Iron here is above groundwater standard. And wherever nickel is here, 1.77, was identified as above groundwater standards. And that's identified in Appendix D-5. Actually, what struck me -- first struck me as when I

looked at this table was this low sulfate number of 28 milligrams per liter. It struck me as very low for a sulfide mine.

Q Why is that?

A Well, it's just you've got a lot of sulphur. And other mines that I've looked at, if you mix waste rock with water, the other mines have always gotten a lot higher values of sulfate than that.

Q All right. Now, since the application was filed in 2006, have you gotten any answers about why that sulfate is so low? Has there been any more information about it?

A Answers from?

Q Well, in the course of looking at subsequent materials submitted by the company.

A No.

Q "No"? Okay. Now, do you believe that the mining permit application realistically describes the generation of contaminants in the reflooded mine?

MR. LEWIS: Objection, Your Honor; foundation and qualification. The witness testified earlier he's not a geochemist. He's apparently being asked questions now seeking to elicit opinions and conclusions as to the geochemical calculations for this mining.

MS. HALLEY: Your Honor, Dr. Coleman is very experienced in looking at mining, including geochemistry, as

he said. And he is fully capable of reviewing an application and figuring out what's going right with it and what's going wrong with it. And that's what we're going to be talking about. He's not going to be testifying about specific geochemical equations or anything like that.

MR. LEWIS: I guess the question was posed to solicit that kind of opinion and conclusion. Perhaps we could start with a different question.

MS. HALLEY: I'll start with a different question.

Q Dr. Coleman, did you observe any conflicting data in the mine permit application?

A Yes, I did. I'm mainly a statistician and data analyst. At least that's a lot of my background. And so I started by looking at what were the inputs to the models used for calculating the water quality in the reflooded mine. And these are not complicated models. They're simple spreadsheet models that take some inputs and use a spreadsheet to do admission, multiplication and subtraction to come up with estimates of what the water quality might be. And so I saw that some of the inputs to those model were stated in the mine permit application text. Yet, when you looked at the actual models, the data that was used in those models was significantly different.

Q So were there any particular areas that stand out?

A Yeah, there were. Actually, ended up being four areas that

there seemed to be some real differences between what was stated in the mine permit application and what was used in the models. In the first area that I caught my attention was that the volume of rock -- development rock that was used in the calculations was much less than the mine permit application said would be backfilled in. I think it's Table 4-4 maybe of the mine permit application that has a --

Q We'll get --

A Okay.

Q Just why don't you list the areas in which you saw problems with --

A So there was -- it seemed like a lot less rock -- development rock was being used in the model than was actually going to be backfilled. The other area was the amount of groundwater. Groundwater was a component of the spreadsheet models and the models used groundwater to dilute the constituents and come up with a final number. The inflow to the mine was used in the model is different than what was stated in the permit application. Then the particle size of the development rock is a critical component of any estimate of water quality, because the constituents leach from the surface of the rock rocks, and the size of the rock particles determines how much the surface area is. So the particle size in the mine permit application text was different than the particle size in the

model. And finally, the leaching data that was used, there's a very clear table in the appendix that says this leaching data was used for the analysis. But if you look in the spreadsheet, a different set of data was used. So those things raised my eyebrows, and I started looking at them a little bit more.

Q Okay. Now, Dr. Coleman, you weren't here last week. But Dr. Maest testified on some of these topics in quite a bit of detail. And she is a geochemist; right? And by and large --

A My understanding is she is, yes.

Q Okay. So we're going to move through these fairly quickly, since the court has already heard a good amount of testimony on these topics. So first of all, let's talk about the volume of rock. Now, this is Table 4.4 from DEQ Exhibit 25.

A Yeah. The volume of development rock that -- this is the rock balance. So the volume of development rock available for backfill and that would be backfilled into the mine ultimately is 663,000 tonnes of development rock with an additional 2,000 tonnes used for roadbed material. The tonnes of development rock actually used in the spreadsheet model for calculating the final water quality was only 125,600 tonnes of development rock. That was a 4.2 or 4.3 -- 5.2 to 5.3 times different than amount of development rock what was stated in a clear rock budget in the mine

permit application and what showed up in the spreadsheets.

Q All right. Can you show us on the spreadsheet which --

A And so on the spreadsheet, this is just a printout of the spreadsheet --

Q Just a minute. Just for the -- just a minute. It's

MS. HALLEY: 68, Appendix D-2, page 39.

A Okay. So this is just a printout of a spreadsheet, Excel spreadsheet. And if you're looking at the spreadsheet itself, you'd, you know, have the -- it'd look more like a spreadsheet, but the lines don't show up on here. But it's just the spreadsheet without the lines. And so the assumed pile volume for the -- is the amount of development rock used in this. And it's -- this is the same amount of development rock that was used in the models for the temporary development rock storage area calculations. Unfortunately, that is not the appropriate volume, because the amount stored at any one time in the temporary development rock storage area is much less than the total amount that would be backfilled into the mine. So you can see that volume translates to a total rock mass of 6.- -- this is intrusive and country rock, the two different types of development rock. That translates into a 6.4 times ten to the four and 6.16 I think it is times ten to the four tonnes of development rock. That summed, those two different components summed, is 125,600 tonnes of

development rock used in this model. And this is all part of a calculation so the tonnes here, then you have particle size, and it's working towards a calculation that's actually out there into the screen for a particle surface area and then total surface area, which is one of the steps in calculating the water quality.

Q All right. Now, what would the likely impacts of this error be?

