MANITOBA CLEAN ENVIRONMENT COMMISSION

HEARING

VIVIAN SILICA SAND EXTRACTION PROJECT

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Transcript of Proceedings
Held at Brokenhead River
Community Hall
Beausejour, Manitoba
MONDAY, MARCH 13, 2023

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CLEAN ENVIRONMENT COMMISSION
Jay Doering - Chairman
Laurie Streich -Commissioner
Ian Gillies - Commissioner
Terry Johnson - Commissioner

ADDITIONAL SPEAKERS
Dennis LeNevue
Peter Crocker (Secretary)
Sander Duncanson
Jesse Baker

Reporter: Nidia Romero

MONDAY, MARCH 13, 2023

UPON COMMENCING AT 01:30 P.M.

THE CHAIRMAN: Chair. Well, good afternoon everyone. I think we will get started. I would like to acknowledge that we're meeting here today on Treaty One Territory, and I believe we are still on Treaty One Territory, although it looks like we're beginning to encroach on Treaty Three Territory. Treaty One is the original land of the Anishinaabe, Cree, Oji-Cree, Dakota and Dene people in the homeland of the Metis Nation. We respect the treaties that were made on these territories, we acknowledge the harms and mistakes of the past, and we dedicate ourselves to move forward in partnership with Indigenous communities in the spirit of reconciliation and collaboration.

So, today we have Mr. LeNevue -- Mr. LeNevue presenting. We would like to wrap up this section of the hearing process today. So, I have allocated two hours to Mr. LeNevue, and that will then be followed by questioning. So, I guess with no further ado, I pop it over to you Dennis, and some of us may get up and sit at the front there so that we have a clear picture of the screen in case you wonder why some of the commissioners

are moving.

MR. LENEVUE: Thank you. Just a word on my background. I started out teaching at -- with (inaudible) in Nigeria, two years teaching physics, math, and chemistry -- chemistry. Then I moved to Atomic Energy of Canada where I was the safety officer in charge of workers safety, and then moved on to research in nuclear fuel waste management. I was the vault modeller, and I was responsible for interfacing with numerous professionals to present the Canadian concept for nuclear waste disposal. Just a second.

THE CHAIRMAN: Chair. I -- I -- you know, please remind me. I don't think Mr. LeNevue has been sworn in, is that correct? Yeah.

MR. CROCKER: Secretary. My apologies. We forgot to swear in Mr. LeNevue before he -- he got started. So, Mr. LeNevue, can you say and spell your name for the record please?

MR. LENEVUE: Dennis LeNevue, D-E-N-N-I-S L-E-N-E-V-E-U.

MR. CROCKER: Mr. LeNevue, do solemnly affirm that the evidence to be given by you shall be the truth, the whole truth, and nothing but the truth?

MR. LENEVUE: I do.

MR. CROCKER: Secretary. Thank you.

MR. LENEVUE: Okay. We'll proceed with the slide now. This first one shows the complexity of the silica sand extraction process, and you'll see the extraction wells, and the cavity, and the limestone -- or the aquitard shale collapsing into the cavity, and your sand pillars all -- this silica sand is a very heterogeneous material. It's not just silica sand. It has concretions in it, interbedded shale, and layers of oolite, and silt, and clay. And the concretions interbedded shale oolite, they contain iron pyrite, which when exposed to air and moisture, will release acid and heavy metals, the acid will leach out heavy metals. Now, the shale itself, the Sio Silica's own study show also contains pyrite and heavy metals, but there's some calcite in there that can act to neutralize it, but it's still given what they call an uncertain acid producing potential.

Now, this information, this is documented in very many places. One of the best is a paper by Rick (inaudible) that describes marcasite and pyrite in the Winnipeg formation. Now, above that, we have the carbonate aquifer, both the sandstone and the carbonate are your drinking water aquifers. At the top of the carbonate is a coarse layer that is more fractured, and water moves very fast. Then we have your glacial till that is essentially impervious.

Now, on the top, what happens is when the sand is extracted by air lift, you get the slurry sand mixture put into a -- a tank, then the sand is sent, and the -- it's sieve in what they call overs and unders, big and small particles are removed, and the water is to be returned to the aquifer. It has to be before it's returned, while the overs and unders go out as waste, and the water is squeezed out of them, and -- but the water to be returned has to go through a UV system to sterilize it, and to do that, you have to remove all the suspended fine particles. So, there's a clarifier that apparently is going to use kyoto sand, which is nontoxic, but they'll be a waste from that as well, and there -- there's a press there to squeeze out the water from the waste from the

Kyoto sand, a filter press, and it needs coagulant chemicals.

Now, when this water is -- there -- it's returned to your aquifer on the outer anulus of your wells by gravity feed, but it will be fully oxygenated. So, it contains dissolved air, which is -- formation hasn't seen, or it's devoid of air and oxygen. So, it is able to react geochemically with these acid producing and substances, and another one is very important is selenium that doesn't need any acid to reduce the oxygen, and it's present in -- in your shale and your carbonate, and the (inaudible) test that Sio Silica had showed you can get release of selenium above levels, and -- and it's a toxic material. So, I'll just go onto the next slide. Oh, why isn't this advancing? Okay.

THE CHAIRMAN: Chair. The secretary will be right with you. Chair. While we have an interruption, by chance might anyone in the room have a USB -- USB B to C adaptor? I'll take that as a no.

MR. LENEVUE: This second slide shows you a close up of the air lift process, and shows you the air and sand going up the central tube, the production tube,

and the air tube coming down the middle, and it shows you, again, these concretions and interbedded shale airs in the sandstone, and the carbonate above it. Now, this air here that's pushed down is supposed to stay inside the production tube, but if you over pressurize it a bit, and this air tube is moveable, you get it too close to the bottom, you can -- you could get leakage, and there's another factor in here called entrained air that is actually gaseous air in the water returning. And so, you can get air bubbles moving up, will move up into your carbonate, you can't penetrate the glacial till, and so it moves through the carbonate with the regional gradient, and then moves quite faster than the water, especially in the karst, and it can dissolve as it moves, and precipitate iron, and manganese, and solubilize selenium into your water in the carbonate, and it can move quite fast, and eventually contaminate wells downstream. Whoops.

Now, this slide shows you one thing that nobody has mentioned yet, none of the technical experts hired, and none of the participants. Al MacLean mentioned it yesterday, and Dr. Eva Pipp brought this up in her submission. This is the air that is going to be sucked in by the compressors, and it'll suck in any diesel fumes, or

-- and microbes in the ambient air, and I put this in my information request, and Sio Silica said the generators, and there's a lot of diesel equipment in the extraction, and they said their exhaust is too far from the compressor to take it, not a problem.