A Well, the -- since the model is a fairly simple model simply calculating the amount of constituents that are available for dissolution into the water, the volume in development rock effects the mass of constituents that are available for dissolving in the water in the reflooded mine. So having over five times more development rock actually in the mine than were used in the spreadsheet model suggests that there would be a real difference in the amount of constituents available for dissolving in the water.

Q All right. Now, the next item that you noted finding discrepancy in the application versus the actual data is related to inflow -- the mine inflow?

A Yeah. The mine inflow, the permit application, you know -- I know it's a controversial topic -- and I think the numbers now are even less than the 75 gallons per minute, but the mine permit application says the best guess is 75 gallons per minute for mine inflow. The model uses a number of 180

gallons per minute for mine inflow, a significant difference between what is stated in the mine permit application and what's used in the model for calculating reflooded mine water quality.

MS. HALLEY: All right. That was DEQ Exhibit 25, page 30. And now we're going to look at DEQ Exhibit 68, --

A I'll slow down a little bit.

MS. HALLEY: -- which again is Appendix D-2.

A Okay. So here -- and again, this is another page out of the same spreadsheet. The printout here shows the long-term inflow, the inflow 180 -- that's 1.8 times ten to the two -- gallons per minute. And that is the amount of water used to dissolve the constituents. So we've got two primary components here; one is the mass of constituents that are leached from the development rock and the other is the volume of water in which to dissolve all this constituents. Those two basic components are what are used to calculate the final water quality. And actually you can see here this spreadsheet is the spreadsheet that was used to come up with the numbers. Here's the nickel number that showed up in the Table 1.77, and the sulfate number. And the other numbers are all here. I just -- those two were ones I wanted to point out.

Q Okay. And the likely impacts of that error? You touched on this a little bit, but --

A Yeah. You have more water, you have more dilution and so your final numbers are for concentrations would be lower if you use more water flowing into the mine.

Q All right. Now, you also noted some discrepancies related to particle size; is that correct?

A Yeah. The text of the --

Q All right.

A Well, you want to --

MS. HALLEY: This is DEQ Exhibit 29, Appendix D-3, page three.

Q Okay. What's relevant in --

A Okay. This is the text from that appendix that says the surface area of the rock in the stockpile. And this is the same -- this is referenced -- this is text related to calculations for the stockpile, but it's referenced in the appendix for the reflooded mine. It uses the same approach. It's based on a model of particle size distribution for the rock. Particle, you know -- development rock, when you mine it and haul it and break it into sizes that are manageable, there will be a whole distribution of particle sizes from large boulders to powder essentially. And so that's the distribution of particle sizes that is being talked about in this appendix to the mine permit application.

Q So your interpretation of that bullet point about particle size distribution, could you just tell us one more time what

that means to you from a statistical point of view? What would that --

A Well, I mean, particles come in, as I said, all sorts of sizes. And the reason this is relevant -- and it's touched on here -- the surface area of the rock, when you have small particles, you have very large surface area compared to mass. So when you have a distribution of particle sizes for the development rock, you have some portion of the mass in very small particles. It may not be the greatest mass of the development rock, but it provides by far the greatest surface area for the development rock. So when you want to calculate the surface area for development rock, you want to look at both the very small particles as well as the larger particles. And that's what's stated here in the appendices. However, in the spreadsheet, there's only one particle size used. That particle size is ten centimeters. Well, when you use a ten centimeter particle size, clearly with development rock you're going to have some bigger pieces. But if you use one particle size in your analysis, you're missing all the small particles. And the big particles really don't make much difference when it comes to surface area; simple volume surface volume ratio issue. And you can see here this is the same figure that we had before, the same part of the spreadsheet. And here again is the mass. We're talking about particle diameter. So in this

spreadsheet there's one times ten to the negative one meter. So ten centimeters for particle size for both the intrusive and country rock, which is a component -- it's the development rock. And that particle size is used in calculating the surface area, as I said, is in another part of the spreadsheet.

Q So does it appear to you that a distribution of particle size was actually used in these calculations?

A Well, only if you could say one object is a distribution. No, it's not a distribution. I mean, a single measure of ten centimeters is not a distribution of particle sizes.

Q All right.

MS. HALLEY: And that was DEQ Exhibit 68, again, which is Appendix D-2.

MR. REICHEL: Thank you.

Q Okay. Now, just to illustrate this idea of surface area and particle size, I think you conducted a little experiment of your own; is that right, Dr. Coleman?

A Yeah. This was my 5-year-old's boots here. So there's a ten centimeter piece of concrete that has a certain surface area. You calculate it, you know, with a simple formula. Actually, this piece of rock has more surface area than a sphere. The model actually calculates it as a sphere as if it's -- this is about the size of a softball. So the model actually assumed it's a perfect sphere, so you don't have

these jags here that contribute surface area. But that aside, this rock has a certain surface area that you can -- if you assume it's a sphere, you can calculate very easily, and that's what the model does.

Q And what did you do, Dr. Coleman, to that piece of rock?

A Well, to get an idea of, you know, visually what happens when you have smaller particle sizes, I just crushed the same rock. This is the same rock crushed into gravel and some of it's powder. This has thousands and thousands of times greater surface area than that one rock. So as you get smaller particles, you exponentially increase the surface area. And like I said, the bigger rocks make almost no difference. It's these small powder and the small rocks that contribute all the surface area to a rock mass and a stockpile. And there are articles about this in the literature that talk about this effect and what actually are particle size distributions in waste rock stockpiles.

Q We're going to look at some of that.

MS. HALLEY: But for the record, those were Petitioner's Exhibits 73-B and 73-D. And this one is Petitioner's Exhibit 3, Appendix 10, page four.

A Okay. So what I --

Q What is this, Dr. Coleman?

A So what I did, I just thought, well, particle size distribution for development rock, well, somebody must have

looked at particle size in development rock. So I came across in the literature and from my own experience a number of studies that looked at the distribution of particle size. It's not a difficult thing to do. They do a sieve analysis of the material and classify the rock by different sizes. So this figure maybe isn't the clearest in the world, but what it is is these are the particle diameters and each line represents a distribution of particle sizes. So this purple line that stands out fairly well shows a distribution of particle size at a mine site waste rock pile of less than -- a little bit -- sorry. This is large, large to small. The particles are getting smaller here. So fairly large size, a little bit above ten centimeters down to very small particles that are one times ten to the negative -- almost one times ten to the negative six meters. So these are very small particles, almost dust. And so each of these colored lines represents a distribution of particle sizes. On here is the total surface area of a tonne of development rock based on these particle sizes. So for this purple line, you have a total distribution of particle sizes. The particles of this size that are around ten centimeters don't contribute very much to the total surface area. This is summing the contribution of each of these particle sizes. So that by the time you include the very small particles, even though they're by mass, they're only a little bit of

the development rock, they contribute a lot of this total surface area. So here in this red square is what was calculated using a ten centimeter size particle size. One -- not a distribution, but a single size. That calculates a certain amount of surface area about a little bit -- well, it's about two square meters per tonne of development rock. That is orders of magnitude less than these other mine sites found for development rock stockpiles when you actually look at this full distribution and include the smaller particle sizes. So we're going, you know, from somewhere down around two square meters per tonne to, you know, hundreds of square meters per tonne surface area. One you actually include a distribution of particle sizes.

Q All right. Now, I can't help but to notice that the green line there seems to indicate the Foth, which I think formerly was Foth and Van Dyke, so this --

A Well, maybe I should have labeled this --

Q -- concept is --

A -- Crandon. I mean, they were consultants on the Crandon project, and so they produced the sieve analysis.

Q Okay.

A They did not produce this graph.

Q No. I understand that.

A But they did the sieve analysis that came up with these different amount of rocks and different particle sizes.

Q But this is not some novel concept; this is something that the mining industry is well aware of?
A Well, certainly the people that wrote these papers. I mean, this Hill & Benson and Swanson, et al, are papers about this exact effect. So it's not a new concept. And Appendix D-5 wouldn't have stated that a distribution of particle sizes was used unless it was thought to be important.
Q Okay. Now, this diagram comes from a report -- right, Dr. Coleman? -- that you wrote?
A Yes. I submitted comments to -- GLIFWC submitted comments to the DEQ during the permit materials review process. This was a report that I did on the water quality basically covering some of the points we're talking about now. We submitted it as a comment document to the DEQ.
Q Okay. We're going to come back to your report later. But so just to be clear, though, that the DEQ had this information at least in October of 2007?
A Yes. And I sent follow-up e-mails asking if they had any questions. I think at least once, maybe twice I followed up asking if there were any questions about the comments, these comments in particular.
Q Okay. Now, you also listed discrepancies in the leaching data. Could you describe for us what that's all about?
A Yeah. I think it would be good if the table was up first. But there's a table in Appendix D-5, Table 1, that states

what the inputs were for the model used for calculating the water quality. And that table very clearly states what leaching rates were for the different constituents. That data in that table -- so this is the input leachate chemistry for the underground mine at end of mining. So here -- and so for that model I used leachate data for the massive sulfide unit, the semi-massive sulfides, the massive sulfides, and then these are the development rock constituents, as I mentioned, the country rock and the intrusives. And this set of data, you know, I don't have an opinion about that data, whether it's good or bad. This is a set of data that very clearly says is the input chemistry for the spreadsheet model. If you look at the spreadsheet model, it's not the data that was used in the spreadsheet model. Right or wrong, you know, I don't know. It's just not the data that was used in the model. The thing I did notice, though, for a number of constituents, this data that was claimed to be in the spreadsheet model showed a lot higher leaching rates than the data that was actually used in the spreadsheet model. Like I say, I'm not sure which is the right data. But it's not the data that shows up in the spreadsheet model and was used for calculating water quality.

Q All right. So we'll look at the spreadsheet now, Dr. Coleman.

A So in the Appendix D-5 it says that 40 to 70 week data was used for the spreadsheet model. And as you see here, it's labeled as anywhere between 20 and 50 week data. And you start looking at the numbers and the numbers are just very different. Like, nickel here is much, much lower than was in Table 1. The sulfate numbers, although this for one category is fairly high, they are much lower than what was in Table 1 in the appendix. So like I said, you know, which is the correct data to use, I don't have an opinion on that. I think Ann Maest maybe had maybe addressed that. But the text states one set of data.

Q But from the statistical standpoint, there are some problems with this discrepancy?

A Well, from a data analyst's point of view, the data that was stated is not the data that was used.

MS. HALLEY: Okay. This is DEQ Exhibit 68 again, Appendix D-5, I believe. And the previous slide was DEQ Exhibit 29, Appendix D-5, pages four and five.

Q Now, Dr. Coleman, you've described these errors individually. Now, do you have any conclusions about through the overall impact of all that?

A Well, you know, I realize it would be fairly easy to just take the numbers that were stated in the text and plug them into the spreadsheet model. Because, like I said, it's just an Excel model and it's pretty clear in the model where

those values belong. And so I ran the spreadsheet model -- the company spreadsheet model with the volume of rock corrected. The amount of inflow instead of 180 gallons permitted, I used 75 gallons permitted. I used a particle size distribution and calculated, you know, what the surface area was based on a particle size distribution. I didn't take some of the higher numbers. I took a fairly conservative number. I didn't want to go out on a limb on that. So and then I used the leaching data that was actually stated in the Table 1 and ran that same model. And the numbers were much higher, much, much higher, one to two orders of magnitude higher than what was calculated by the incorrect amount.