Well, there was an air quality study done from the processing plant, and here are the results up here, and you can see the contours like the 50 and 70 contour cover a wide area, and the GH -- and this includes the nitrous oxide, sulphur dioxide, carbon dioxide from the exhaust fumes, and the greenhouse gas emissions from the plant -- plant site where six times -- from this equipment, six times lower than the greenhouse gas emissions tabulated for extraction. So, that means you'd get six times these contours, and it would be in your extraction site. So, now Sio Silica's own modelling demonstrates -- and you would be above your air limit if you multiple these contours by six. For instance, it's 51, that's 300 for nitrous micrograms per metre cube. So, the -- the nitric NO2 would be above your air limit, and there's absolutely no doubt it's going to be sucked in by your compressor air. There's lots of literature on this, and your SO2 and your -- and there's benzyne in there, toxic at five parts per billion, that's going -- injected

into your aquifer. Now, some of it may come up in the return water, but the dissolved components like the acids, heavy metals, the filtration takes out your suspended materials, not your dissolves from (inaudible) coming back.

Now microbes -- oh, I did a -- just a rough calculation of the potential to -- from these gasses that will go into the system. Based just on the compressors and the diesel fumes that they -- diesel fuel that they will consume based on the federal government NPRI emission factors, and from -- you can get the emissions that will come out from these calculations, SO2, NO2, and then I say okay, well let's capture point one, ten percent, and you can see when you do that you get a -- and put that into the aquifer with certain volume of the aquifer determined by the 21,000 tonnes removed in a cavity, you can get a very low pH of four, and -- and benzyne above your toxic limit. If you go down to one percent, your pH is still the problem. It's very acidic. Your benzyne has gone done just below the limit, but -- and this doesn't include all the other emitters.

So, this is definitely a problem that has not been considered. And now as well, there'll be

microbes in there, and the literature says from the industry that -- to get rid of microbes, you need this extensive filtration process that you see on your left here, including ultra filtration, and drying the material.

Now, Sio Silica says they're not going to do this, but there is a standard compressor filter in there of five microns that will remove essentially dust. Now, Dr. Pipp states, "Virtually all bacteria can pass through a three micron filter. Huge growths of iron bacteria have been reported in wells containing less than five milligrams per litre of dissolved oxygen. The -- the air limit -- the solubility of air is about ten milligrams per litre." So, you're definitely going to get this potential for your micro bacteria, and this on the left shows you your iron bacteria sludge that can contaminate your wells.

Now, Sio Silica says as well they're not going to scrub the air to remove the NO2, SO2, and they're just going to use this filtration process. Now, they say they're always following industry standard. Well, there is an industry standard for this, for microbes, and it involves that complex equipment you see on the left here. Now, Sio Silica says this is a standard for

pharmaceuticals, and food and beverage, so they don't have to follow it, it doesn't apply to well water. Well, I understood that you drank well water, so I would've -- same as you drink a beverage, so I would've thought that Sio Silica, if they're interested in protecting your water, would follow the ISO standard. And so, the filtration they're -- they're going to use is not adequate, and this should shut down the project, but of course it won't. I'm just going to go onto the next source -- one here.

Now, I'm going to talk about the dissolved air that can get into your aquifer, and there's three sources. It's dissolved -- actually dissolved and gaseous air. Gaseous air is a bigger problem because the bubbles will move up and fast. Now, dissolved air is in your injected water. That's absolutely incontrovertible. It comes up with air lift, and it's out in the atmosphere, and -- and returned. So, but there's also entrained gaseous air. That means bubbles of air, and I'll describe them, and you can get -- there's a potential to get air leakage from your injection tube that could put in huge amounts of gaseous air into your system, and the air is a big problem down there because of all this pyritic material and selenium that can be leached just by oxygen.

Pyritic material for acid, and it can leach heavy metals.

And this is not a simple benign system down there. You have all these other material in the silica sand. It's just not pure silica sand, and this shows you their -- how the slurry gets into their frac tanks, that spray, and as it comes out the nozzle, it spreads. How does it spread? How does it get water? Well, that's entrained air, and it comes out with air lift, so it's already full of air, and it gets into the tank, mixes more air, it goes into another tank, down the chute, it puts in more air, then it gets into disclosed system with no place for that air to come out.

And here's an example of a calculation of how much entrained air -- this is gaseous air. This is in addition to your dissolved air for a plunging jet, and turbulence on the surface, and you can see you can get .17, .36, a lot of entrained air, and that's from air that starts out with no gas in it, but in Sio Silica, it's come up through air lifts. So, already have gas. So, you can get big fractions of gaseous air in your tank that is completely ignored, and in -- and no other of the experts so far or participants have brought this up.

Now, here's a -- just some examples of YouTube where they're demonstrating air lift, and in both cases there is air shooting out the bottom, they -- from the pressure in the first case, it's an air lift where there's a hose that comes in at the bottom and injects air, and the other one he just used a tube and a hose there injecting air. In both cases, the air came out the bottom. Now, here's an example of what I did at home.

I'm going to skip this now because my time has been cut down. Now, how much air is in that cluster? Well, from these sources, we'll do the math. Dr. Hollaender already did the math for us for dissolved air for a cluster, he got 70 kilograms, and that's for five milligrams per metre of air, and can dissolve to over ten, and so that could be an underestimate by a factor of at least two. And then for ten percent entrained air for a cavity of 21,000 tonnes, at water density of 1.3 kilograms per metre cube you get 1,605 kilograms of air, way more than your 70 -- so, the entrained air can be a big problem, and at the rate of 450 cubic metres per minute is -- of air, the Sio Silica patent says between 300 and 600, and you can calculate it to be almost 1,200 kilograms of air.

And now, what is the effect of that? Well, here's the chemical equation for reaction with iron sulfide. Pyrite. And seven oxygens form two molecules of H2S04, and the hydrogen from the H2S04 forms an acid, and I only use the first association because the second one is weaker. And so, that's an underestimate, but you can do the math and the calculation. One kilogram of air can contaminate from that reaction over 2,000 cubic metres of water to a pH of six, and -- and the reason -- or it -- for that is H2S04, it's got a molecular weight of 100 grams, one mole, and that -- a pH, you need a million litres to get -- for 100 grams to get a pH of six. So, it's roughly one gram of acid can contaminate 10,000 litres of water to a pH of six. Now, the drinking water limit is -- got to be a pH above 6.5. I -- I don't know if anybody remember from chemistry what pH is, but anything below seven is acidic, and -- and if it goes by -- down by a unit of one, that's seven times more acidic.

So, also this -- to get a pH of six in your cluster, you only need eight kilograms of air, and you're putting in at least 70. So, we've got -- and -- and then -- and when it's pH six or lower, you start to acidify and leach your heavy metals. So, we have a problem here

that's not addressed, and nobody talks about it.

Now, I'm going to talk about the extraction cavity and the stability of it, and the problems with it. Mixing of aquifer water in the cavities is prohibited by Manitoba Groundwater Regulations, and I'm going to talk about the transfer of aerated reinjected water into the carbonate, the collapse of the limestone, and something called cover collapse none of our experts have talked about, and nobody's talked about it, and the inadequate extraction plan.

Now, here you see a side scan sonar of a well that was extracted -- the sand was extracted BRU928, and you can see the cavity, and it all goes right up into the limestone, and that's going to be left there. And so, that's a mixing tank, but Sio Silica says after the extraction, that all settles down, there's only diffusion. Well, there's a regional gradient here, and I'm going to show you a simulation, a calculation that shows it does continue to mix after that, and they also tell you that the mixing is benign because even though the carbonate and sandstone water would mix, it's still perfectly drinkable, and it might change the -- they actually say the manganese and oxygen content goes down because it gets oxygenated,

but that would precipitate and get in your drinking water, but what's missing here is that sandstone is very pure valuable water. It's very soft, and it's low in iron, and you win awards when you bottle it.

This is the best drinking water you'll find on the face of this earth, in the sandstone, and when you mix it with carbonate, now you've got harder water, your quality -- and it's -- the iron content goes up, your quality's destroyed. And so, anybody downstream of here that's picking up after it mixes here -- and this is forever. This tank is forever. It moves slowly in the sandstone, it moves faster in the carbonate. I'll talk about that, that's water velocity, but these wells downstream, they're -- this plume of mixed water is going to go off downstream, and eventually reach your wells, and you've destroyed your sandstone water quality.

Now, there's people near -- Landmark I hear is putting dedicated municipal wells to pull out that sandstone water, so people don't have to use water softeners, they get pure water. That is destroyed. Now, this -- and there's a regulation against this, and that's the reason. So, okay, the regulation you can't stop it, it's going to go on forever, it's irreversible in the

project. No. You read the regulations, and it says there, "Compliance is according to the director." So, you just have to tell the director this isn't a problem, they can still the water, and the director will say, 'Okay then. Go ahead.' Because they have the power to do that.

Now, here's the next slide, and Mr. Boutin did the analysis here using speed flow, the same code that Sio Silica used on a local scale, and Sio Silica told me you can't do this on a local, so he did it on a local scale, and he put a high hydraulic conductivity in that -- that means resistance to flow in the -- in the system, and in that cavity, and -- and your regional flow, and you -- you -- you can see you get flow going on in your cavity, it's not stagnant. You'll get flow.

And now, hydraulic conductivity is not defined for this because there are new material in there, and no sand or anything, but you'll find out I'm sure that as you increase the hydraulic conductivity you'll eventually come to a limit because the water has to be drawn in from the sandstone. So, you can only draw it in so fast.

And so, here up in the corner we see the

water velocity, I think it's four times ten to minus five metres a second. Well, that's about 120 metres a year. It's not insignificant, or maybe ten metres a month you see. So, this is slow mixing, but it's mixing, and it's going to change your water quality, grade your water quality and your sandstone, and it moves downstream, and this is forever, and that plume will go on forever, and they keep moving Westerly with their cavities. So, they're destroying the water quality, but your regulations that say they're going to protect you, they can be overridden.

And I just want to talk about the shape of the cavity. Some say pictures you'll see later show it overhanging, and some say V shape. This is a YouTube of an air lift in the seashore, and the cavity's more parabolic, and it even has a sharp face at the back there because it can fall down like this, and so it can look almost vertical at the top.

Now, here this is (inaudible) where they tried to extract sand near St. Anne in 1960 -- (inaudible) near St. Anne 1967, and they -- this is in the Carman Sands, and they encountered -- consolidated sand here and hard shale (inaudible), and this is supposed to be this

very pure Carman Sand, and they had to do extreme lengths to break it up. Extend their production tube and their air tube to the side and shoot very high pressure air in there to break it. They couldn't even -- their compressor wasn't strong enough, so they used water jets, 600 PSI, and eventually they gave up, but this shows you the heterogeneity of the system. You can have very loose sand, you can have very hard consolidated sand.

Now, here's the analysis they did on the (inaudible), and I was particularly concerned about the sand because you actually have a bridge here. Here's your cavity, it's got a limestone on top, it's unsupported with till bearing down on the top of it, so it's like a bridge supported by sand pillars. It's submerged bridge, but the cavity here, that's -- and this limestone on top, it's your -- it's your bridge, and what -- and so, if you're an engineer and you're building bridges, you would want to know your material properties, especially if your sand support well because this is a new material. It's not like steel. They go and you -- you've got to find out what your material properties are.

What did they do? They take them from the literature. Why? They said because they couldn't sample

down there, falls out of the core barrel of the sand, but you can use sonic drilling. It's been done before. Where do you think the literature values came home? But they -- they said that would disturb the sample. Well, they took core samples of your limestone, and -- and the bit would disturb the limestone.

I don't buy that. The sand is a fine grain material, you can pull it out, reconstitute it with the clay and everything in it under pressure. You're not inducing any fractures in -- in -- in the sand. They -- they didn't do it. They took literature values. I think that's unacceptable. You've got to measure, but the cohesion, what they call a cohesion number, it's a unit of pressure. It's absolutely critical, and this internal angle of friction. They used a -- a number between -- from the literature around 35, 30 degrees. You can get as low as 15 in the literature, but in any case, the cohesion is a big problem.

You see this overhang here in well BRU922. That's in your sandstone. So, that's got to be consolidated. It needs a big cohesion. They back calculated their cohesion to get this huge number. 220 I think it is, but you look at the literature values on the

right for sand, and even silty sand, you -- biggest number I could find was 74 because they've got this overhang here, which you look at BRU928, and you can see a shelf coming out, but you look carefully, that's in the aquitard. In the sandstone you get a vertical face and then a slope, and in their model they just have a slope, and that looks maybe 30 degrees or something. That's what they model, but they use this huge number here for their cohesion, and -- and then they -- they can say that's -- you don't -- that governs the separation of your cavities, and the cavity size on how big you -- those cavities can get in the long term.

I don't agree with this, but you see there they also put a value of zero for your cohesion, and it's in the literature. Did they run that value? No. They refused to. They refused to do any sensitivity analysis, see what happened if you use zero. That's unacceptable.

So, I would say your bridge here, it has a sand pillar. What kind of bridge would you have with a sand pillar? And there's going to be, whatever, how many hundreds of these bridges? You know, when I was a kid we had a little song, Vivian bridges are falling down, falling down, falling down, Vivian bridges are falling

down, my fair lady-oh. Now, this shows you the actual well schematic here that I took from the Manitoba groundwater information, and that hole actually goes down to 236. They were sucking sand from 236 metres. It only showed you up there 190 because that hole is missing, you can't see it with your sonar, and that's filled with sand, and it's all collapsed in there. So, you've got loose sand in there, and I'll just go on to the -- I should've shown you ---

Previously I should've commented that in the last slide it showed in the limestone you can get possible fracturing and opening up of cracks in the limestone. So, that's -- this has -- nobody talks about this. This is called cover subside. This has happened in Florida where the overburden on top migrates it down through the cracks in the limestone into a cavity. Jeanine Gibson was talking about this. Nature doesn't make a void like that.

So, the -- if you have cracks opening up in your limestone, you can get this subsidence growing where the till -- and it takes a long time, and you get a cover subsidence at the top that can fill with water, and you know, at the bottom where you have clay, which you do in

the till, you get a cover collapse where a hole builds up in the clay, and all of a sudden, wump. And -- and now, that's all connected to the surface, and you -- contamination can go in there. This has not been considered.