Q Okay. So you said that you ran the company's model. Where did you get the model?

A That was supplied by the DEQ. I think they requested it from Kennecott. It was part of the application. It was referenced that model -- spreadsheet model is referenced in Appendix D-5. And so it was part of the permit materials.

Q Okay. So just so we're clear about what you did, you got the company's model from the DEQ -- okay -- and you changed the input parameters only, as you just described? You didn't change how the model itself functioned or anything else; --

A That is correct.

Q -- is that right? Okay.

MS. HALLEY: This is Petitioner's Exhibit 3, Appendix 10, pages five and six.

Q Dr. Coleman, what is this chart we're looking at here?

A So this was part of the report I sent to the DEQ as a comment about the water quality in the reflooded mine, because we were concerned that the water quality wasn't being correctly predicted.

Q Okay. But does this represent -- does the column there with red highlights represent the outcomes as you --

A These were the outcomes -- well, this is the value that was calculated in Appendix D-5 and the outcome. And you can see here's the 28 sulfate that I mentioned earlier.

Q Right.

A I think the nickel is maybe on the next page. This is the values that were generated by that same model, if you adjusted the four parameters that I mentioned to be the values that were in the text. And these are the outputs. And then I listed here just for my own reference and then I thought it might help in evaluating the comment that I was submitting the Part 201 standard. And so these red values are all exceeding the Part 201 standard.

Q All right. So, Dr. Coleman, maybe you could just walk us through a couple of these and explain the relevance. Maybe particularly for the items you've already pointed out, like

sulfates.

A Well, I mean, the sulfate, you know, 28, you know, that's what really started me wondering about the whole analysis. 28 seemed very low, you know; much higher values when you change the inputs to the model. If you go to the next page --

A Well, I mean, the sulfate, you know, 28 -- you know, that's what really started me wondering about the whole analysis; 28 seemed very low. You know, much higher values when you change the inputs to the model. If you go to the next page --

JUDGE PATTERSON: What is that value? I can't --

THE WITNESS: 9,307.

Q So from 28 to 9,307?

A Yes.

Q All right.

A And if you go to the next page I think the other ones that -- zinc and iron that I mentioned. Iron here, which was also about standard in the original Appendix D-5 model. And these values you can see right in the spreadsheet, you know, so it was very clear that the spreadsheet was -- where these numbers came from. It's just the outputs were the correct, the outputs in the spreadsheet, but the inputs weren't the ones stated in the text. So --

Q Well, what -- just a minute. What do you mean by the

"correct outputs"?

A In Appendix D-5 in the spreadsheet, the actual Excel spreadsheet, if you look down at the bottom at the calculations of these -- the last row in that model in that spreadsheet were these values and those are the values that show up in the text of Appendix D-5 and are repeated I think in the mine permit application, or at least referenced in the mine permit application. So these are the outputs that are used by the company that -- Appendix D-5 and the mine permit application also has tables and text about the inputs. Well, the spreadsheet has different inputs. So and then when I just made it so the inputs were the same as what was in the text then you get a very different set of outputs which exceed most parameters exceed Part 201 standards. And so nickel is much higher -- most parameters above standard.

Q Though everything -- what does the red highlighting indicate in your corrected values column?

A Well, it's just anything that's above the Part 201 standard.

Q All right.

A Now, you know, the standard -- my understanding of the regulations for the water quality standards for this mine site is the trigger point that's less than this, but this is just in relation to the Part 201 standard.

Q Could you talk to us about the copper, the --

A Copper. Well, I mean, I can talk to you -- the relatively

low numbers here in the regional prediction: .002 milligrams per liter; this is, you know, many-fold higher, 93.9.

Q And does that appear to be a trend in this chart that the corrected values are far higher, orders of magnitude higher in most cases?

A They're not all exactly the same factor, but they are orders of magnitude -- almost uniformly one to two orders of magnitude; in some cases I think it might be three orders of magnitude higher when you correct the inputs.

Q Okay. Thank you, Dr. Coleman. Now, did this very poor quality of water surprise you? Were you surprised when you got the results of your corrected modeling?

A Well, no. What I was surprised at was how clean the water was predicted in the first place. I mean, when I looked at other mine sites that have similar types of backfill that has been flooded, the water quality is nothing like what was originally predicted. And that's what tipped me off to say, "Well, is this correct?" And that's why I started looking at the inputs and outputs.

Q Okay. Now, what other mines in particular have you studied the groundwater quality and --

A Well, we spent a long time looking at the Flambeau Mine where, you know, the back -- or the pit was backfilled in a somewhat similar way; development rock was stored above

ground for several years prior to backfilling. And then it was backfilled with lime addition into the pit. The water quality in the Flambeau pit is nothing like 28 milligrams per liter of sulfate. The wells in that pit range anywhere between 300 and 1600 milligrams per liter of sulfate in the backfilled Flambeau Mine pit.

Q Now, how does that compare with the predictions premining?

A At Flambeau?

Q Yes.

A They're higher numbers than what was predicted premining.

Q A lot higher or a little higher?

A You know, I don't have off the top of my head what the premining predictions were for sulfate. There are a number of parameters that are higher than was predicted. It's an issue we've raised with the Wisconsin DNR but, you know, the regs in Wisconsin are different than elsewhere.

Q Sure. Okay. So you're telling me that in some ways at least there are some similarities between the Flambeau Mine and the Eagle Mine and that those similarities include that -- the used of development rock as backfill and reflooding?

A Reflooding. Also the sulfur content is not very different. I mean, at Flambeau the development rock had sulfur content of about .1 percent sulfur to -- the high end was 4.8 percent sulfur. At Eagle -- and I think it's been estimated to .25 to 2.5 percent sulfur, but the range is anywhere from

.1 to 14 percent for the development rock. So they're, you know, fairly similar in sulfur content. And they're both fairly short-term mines, so you know, development rock wasn't sitting around for 20 years before it was backfilled at Flambeau. Some of the development rock I think was backfilled fairly quickly after it was mined.

Q Okay. Now, what are we looking at here, Dr. Coleman?

A Well, these -- this -- you know, some of the numbers I mentioned --

Q Just let me interrupt you for a moment.

A This is -- okay.

MS. HALLEY: This is Petitioner's Exhibit 70, page four.

Q All right. Sorry.

A You know, I think the interesting numbers -- you can see iron's going up pretty high here, but if you go down to sulfate and manganese I think you see some of the numbers that I was talking about. What this is, is a plot of the water quality. This is an in-pit well you can see here. 10-13-C; it's a well -- after the pit was backfilled the well was placed into the pit and then water quality was measured and you can see iron has been increasing ever since it started being measured. Manganese is pretty high here or up at, you know, over 10,000 or about 11,000 micrograms per liter. But sulfate; you know, this is around 15-, 1600

milligrams per liter for sulfate, which didn't seem -- you know, given that it's a sulfide mine like Eagle would be it's -- you know, it's -- I don't think this number is surprising people a whole lot. If you go -- well, --

Q If you know, Dr. Coleman, how do these levels compare with the standards that would apply to this situation?

A This situation being the Eagle project?

Q No, no, being the Flambeau Mine.

A Well, these don't meet drinking water standard, but the standards in Wisconsin are -- within a mine pit are different than --

Q I understand that. But if we are using the playing field of the drinking water quality standards --

A Drinking water quality standards this -- you know, it's 250 for sulfate, you know, manganese I forget what it is, but I'm pretty sure this is about it. A number of these are above drinking water standard -- well above drinking water standard, you know. I think there's higher manganese on another figure here. I think it gets up to 40,000 micrograms per liter. I think the standard is -- well, it was on that other figure. It's in the single digits I'm pretty sure. Well, why don't you go -- I mean, this -- you know, the pit wells -- it varies between -- well, this copper is fairly low in this well. And you know, they vary depending on this time they're taken. But if you go to

another figure this -- in this well copper was fairly low. Although, you know, iron and sulfate was higher. If you go to the next page copper is higher.

Q And the next page being what? A different point in time or --

A No, another -- a different well.

Q A different well?

A So there are multiple wells into the pit. I think there are -- no, keep going. That's the same well. So here you can see copper up around -- it's sort of stabilized; it's gone up and down, but it's stabilized around 500 micrograms per liter of copper in that well.

Q And what's -- well, okay. Do you know, Dr. Coleman, off the top of your head how that compares to the predicted levels of copper at the Eagle project? Post mining I'm talking about.

A Levels of copper predicted were .0023, I think is what I read off the figure there. I've got it somewhere here, but --

Q So how does that compare to what actually happened at the Flambeau Mine?

A Well, it's orders of magnitude higher at the Flambeau Mine than what was predicted at -- for the Eagle project in Appendix D-5. And it's those kind of differences that really seem just kind of a little out of whack; didn't make

a whole lot of sense to me.

Q Okay.

(Pause in dialogue)

MS. HALLEY: Okay. This is DEQ Exhibit 32, which is Appendix B-3, page 41.

Q Now, Dr. Coleman, you know, I'm wondering why the water quality in the reflooded mine matters. Does it matter?

A Well, you know, contaminated water almost anywhere is of some concern. But you know, if that water migrates out of the reflooded mine into aquifers of concern, then there would be contamination of those aquifers. And I think there's some -- you know, this is -- I've heard various opinions on this, but there's -- you know, some of the data indicates that there could be upward gradients. And you know, I want to show here -- this is the fresh water -- these -- actual calculation of the gradients is a little complicated but it was done in the mine permit application in Appendix D-3. There are some bedrock wells and the real important thing is that as the difference in pressure between the bedrock -- which is -- these are bedrock wells -- and the surficial aquifer, and these are shallow wells in the surficial aquifer and, you know, these numbers tend to be, you know, about 431 and a half. Here the numbers in the bedrock in some of these wells are higher. Some of them are lower, but there are some comparisons that

you can make here that indicate that there's higher pressure in the bedrock than in the glacial aquifer. And I wouldn't claim that this data is conclusive that they're upward gradients in general, but you know, this kind of data is a limited use, because this data is wells in the bedrock that will no longer exist when the mine is mined out. We're talking about a huge opening underground. So these are just a subtle indication of what might be going on ultimately. But some of these wells show an upward gradient. If there is ultimately an upward gradient after the mine is all opened up and the pressure within that mine becomes uniform in the reflooded mine, the real question is, is that pressure in the reflooded mine going to be slightly higher than in the surficial aquifer. And some of these wells would indicate that that is a distinct possibility. And if that is the case, then you would have upward migration of contaminants out of the -- out of the mine towards the and possibly into the surficial aquifer. And what was frustrating for me here was there just wasn't very much data to look at that question of gradients between the bedrock and the surficial aquifer. But the data that was there suggested that there could be upward gradients.

Q And it certainly didn't rule out that there could be upward gradients?

A No. It certainly -- it suggests on some wells there were

some upward gradients.

Q All right. Now, Dr. Coleman, what is the applicable groundwater standard in the reflooded mine according to Part 632?