And now, another issue here is when you put in your reinjected water, we -- it's gravity flow they say, but why can't you get a pressurization here when it's put it, and move up into the sandstone. Why did they model this? And I got a solution, an analytical solution, and I implemented it, and I could put injection points in here. In their model, they just used withdrawal, they never put in any injection. How can you model injection without injection?

And -- and what it shows here if you have injection points, you get quite a high hit just from the flow of water. I didn't specify any pressure, just the flow rate that you need, and -- and so that you -- and there's a low pressure here. These are head gradients. So, water flows perpendicular to that, and -- and so with a high head here you get water movement up into the carbonate, and -- and then up it would go carrying aerated water or dissolving selenium precipitating magnesium.

Well, this was not in their modelling. And -- but to corroborate it, this is from their patent that shows you 130 on the outer anulus how the anulus water is drawn down by the suction. And so, there's a space there you can put in extra water, and what they say is, "Water may be added from an external source to establish the water level 130 at sufficient height to increase the water pressure." In the sandstone formation, that's exactly what I modelled. It happens. They say so. To facilitate extraction of the slurry. So, you have a high pressure there from this injection here, it can go up into the carbonate.

Now, this shows you the fracturing in the carbonate in the Interlake Region, and this is just 15 kilometres north of Winnipeg, and -- and the water -- and you can see the bits of water there. It moves fast in those cracks. The overall flow could be -- it's not too much different than in the sandstone, but the actual flow in the cracks were -- there it carries the water, it's faster. And you can see they (inaudible) where the chute of water comes out. It's very heterogeneous. You've got almost no water moving in this limestone blocks, but in the cracks it moves fast.

So, you can get fast water movement towards

your wells, and we're getting closer to Vivian here, aren't we? Garson. About -- then I showed pictures up at Hecla, and he said -- and they said, 'Oh, that's far away. Different formation.' Well, this is the Fort Garry aquifer, and -- and you can see down here in the right -- bottom right it goes right down to where we are. And this shows you the regional gradient was very small. It's roughly ten to -- one percent of the minus three. That's the pressure -- the slope that the water is falling down. That's like one metre in 1,000 metres. So, it -- moving down that slope, but I showed you earlier those pictures around the well, it was about two or three metres and three metres, you know, one in three, not one in 1,000. So, a well can create huge gradients for the water to flow down like the water is falling down a hill that's got a slope of one to three rather than one to 1,000.

And I actually modelled this where I used the Sio solution to put water up into the carbonate coming from the sandstone under the injection pressure, and you get these gradients, and you see the travel times. Now, it's actually not too much different than the natural flow that you see on the right, but you know, it's hundreds of days, and that's because of this effect of precocity, and it depends on -- the precocity tells you how much of the

flow is being taken by these cracks, like precocity of point one means ten percent has been taken by the cracks. So, .01 is one in 100, and most of the flow is going through the cracks. So, the water moves faster in the cracks, you get shorter transit times. So, you can in fact -- the contamination can go from Vivian to Anola, what, in 100 days or so. And so, this is not a localized effect.

Now, I'm going to go on -- so, the slopes overestimate a slope stability. They only did overhang in the shale, and they used that in the model even though we know it's loose in everywhere else. I mean, there's special variability. Jason Mann talked about this. But they used the one image of overhang for the -- all their modelling. That's not acceptable. And that's that long, large cohesion, and they didn't do any cover subsidence, and they didn't take into account the stress on the system induced by the pressure, and I'll talk about this more later, from withdrawal and injection of water that induces the pressure. They're supposed to measure that, and they never did, or if they didn't want to report it. Okay.

Now, I want to talk now about their extraction plan. And people have kind of glossed over

this. This information that your cluster size is based on was put out in the Stantec table nine in response to public comments on January 14th, 2022. That was after the (inaudible) had seen it, and after we had a chance to comment. This very important information came out after the EAP was put out, but then there was a supplemental filing based on the extraction plan you see here below with five wells per cluster instead of seven that they had in the EAP, the revision, and it was based on this information as well in Stantec table nine, January 14th, it's the cluster sites apparently, and that's 60 metres, and 60 metres apart, but then there was some information from 60 wells, but that Stantec data information of table nine didn't change. Then we've got a -- a revised plan out in January 24th that completely obliterated this one in the summer with no new information, and -- and now we have clusters with one to five wells per cluster, so they're all varying in sizes.

Does that give you any confidence? That they're using the same data and all of a sudden you get a radical change in your plan based on the same data, and they're going to follow their cluster sizes, but we'll talk more about that. Well, you see what changed? Well, one thing that changed is I put in some IR's, and I

analyzed that data, and we couldn't analyze it for my submission to the public comments because it didn't exist. So, I analyzed it afterwards, and you plop the Stantec table nine data on there of the cavity size versus the limestone thicknesses were two varying overhang, and it's straight lines, huh? Straight lines. And so, linear analysis -- this is very common. Linear you can fit straight lines to that and come up with an equation. And for this equation here, for any limestone thickness or any overburden thickness, I can tell you what the cavity span is, and I plotted those lines against the Stantec cavity plans, they fall right on it. So, in the area we're talking about here, this equation works.

Now -- now I have all the data, we got it from the Sio Silica extraction wells, Manitoba groundwater of 44 wells all over the project area, what gives you this limestone thickness and the overburdens. I put in my equation, plotted the cavity size, and here you see there were two up to 60 metres. All the rest were around 40, 50. And so, that says all those 60 metres are unstable, you can't use them, and there's another important thing here. There's -- in that -- before that table you said you can't go in any regions with more -- the limestone thickness has to be more than 15 metres. Well, there's a

whole bunch here under 15 metres. That's east of Highway 302. They're out of the picture, so you don't see any red lines for those because those cavities are not allowed.

So, isn't it funny that I did this analysis in October, and then in January they come, and it said your 60 metres clusters are not valid. And then in January, out comes this cluster plan, the 60 metres are gone. Oh, why is that? The Stantec table nine data didn't change, and it corroborates exactly what my analysis said, that you've got to go to smaller cluster sizes based on the data. And so, they put out this. Is this to tell you the cluster sizes? These are schematic of your number wells per cluster, not your cavity size. How the heck do you know your cavity size from one well, and it goes from one to five, or two, or three, or four, or five. In fact, they told us that five can be up to 60 metres and no good. So, how are they supposed to determine this? Well, they said there's a TARP plan, and we can stop our Trigger Assessment Response Plan, and we can stop our cavity, and we can do sonar, which can't see very much until things settle, and then we can start up again, and they're going to do this over and over again. Oh, my goodness.

And you see there's a lot of special variability. They say well, after we get a few, we don't have to keep doing it. That's not true. You can have a well right next to it that has different limestone thicknesses and so on, and different allowed cavity sizes. This is unworkable, but then again, we look at this data, and it's bizarre. Over here on 92 -- the area 822 I think it is, you look at the big -- the ones with five wells per cluster a little fatter. How much fatter? They don't say, but -- and then the ones to the left, which are farther west, are smaller.