A Well, there's a trigger point where Part 632 requires some action and that's half of the drinking water standard. And I don't know if -- I guess I think it's been -- that page of Part 632 is referenced earlier, but it very clearly says that certain activities have to occur, responses have to occur when constituents get halfway between the long-term background and the drinking water standard. So that assumes that you know what long-term background is so that you can figure out what is halfway between long-term background and drinking water standard. Well, unfortunately we have no idea what background is, because if you look at the data that was collected on the groundwater wells, none of these constituents are ever detected. The methodology used here -- these are all the constituents -- you can see these less than .5, less than 0.5. These are nondetects. So these sampling methods are not detecting anything. Well, that's because the sampling method is incapable of detecting the low levels of these constituents in the groundwater. So we don't know what background is.

Q Okay. But are there methods by which those lower levels could have been detected?

A For many of these constituents there are.
Q Okay. So it could have been done but it wasn't done?
A That's correct. So you know, you probably can't see from very far away, but virtually every single value in here is non-detect. You know, I think they're probably -- in this whole table there's probably about six or eight values. So we don't know what long-term background is.
Q So you're saying all of the "less than" symbol before the numbers, those all indicate --
A A nondetection of --
Q They're lower than that number but we don't know how much lower?
A That's right. So you know, trying to find out what is a halfway between background and the drinking water standard is a little difficult if you have no background, no defined background. So how that's going to turn out I don't know.
Q Okay. Now, is it your opinion that the water quality in the reflooded mine would exceed that standard we just talked about from Part 632?
A Well, my --
MR. LEWIS: Objection; relevance, your Honor.
THE WITNESS: Yeah.
MR. LEWIS: I think we're mixing and matching again what standards apply where.
MS. HALLEY: Well, Part 632 states clearly that

there's an action level between -- halfway between the level between long-term background and drinking water standards. And so this witness can testify about whether or not he believes that those -- the water in the reflooded mine would hit those levels based on his studying of the application as the water quality was predicted there, and his corrected model. That's what I'm asking him to opine about and he's already testified about it.

MR. LEWIS: My relevance objection is I don't believe there's any evidence that those standards and that requirement applies to the water in the mine after mining.

MS. HALLEY: Well, I think that's a legal argument that we may have later, but right now I'm asking him to testify about his opinion related to the fact about the water quality in the reflooded mine. That's a different issue.

MR. LEWIS: It's not relevant if the standard does not apply, your Honor.

MS. HALLEY: But we haven't settled that, your Honor.

JUDGE PATTERSON: I'll allow him to go ahead and answer.

Q You can answer, Dr. Coleman.

A Well, you know, I think that the corrected spreadsheet model indicates that they would be exceeded -- easily exceeded by

several-fold. Evidence from the Flambeau Mine pit suggests that they would be exceeded by several-fold for a lot of parameters. So I think that evidence suggests that that is a high likelihood.

Q Thank you. And if the groundwater in the reflooded mine is contaminated as your model predicts, and --

A It's not my model; it's a -- you know.

Q Right. Thank you.

A I just want to make sure I have not modified the structure of the model.

Q Okay. Thank you for that clarification. As the Kennecott model with corrected parameters, your corrected parameters indicates that the reflooded mine water would be contaminated, what would the consequences to the aquifer in that region be?

MR. LEWIS: Objection; foundation, your Honor.

MS. HALLEY: I'm not sure I understand the objection.

MR. LEWIS: The way I understand the question you're asking him to combine two things at this point. First, assume the mine water is contaminated, and then ask him to offer an opinion as to what effect it would be on the glacial aquifer. I've heard no foundation for this witness to offer an opinion that there would be any effect on the glacial aquifer. So far I've heard this witness say that in

his opinion that the possibility of communication of the mine water up to the glacial aquifer is a possibility.

MS. HALLEY: Okay. I'll rephrase the question.

JUDGE PATTERSON: All right.

Q Dr. Coleman, based on the predictions of reflooded -- water quality in the reflooded mine Kennecott's -- as were in the application and the corrected values, do you believe that monitoring of that water quality is critical?

A Yes. Monitoring is obviously critical.

Q Okay. Now, we're looking here at DEQ's Exhibit 25, which is the mining permit application itself, not an appendix, Figure 7-3. Dr. Coleman, could you go over to the map here and show us where the compliance wells appear to be for the mine itself, the reflooded mine itself?

A Okay. It took me quite a while to figure out where these compliance wells were, because I initially thought, "Well, there are a lot of wells on here and we're talking about, you know, post mining. You know these were all compliance wells." Well, it turns out almost none of them are compliance wells.

Q Okay. Just a minute. Now, what are you basing that on? Where do you -- where are you getting that?

A Down here (indicating) I finally read -- you know, I need glasses so it wasn't easy for me to read this, but -- and you certainly can't read it. I can't even read it from

here, but --

Q I have a hard copy of it.

A If somebody wants to read it.

Q Would you like to see that? Can you read that better?

A Okay. Sure. At the reflooded mine there are only three wells here that are compliance wells. None of these are compliance wells here inside this footprint, which appears to be the peridotite -- outline of the peridotite. The compliance wells are out here (indicating), the three compliance wells out here. These three here, here and here. So to the west, to the southwest, and to the northwest of the mine there are these three compliance wells.

Q Well, what are the other ones then?

A These are all -- some of them are wetland monitoring wells. Some of them are water level monitoring wells. They are all monitoring wells of one sort or another, but they're not compliance wells. And it says down here in -- under footnote 6, I think D it lists what are the compliance wells and these are the three that are listed as compliance wells for the reflooded mine.

Q All right. Now, those three --

A I think they were pointed out previously by a previous person.