Now, east goes the opposite. Your limestone gets thicker as you go further west. All the data from their well core says that, and it even says that in their EAP. As you go further west, the limestone gets thicker. Well, they've got it backwards. As they go further west, your cavity sizes are getting smaller. What the heck is going on here? And -- and in this region here, same -- east of 302, they've got the same backwards thing. This is all -- this doesn't give you any confidence these people know what the heck they're doing? I don't think so.

But I want to get back to this 15 metres.

Now, I put this in my 2021 public comments because even though the Stantec report came out, they said well, we can't go below 15 metres, and I had all the data, and 15 -- - east of 302, they didn't have a single well, limestone thickness more than 15 metres. Competent limestone. It has to be competent. So, why are they there? Well, I showed this at -- at the hearings in the responses to questions, and they said oh, this is the first time we've seen this. What? I put it in their in 2020. Everybody ignored it, including the approvals branch. Why bother doing this?

Okay. So, I put it in, and so, oh, it's work. So, they went out and found two wells. Two new wells, and they're up on this page here, and I can't see very well on this small (inaudible). BRU92 -- it's this one on the left, and 921, and another one, 823 I think it is, and they were above 15 metres. 17.6 and 16 point something. I can't see it here, but it's up there, but that's not competent, and you look at what the competent limestone is. Well, you have to take off three metres at the bottom, and that fell into the cavity, and three metres at the top for the karst, and you subtract six metres because the data they got it the total limestone thickness from well construction reports. They don't give

you the competent. So, you subtract six metres from the two wells they found in there, and it says okay, we can go in there now. You're in less -- still less than 15 metres.

So, their own data says these are their two new wells they found, and it says you can't go there. You still can't go there. You can't go there, but the plan says you can go there. What the heck is going on? Well, are these people competent or what? And -- and now here's another thing. They said you can't go, and I showed you that patent slide where the water has been drawn down in the anulus. Well, if there's a flowing well where there's -- sandstone is pressurized in the carbonate, it flows up, and from out the surface, and your anulus is -- there's no place to put water in. They said okay, we -- we -- we won't go there. Well, look, there's a whole big area of flowing wells right in the middle between Anola and Vivian. I can't go there? And now I can't go east of 302. They can't go in the middle. Isn't their area shrinking? Is this viable? And what about this aquitard -- the Winnipeg aqueduct? They have to cross that someday, and I'm going to talk about that later. They need -- they don't have permission there. You think the Winnipeg -- city of Winnipeg wants their slurry lines

crossing their aqueduct? It can leak. It could leak you know. And I'll talk about later on what's in that slurry line.

And okay. So, in the long term our sand pillars are gone, and this is -- are -- can slump, and this shows it, and their cavity gets bigger, your Vivian bridges are falling down, and bang, you get a big slew at the top, this is all loose stuff, it's open to contaminations from the surface, E-coli and so on. Is that what you want? And has this ever happened? Well, I heard this from Mr. Duncanson the other day. Oh, this stuff has never happened. You don't have any examples of this happening. Well, here it is in Sheridan, Wyoming. This is a coal mine. Cole isn't too different than limestone, except that -- and it was covered by overburden, and they mined some cavities in there, and mined out the coal, then they went away, and gradually over many, many, many years you've got this subsidence, and there it is there, and this is a similar situation as in Vivian. So, here's an example of it in real life, and there's your future.

Now, the injection wells require a permit, and all kinds of stipulations in the permit, including the

measurement of pressure while your -- and that's to protect the cap rock, what they call the cap rock from being over pressurized or underpressurized, and inducing more stress on it, it'll make it fall down. And so, they had to measure. Well, 928 they did an extraction, and they put in their injection water, so -- but according to that permit, they had to measure the pressure inside the cavity. I asked for that pressure in my IR's. They -- Sio Silica said oh, it's unnecessary. This is gravity feed. There's no pressure induced there. So, no, we won't -- it's not necessary. Well, I -- I said well, wait a minute, this Manitoba groundwater put out this. They must have the pressure. So, I asked them, I sent them an email. "Can you please send me the pressure data from this?" And they didn't have it either. So, they went and called Sio Silica, and Sio Silica told them you don't need it. So, the regulator got back to me and said oh, Sio Silica said you don't need it, so we don't have it. So, who's running this show, hm? Who's the boss here?

Now, so this is one well, and now I asked this question in -- in -- in the -- some of the question periods. Well, you have to -- according to the permits, you have to measure this pressure right in your cavity, and that's where I got back oh, we'll abide by the

regulations. And then I asked if we -- if the public would be available to this pressure data, and they said well, we'll give it to the regulator. Now I have to get it from the -- yeah, I've gone through this exercise already. We -- we went through this. They refused to do it once. Why -- why would they do it again?

Now, so you -- you -- you can be protected by the licencing conditions, right? And they've got a facility here, so it's already got a licence. Your processing facility, and so they sent us some of the protection you've got in the processing facility. It's all discretionary. Upon the request of the director. Upon a written request from the director, and they said not emit particulate matter that exceeds .23 micrograms per -- per cubic metre. That is not for silica dust. Silica dust requires around 50 micrograms per cubic -- (inaudible) magnitude smaller. That's for nuisance dust. They don't protect against silica dust in their regulation. They put PM10 and PM2.5, which is your silica dust, in the definition, it never appeared again. They said -- they're protecting against nuisance dust, not the dust that's piled up -- fine silica dust that gives you silicosis.

And then it says here oh, they have to wet the sand piles to stop that silicosis problem, but who's monitoring it? Are they going to check? No, no. This is all self regulated. Now, here are your sand piles, a picture of them, and I hear they're, what, 24 metres high, and look at this on the -- on the bottom left. That's the sand piles from their extraction site in August 2021, and they're going to be sand piles in your -- in your site here. Oh, they're going to keep them wet they say. Well, these piles here, they weren't wet, and they were dry because -- and they were left out in Vivian for more than a year exposed, and people got exposed to them, and they were dried, and the workers were around these piles.

Now, they had another pile out in August, and someone reported it, and they had to cover it. Then that was in -- in the spring. Then they did another one in August, and again, they're not covering. You need to cover these to protect your workers. I was a safety officer at Atomic Energy of Canada, and they had similar problems, but it was a radioactive dust, and we had gas masks, we had monitors, we had personnel monitors, airline respirators. These -- look what they say on -- this is what quoted, and Steinbach online journal. "From the stockpiles of sand dried from -- directly from the

aquipost, roughly the same threat as the sand along Grand Beach." That comes from Mr. Bullen there. It's just in -- - it's in the Steinbach online journal. That's how they protect their workers.

They say the sand is -- the sand at grand beach has been exposed to weathering for thousands of years. All the silica fine stuff is weathered out of there, but in the response to attack comments, Eastern Manitoba Health asks them what the particulate distribution was, and here's the results. Two samples of raw sand slurry material analyzed by third party (inaudible) show 0.67 percent and 0.5 percent of particles less than 11 microns in size. Well, that's the -- in the silica dust (inaudible) area that gives you silicosis. It's their sand. .67 percent, that doesn't sound like much, does it? Well, how about one of .67 percent of 1.36 million tonnes, and how -- what's the limit? 50 microns were cubic metre. You can't see 50 microns. Well, what's a cubic metre? It's the size of your coffin. This makes me shudder. I -- I -- I was responsible for workers safety, and they've got workers coming here, and they're going to be dealing with this sand, and moving it around, and I don't know if those sand piles would still be at the extraction site, but they're told that it's Grand Beach

sand. Will they be protected? What -- what is this, a death sentence for your young men coming in here to work on this? And -- and that blows off if they don't water it. Who's -- who's checking them? It blows off into the houses nearby. It's the same as Grand Beach sand they say. This is a responsible company?

Now, I'm going to go onto well sealing. Now, this is BRU922, one of the wells they just built a year ago right beside 928 where they did their cavity. They did a cavity in this one too, and they have an extra anulus on the top that's protected by a temporary seal that opens right into the carbonate, and that according to the regulations has to be permanently sealed, and the anulus filled up. It's got a shale trap on it, and here's the picture on your right. They've got a -- a skirt on it with grey tape. Hey, what is that, to cover it up? And -- and now any contamination if that shale trap doesn't hold or deteriorates, it goes right into your carbonate. Why -- what's the purpose of this thing? You see your production tubes in the middle. I'm going to show you in the next one.

This is 923. They don't even have a shale trap on there. There is open to the elements. Right at

the surface they put a -- a skirt on it with grey tape. Or maybe the -- maybe the vandals did this because they had this problem before that I'll show you, they -- they left open wells, and they say oh, they were vandalized. Maybe the vandals put that skirt on there.

Now, look at this well here. You -- here's your production tube in the middle -- or sorry, your casing with your production tube got stuck. You can see it in there, and the water's supposed to come down that inner anulus and be returned, but is this outer anulus for, and it's open, and it opens into the carbonate. Why would you build it like that? That -- that's been specially designed. It's got a cement plug down at the bottom, but it's open in the carbonate. Is this in case your water down here can't accept all the gravity flows, they can stick it in the carbonate? Is that -- that design for? And it's against all regulations. Is -- does that give you any confidence that their wells are going to be properly sealed? This is still probably sitting like this with this lovely skirt on it. Is that going to protect anybody?

Now, has this been done before? Yes. 2018, here's triple tube well. Look how it was left, and

it's got three open. It's got an opening into the carbonate, and sandstone, and so you could return water there, and it didn't have an injection permit. Did they return any water there? Oh, I'm not saying they did, but why was it built like that? And the vandals did this, they left that thing open like that. I don't know. I guess they didn't manage to get the weld off the cap, but maybe they removed the welds from those outer annuluses. So, there's a history of this openings into the aquifers, the two aquifers in this case. I mean, this seems to be consistent.

Now, this is another plot. So, what they did up until 928 when they finally disposed of some water -- return water, they spill there on the ground for five years or four years. These -- all their permits to temporary authorization to divert water to the ground, and this is from your Manitoba Water and Drainage, your regulator, and they just let them do it, they don't even find out where it is most of the time, and there's no checking on it, and we know now with process water where you're bringing up the sand and it's been exposed to the elements below there, and you're bringing up oxygenated water, it can have selenium in it, it could have acid, it can have -- and this has been spilled out onto the ground

for this many years, and nobody checking on it.

Okay. Now, I'm going to go on to their geochemical analysis. They are -- they did some sampling, and they said they followed the main guidelines. These are guidelines to protect against oxidation of pyrite in the sample. Dry samples at less -- dry the samples at less than 40 degrees prior to -- and after drying, keep the samples cool. Minimum ice for delay before drying. Maintain anaerobic conditions by storing under nitrogen, free sand. Did they do any of those? No. All they said is that we controlled the humidity. And -- and there's a requirement for how many samples here. Well, they don't -- only three samples of their sandstone, and their shale, and their carbonate.

THE CHAIRMAN: Chair. Let's -- let's just -- let's just pause for a minute perhaps. Why don't we take a brief five or ten minute break, and then we'll resume with the rest of your presentation, sir? It is 2:35, so you actually have 55 minutes left. So, let's regroup in ten minutes. Those are, for those of you that know me, my ten minutes. -- are passionate about, and I appreciate your emotion, but I would caution you on what I think I'll just bluntly call some cheap shots.

MR. LENEVUE: Thank you. I'll try and minimize the cheap shots. Now, this slide here shows you the recommended, and this is not rigid standard. It's a minimum initial recommendations for how much sampling you have to do to characterize your disturbed ore body, and Sio Silica took three samples of shale, three samples or carbonate, and three samples of sand. Now, for instance, they based the shale on their drill cuttings, which aren't a very big volume. Just the -- the ten inch or drill that pulls up shale from a three metre shale layer, but as we've seen previously, the shale will collapse the entire shale over about 40, 50 metres in diameter at three metres thick for each cluster will collapse into your -- into your cavity, and some of it will get sucked up by your air lift, and the rest is in there exposed to this returned oxygenated water.

So, the amount of shale that's exposed and can be an acid draining problem is over the magnitude bigger from your drill cuttings. So, three samples for your shale is absurd, and I pointed this out, and other people, and they just stick to their guns, and they refuse to have any more sampling.

Now, the sand is a separate -- is the same issue. Now, they claim that there's no pyrite in their sand generating material, but there is in the concretions and the interbedded shale layers that they acknowledge are there, and they say that's up to five percent of the formation. Well, that's thousands of tonnes of that materials, and a lot of that is going to be brought up, and -- and that's never been sampled. And so, this idea that they can get away with this, completely violates their main guidelines, but they won't budge on this, they will not do anymore sampling, and they only did it from a very restricted area. It should've been done over the entire area.

Okay. Next slide. Now, this shows you where the sand samples were -- there were only three sand samples. Two of them were BRU46 and BRU121. They're outside your area of 24 year production, as you can see in this slide here. They're outside the area. So, they're not valid. So, there's only one sample that was taken, BRU953, that's valid. And those even ones there, they were drilled in 2018, and kept in storage for two years. That's been around the whole time restricted for samples, and they weren't protected against air oxidation all that time. So, they don't follow the main guidelines. Those

samples are -- should not be allowed.

Now, let's look at the one sand sample they took. Well, they can't get it from a core log, so they got it from the sand stockpile at Vivian, and now that stock sand was taken out in 2019 in June, I got a Google image of it, and those white spots are the sand that was taken out, and it was uncovered until June of 2020 for a whole year, and people were walking by, ATV's were driving on it, kids were exposed, there was no access control into that site in Vivian, and eventually people were -- complained about getting exposed to silica dust.