Q I believe they were. I think Mr. Donohue pointed these out. Now, your understanding based on the application of the

general down -- general groundwater gradient is in which direction or direction --

A There's been very little work done on bedrock gradients and very little data, but --

Q Okay. But based on what we know from the application, which is all we have.

A The application makes a very clear statement and very clear argument that the general groundwater gradient for the surficial, the upper aquifer is from the southwest to the northeast, so generally from here across the site like this (indicating). The upper parts of the bedrock, which are heavily fractured, probably would have a similar gradient as what's seen in the surficial aquifer.

Q Now, do those compliance wells seem to be placed in a way that are optimal for figuring out if contaminated water or any water is moving up?

A No. I mean, maybe there's a key here that I don't know about, but why these wells are out here is way beyond me. They're not downgradient. They're not as close as they should be.

Q What do you mean by that?

A But they're certainly not downgradient of the mine.

Q What do you mean by not as --

A There are no compliance wells out here downgradient of the mine.

Q All right. Now, what do you mean by they're not as close as they should be?
A Well, you know, Part 632 says that the compliance wells -- very clearly says compliance wells are supposed to be as close as physically practicable -- I didn't write that word, but as close as physically practicable to the mine facility. Well, these -- and at maximum, absolutely maximum 150 feet. Well, these are at 150 feet, so they're in the maximum distance away from the mine possible. You know, the regs say they have to be as close as physically possible; well, they're not. You know, why they're not on this black line and this black as we pointed out earlier, there are parts of this black line that include things that aren't -- they include something, the peridotite. It's not part of the mine as currently proposed. Like this lobe here (indicating) is some extra add-on. But you know, these wells could be placed and according to Part 632 ought to be placed right on the boundary of the mine. Why they're here, it's beyond me. It looks very strange to me. There are three wells that are not downgradient and not as close as the regs say they should be.
Q All right. Thank you, Dr. Coleman. Are there any compliance wells that you could find based on the application in the bedrock aquifer?
A Compliance wells in the bedrock aquifer? None near the --

absolutely none near the reflooded mine. I'd have to say I haven't recently looked over by the TWIS, but I can't imagine there are any by the TWIS.

Q All right. So these compliance wells -- how deep do they go?

A Those are shallow -- relatively shallow wells. They go down -- they're only in these shallow aquifer. They stop at the top of the bedrock.

Q Okay. So there's no compliance monitoring wells -- compliance wells -- excuse me. There are no compliance wells that seem to be designed to tell us what's going on in the bedrock aquifer after the mine is closed?

A That is correct.

Q Okay. All right.

MS. HALLEY: Now, we're going to move to a different topic, your Honor. I don't know if we need a break, but it'd be a good time if we do.

JUDGE PATTERSON: Yeah, why don't we break for a few minutes?

MS. HALLEY: Okay. But can I -- just before we go I'd like to move to admit Petitioner's Exhibit 3, Appendix 10, which has been the report from which Dr. Coleman has been testifying so far.

MR. LEWIS: I think my only issue of that is going to be what I've had with some of these others, and that is

that's a big collective exhibit of all the various public comments, is it not?

MS. HALLEY: No, just Appendix 10. Exhibit 3 is our combined comments, but I'm only moving to admit at this point Appendix 10.

MR. LEWIS: And is that identified in that exhibit in some way as Appendix 10?

MS. HALLEY: Yes. It's tabbed.

MR. LEWIS: Is the judge going to be able to find it that way?

MS. HALLEY: Absolutely.

MR. LEWIS: Okay. I have no objection based on that -- well, let me ask you one more thing, Ms. Halley. Remind me. That's the report titled, "A Recalculation of Kennecott's Prediction of Post Mine, In-Mine Water Quality"?

MS. HALLEY: Yes.

MR. LEWIS: And it has seven pages ending with literature cited?

MS. HALLEY: Yes.

MR. LEWIS: Okay. I have no objection.

MR. REICHEL: I don't have any objection to that, but just maybe it's an artifact of how these are saved electronically, but at least what I have under that tab has not only the document that was just described but also any document from the Great Lakes Indian Fish and Wildlife

Commission the heading, "Draft to" blank from Mr. Coleman consisting of four pages of text and then various attachments. Is that the subject of the -- perhaps we could do this off the record.

MS. HALLEY: Let's talk about it during the break. But I don't --

MR. LEWIS: Hence my concern.

MS. HALLEY: This report is what I'm talking about.

MR. REICHEL: Okay.

MS. HALLEY: I think we've had some complications with appendices from electronic and printing and whatnot, but --

MR. REICHEL: Right, but again, based on the understanding that what is being offered here is the document that you and Mr. Lewis just referred to, the recalculation that's -- we've no objection to that.

MS. HALLEY: Okay.

JUDGE PATTERSON: Okay.

(Petitioner's Exhibit 632-3, Appendix 10 received)

(Off the record)

MR. LEWIS: Your Honor, I'd like to just for the record clarify a bit more on that last exhibit.

JUDGE PATTERSON: Okay.

MR. LEWIS: And it is important I think that we

get these right not only for this hearing but on the prospect that this case may be appealed. And I think I have to take care to identify what's in the record and not in the record and there's been this continuing issue about in particular this collective Exhibit 3. So I want to make clear for the record, as Mr. Reichel indicated, and after representations by counsel that the exhibit that was being offered was indicated to be Petitioner's Exhibit 3, Appendix 10 was represented to be only this individual report by Dr. Coleman. And I think Ms. Halley initially identified that as only the report titled, "Recalculation of Kennecott's Prediction of Post-Mine, In-Mine Water Quality" consisting of seven pages. However, there are other various things attached.