So, you see on the bottom right, they eventually covered it, but here's what they said in response to the IR's about taking weathered sand that'd been exposed to weathering since June until -- and wasn't sampled until the -- zero sand samples that are acceptable, and Hollaender and Woodbury said in -- there was still oxygen, and I gave you all those sources of air that going into that aquifer. That will mobilize selenium, doesn't need any acid, and it was above -- all three samples exceeded the acceptable guidelines for dissolved selenium in Red River carbonate Winnipeg shale, how was this ever addressed? Did any of our experts were

hired -- two expert groups, did they even pick up on this or no because they weren't shown the public comments where I documented this. Who pays any attention to the public comments? Nobody. Including the two experts, and the two experts -- or the two groups of experts, they didn't have geochemists. So, the province hired these experts because they wouldn't give us intervene or funding, but they got these experts that they hired to replace the expertise that we couldn't go after, but they omitted the geochemistry. So, we don't have any geo expert -- evidence from the geochemistry.

Now, been told over and over again by Sio Silica that they're in these special sands called Carman Sands, and that these sands are very special, they're not like the sands up at Black Island, or in the -- what they call the Black Island member that is all over the Winnipeg formation, and as proven in (inaudible) that this Black Island -- sub crops near Black Island, there's no crops, there's sub crops, there's still the shale -- layer of shale on top, and a thin layer of overburden, but we've been told that Sio Silica is extracting these very pure Carman Sands that don't have any shale in them and don't -- they certainly don't have any marker site in the sand. Well, you saw my picture of the (inaudible) extraction in

the Carman Sands that was consolidated and had shale layers, but the Carman Sands according to this Manitoba Energy and Mines geology map stops south -- just -- just a little bit on the south portion of the project area as you can see in that diagram there. I'm having trouble with the stupid thing. There.

So, they're not in the Carman Sands. They're in the Black Island member, and I'll show you another picture here that I didn't doctor like that one, two super imposed images on one. This is, again, a government publication from (inaudible) and -- and Manitoba Mines and -- and Saskatchewan of an isopach of the Carman Sands, and it's -- again, shows you the Carman Sands bend around, and they're out of the Carman Sands, and this verifies exactly what I said. They're not in the Carman Sands, but even if they were, the Carman Sands were laid down in the same epoch 450 years -- a million years ago in the same (inaudible), and we'd have the same -- the same characteristics. It's just they call it a thickening or a sand bar, but they're not there. They're in the Black Island member.

So, here's a picture from the Stantec report, January 24th, 2022 that shows the formations.

Okay. They're not in the Carman Sands. They're that -- below there. They're in the shale, and the Black Island member. So, I've been told that all the data from Wanipigow is off the table because it's not the Carman Sands. Okay. It's back on the table now. And here's the data, or this is from (inaudible). This says Black Island member, and this is a -- a electron micrograph of -- of the -- close up of the sand grains, and what do you see? Marcasite, marcasite, pyrite in the sand. It's clean sand that doesn't have -- what is it doing in there in the Black Island member? The same formation that they're in.

Now, at Wanipigow they analyzed the sand for acid drainage, and it came up positive, and there's a -- an acid to a new -- there's some calcium carbonate in there, but not enough to neutralize it, and the acid potential overwhelms the carbon -- the neutralization potential, and they give it in terms of the amount of carbonate you need to neutralize it, and -- and down in the corner here you can see it. My -- minus 6.76, that means that's the acid, that's why they put -- and that you need 6.76 tonnes of carbon dioxide -- sorry, calcium carbonate per thousand tons of sand to neutralize it. So, at 1.36 million tonnes, how much calcium carbonate would you need to neutralize that sand? Well, I'm sorry I made

a mistake here. This -- you can -- this is the homework exercise. I used to be teacher. I take 1.36 million and multiply it by 6.76 and divide by a thousand, and you get 9,000 something, not 7,200, but anyway, that's tonnes. So, you need tonnes of calcium carbonate to neutralize this type of sand.

Now, here's the electron micrographs of Wanipigow, and again, you see the pyrite and marcasite in your sand grains. I mean, this is -- how much of it is unique? Okay. Now, at Black Island where they've been extracting that sand since 1920, this is the stream coming off the Black Island sand. What colour is that? Why do you think it's that colour?

Do you know, nature shows us if we look what is going to happen. We have to look, and she shows us, and she's showing us here what happens when you're in acid drainage ore body. You get this red iron oxide, and I measured the pH there with witness paper. I got between five and six. Sio Silica measured at Vivian from their well extraction, they got eight. So, that's two orders of -- maybe three orders of magnitude more acid in that water, but that's off the table because they're in the Carman Sands, not the Black Island member. But they're

wrong. They are in the Black Island member. And -- and they haven't properly analyzed that sand. They got zero proper analysis of their sand. And so, why won't they go out and analyze more? How much will that cost them? What's the problem here? What are they afraid of? I'll tell you what they're afraid of. That's what they're afraid of. That's what they're afraid of. That's what they don't want you to know.

Okay. Now, I was -- this is another issue. Some of the people in Vivian -- near Vivian when Sio Silica was operating and extracting sand were getting discolouration in their well water at the same time. They've never seen that before. So, we reported it to the director of Manitoba ground -- suspected violation of Manitoba Groundwater Well Water Act. We reported ten residents complained about well water discolourization. The -- the director didn't even contact them. The directors response was, "Our records show issues related to iron content naturally occur in this area. While owners with concerns about water colour can contact the department for --" -- they already did -- they filed an official complaint and it was dismissed, and they also complained about these unsealed wells, regarding improperly sealed wells. The wells are now sealed, and

therefore additional inspection is not possible.

So, that's our regulator helping you out and dismissing your complaints. Can you trust the regulator to follow up after this project that's going? Okay. Now, Mr. Duncanson asked the other day, he said look, there's been no incidents of this underground contamination ever occurring. So, this is all fantasy. Give me an example. Well, I gave an example in 2021, and I put it in my public comments, and who paid attention, hm? Nobody. Okay.

So, here we have it here. "Subsurface acid drainage is ample in South Africa. In South Africa, they mined out a whole bunch of old caverns in a pyritic over body, and it flooded with surface water, and then there started to be exchange between those cavities of the water and the surface, and they started getting acid drainage and heavy metals up in the surface from water -- aerated water that came down from the surface and flooded these cavities. This is exactly what happened, and this is documented, and they hired a company -- a company called AECOM to clean it up, and -- and AECOM, they -- they took out all this water, and started treating it on the surface here. You see what colour it is? And this is a company

who wrote the EAP for both Vivian and Wanipigow. So, they know all about this, and here's your example here that Mr. Duncanson wanted. So, it does occur. And is that the colour of water you want? Is that your future? You know, nature shows us if we look, and they're showing us there, and they showed us at Black Island what's going to happen to your water, and here's your example of underground contamination. I'm pushing the wrong button.

Okay. Now, kyoto sand. They're going to take the -- all the suspended finds out of your water that goes to the UV so that it won't be scattered so the UV will work, and they're going to use this process, kyoto sand filter that's from seashells, very biologically inert, and not poison, and not toxic, and -- but there are a few things about kyoto sand that's are a little bit peculiar, and Dr. Eva Pipp put me onto this that, "Kyoto sand absorption is effective only under acid conditions where the pH is less than six where it becomes soluble. And then after absorption, it becomes insoluble and can precipitate out, but they still need ultra filtration to take it out."