So I guess I want to make clear that, you know, the record is sufficient for you to identify what is the exhibit and what's not the exhibit. And alternatively, I think, you know, if it's not clear the better way to proceed with offers of exhibits out of this collective Exhibit 3 would be to re-label them a new exhibit, let counsel see them and then present them to the Court.

MS. HALLEY: I'm not opposed to that.

JUDGE PATTERSON: Okay.

MS. HALLEY: I don't really feel it's necessary in this particular instance. I don't think we have any dispute

that it's seven pages long and we agree on the title.

MR. LEWIS: Again, my problem is there's no reference in the record. If you go to their Exhibit 3, Appendix 10 you will find a collection of documents and there's no -- that's what you find. So you will not know except by a notation in the record that only, you know, a seven-page report is reflected there. And I would suggest again for clarity of the record -- and if Ms. Halley is not opposed -- that we simply, again, identify that as a separate new exhibit and take care of it that way.

JUDGE PATTERSON: I prefer that.

MR. LEWIS: Okay.

MS. HALLEY: Fine with me, your Honor. While we're on exhibits I need to make one more clarification. When we were looking at the spreadsheet output themselves, I was referring to those as DEQ Exhibit 68, but DEQ Exhibit 68 actually is only a cover letter that references those materials.

MR. REICHEL: I believe that's correct.

MS. HALLEY: Okay. The materials themselves are Petitioner's Exhibits 75-A and C. And if we need to have Dr. Coleman describe how he received these documents and where they came from we can do that if you need to.

MR. LEWIS: I don't think anything was offered that I know of, is there?

MR. REICHEL: That's correct. You're not offering at this time?

MS. HALLEY: I'm now offering Petitioner's Exhibit 75-A and C, which are referenced by DEQ Exhibit 68.

MR. LEWIS: But what's the exhibit being offered?

JUDGE PATTERSON: Those are the spreadsheets being used to --

MS. HALLEY: The spreadsheets themselves; that's correct. Well, maybe we should let Dr. Coleman tell us how he came to have these spreadsheets, because they were not included in the original application. So that's the source of the confusion here.

MR. LEWIS: It's not the source of my confusion. I'm just trying to identify what is the exhibit at this point.

MS. HALLEY: No, it's a different confusion than yours.

MR. LEWIS: Now, I'm really confused.

MS. HALLEY: Join the club.

JUDGE PATTERSON: Now, he confused me.

MR. LEWIS: This is the Part 32 exhibit list or 31, or --

MS. HALLEY: No, this is Part 632.

MR. LEWIS: Exhibit 75?

MS. HALLEY: Yeah. A and C are the spreadsheets

that we had projected on the screen. I was mistakenly referring to those as DEQ Exhibit 68. DEQ Exhibit 68 only references those documents but did not actually include those spreadsheets.

MR. LEWIS: But just so I'm clear, 75-A is a single-page exhibit?

MS. HALLEY: Yes.

THE WITNESS: No.

MR. REICHEL: No, it's -- because I'm pulling it up here. It's multiple pages, spreadsheets.

MS. HALLEY: All right. Let me -- okay. Could I take a look at it myself so we're --

JUDGE PATTERSON: Fine with me.

(Pause in dialogue)

MS. HALLEY: I think we've settled this, your Honor.

JUDGE PATTERSON: Good.

MS. HALLEY: My understanding is that Mr. Reichel and Mr. Lewis, neither one of them object to the 75-A and C being admitted. For the record, I would like Dr. Coleman to describe how he obtained 75-A and C and basically what their contents are, just so it's very clear what it is that we're talking about here.

A Okay. So Appendix D-5 of the mine permit application is the appendix that talks about the calculating reflooded mine

quality and the consultant for that work used a spreadsheet model. In his write-up in Appendix D-5 he references what he calls an appendix, and I won't say the name because it will just cause more confusion. He references an appendix what he says are the spreadsheet models he used. So that material was all submitted as the mine permit application. I contacted the DEQ asking, "Well, I'm interested in this piece of material that's referenced in Appendix D-5." DEQ eventually acquired that. And I think that's the cover letter that you see that was originally submitted was the transmittal of those three spreadsheets, which were the modeling spreadsheets, to the DEQ. The DEQ then transmitted that to me. And those are the spreadsheets that I looked at for the analysis. That is -- it was very confusing and difficult because they're sub-appendices of other appendices, but -- and they're spreadsheets so they don't really work very well for sort of displaying and things like that, but --

MS. HALLEY: So maybe, Mr. Reichel, we could confirm that 75-A is a spreadsheet consisting of about 132 lines?

MR. REICHEL: Okay. Let me look at the line count here. Just a second. That's how it displays for me.

MS. HALLEY: And 76-C is also a spreadsheet, similar appearance with about 124 lines.

MR. REICHEL: That's how it displays as well.

MS. HALLEY: Okay. Thank you.

JUDGE PATTERSON: Okay.

(Petitioner's Exhibits 632-75A and 632-75C received)

MS. HALLEY: Just so I know -- I wasn't here yesterday. Do you have to leave at 4:00 o'clock today; do we have end it here?

JUDGE PATTERSON: As it turns out I don't, --

MS. HALLEY: Oh, you don't?

JUDGE PATTERSON: -- but Mr. Wallace and Mr. Eggan do. They made plans based on my preface. So we are --

MS. HALLEY: We're going to end at 4:00 o'clock?

JUDGE PATTERSON: Right.

MS. HALLEY: Okay. All right. Well, do you want us to start sort of our next section, or -- I mean we only have 15 minutes, so --

JUDGE PATTERSON: I wouldn't mind quitting now.

MS. HALLEY: I wouldn't either.

(Hearing adjourned at 3:46 p.m.)

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