Now, so if it's not acid when it comes in by the nitric acid and everything from their exhaust

fumes, they have to acidify it, and then after they've -- probably after they radiated it, you can't send acid water back, so you have to neutralize it. Now how in the world are they going to do that? They're going to add acid to that water, and then neutralizing chemicals? Like what, sulphuric acid and add crushed limestone back, throw -- pour selenium, they need very pure chemicals.

Look, people don't want this, and even if they had pure chemicals, sulphuric acid, that's a sulphate load. Nitric acid, nitrate load. Calcium carbonate, you're putting calcium, in the water. That hardens it. Anything you put in there is going to disturb your water, and you -- you need a lot to change the pH. This is unacceptable. This finishes it. You can't use kyoto sand. You have to acidify, and neutralize, and dump chemicals in your water. Do you want that? No. And who's going to stop them from doing this? And -- and it's not -- kyoto sand doesn't get everything out, but we've heard it can take some of the heavy metals out with kyoto sand, but then you find out you need coagulants, you need other things like montmorillonite to -- to with it to be effective for heavy metals, but -- and here's some literature examples, you know, just to show you I'm not making this up.

This is for removal of chromium heavy metals using kyoto sand, and it said it did remove some, but it wasn't all that effective, and you can see here went from 25.7 parts per million to 18, and a pH of 5.7. Like I said, you need acid for it to absorb here, and this verifies it. They did manage to take some selenium out over here at a pH of 6.3, but they found they needed to put the selenium monomer in there -- I mean, the kyoto sand monomer in there to take out the selenium, and they're not supposed to be there, and that's soluble, and that -- you can't take that out of there. So, this is a problem. This shows you the kyoto sand doesn't work, okay? Doesn't work. Or cannot be allowed because first you have to acidify it and neutralize it.

And also, they have this -- virtually going to dry out their sludge from all this process using sand beds, and both I and Dr. Eva Pipp pulled out -- pointed out this was unfeasible. And they eventually agreed and said we're going to use filter presses. Well, but filter presses, you need a coagulant, and what chemical coagulant are you got -- we use? You're back in the same problem. You can't use a toxic -- and they haven't specified what they're going to use.

Now, we're getting back to the aquifer sustainability. Mr. Boutin talked about this, and this is actually a problem of the regulator because when there was a pipeline project going to go through here, and one of the recommendations said we should have a regional groundwater model that every big user uses to quantify the drains on the aquifer, and we know Sio Silica's going to have some permanent grains. 15 percent of the waters going into the sand piles, and some's going out in the waste, and I think they say now about 80 percent of the water is going to be returned. Well -- well, what is the -- so, 20 percent is used permanently. And so, their model that they produced won't tell them that because it's too localized. And so, that sustainability calculation was never done.

And so, this model that they used, now my contention is it's completely meaningless because they said it was used for -- the scenarios of various amounts of extraction -- sorry, return of water, reinject of water, and they're supposed to return almost all of it, and what they were interested in the draw down on peoples wells and your -- but we've put almost all the water back, how are you going to get a draw down? And they already

knew from studies, and I'll show -- that's the one in the corner there from Friesen Drilling that glass, when you draw down a lot of water, it recovers very quickly, and it almost was straight up the recovery. They knew that already.

Why do you need (inaudible) to do that? Oh, the model's going to tell us about water reinjection. The water did -- model didn't inject any water. How can you have model reinjection -- model reinjection if you don't reinject? And I said you need a local model to do this, and I've produced one, and they just say that's of no value. Well, I think it's opposite. Their model is of no value. You can't do the sustainable flow, you can't -- and they didn't model reinjection. They said they could. They could refine it, and -- but they -- they have no value. Mr. Boutin developed the local model, and I asked him, he said yeah, I could've put a source and a sink term in there to model both injection and reinjection, but according to Sio Silica, that's of no value, and I've already shown you that even according to their own patent, when you put water back in by reinjection, you have a head, and you might even have a tank on the -- it increases the head, and you pressurize it near the top of the carbonate aquifer, and you drive it into the carbon --

so, what's the problem here, is it draw down of peoples wells, or are you pushing contaminated water into their wells? Well, you don't know because you won't model it, and you won't measure it.

Now, there's another big problem here, and that's just slurry lines. Now, your slurry lines from the extraction site go to the -- the processing facility, and they're carrying your sand, but they've all got some of that shale in it, and that can leach selenium, but they're saying in that slurry line, the water that's carrying around they'll store over the winter, they won't discharge it, they'll keep using it over, and over, and over again, and at the processing plant, they use polyacrylamide that has a manufacturing residual of acrylamide monomer that is extremely toxic. So, that's going to build up in your slurry line, and if you have a spill, that's coming out, and so is your selenium.

This is not a good thing. And so, I have built a model that actually calculates it, how much it would accumulate. Now, they just keep dismissing this and ignoring it, but they did reply in the IR's that -- that they found a study that said well, okay, the acrylamide monomer from manufacturing residual, you can't get rid of

it, but you can get it down to about 400 parts per million. You know, it could be as high as 1,000, but you could -- well, what did I use in my model? 200 and 1,000. I was below what they confirmed was -- can't get rid of. And so, they said you're -- you're -- you're not doing the right thing. They just confirmed what I did. Thank you for confirming what I modelled.

Now, it's a mass balance model where the flow -- you calculate -- and there's equations there where you calculate the amount in this closed loop according how much you put in, how much is generated in there, how much decays because acrylamide can biodegrade, and I got numbers back that up, and how much is lost to your sand piles? And there's an equation that you can develop, and there it is, and the first term of that equation is a steady state that is verified in the literature.

Now, to me, that equation is a beauty. That is the most beautiful thing, and that tells us this is -- nature has given us this gift to get a beautiful equation like that. That's true, and that's beauty, and that's all you need to know about this system. And you put the parameter values in there, and it shows you these lines of how -- and it can come to steady state because

you're continually diluting it by putting on fresh water, and taking some out in the sand pile, but steady state is way above the toxic limit. And look, I don't make this stuff up. It's varied in the literature. You'll find out, I put literature references at the bottom of all my slides. So, if you want to quarrel with my credentials, you'd better quarrel with the credentials of all these people I quote.

I put in a submission of 100 pages -- 130 references. How many people is that? All experts, and they're standing right behind me, all of them, and you want to criticize my credentials? You'd better go after all of them.

Okay. This is the infrastructure problems with Sio Silica. They've got to cross a lot of infrastructure. They've got to cross a point of a hydro line, and 500 kilovolt hydro line to Minnesota. So, they need hydro's permission, even to encroach upon those lines because does hydro want all these caverns next to their power lines, and do they want a slurry line crossing -- you have to cross these in order to get to your processing facility. Do they have permission?

I asked this in my RR. They're under negotiation. That means they do not have permission. Well, how did they get this far with no permission? What if hydro says no, we don't want you crossing our lines? I think the project is finished, but you know, they have to cross Highway 302, they need permission from the Manitoba government from that, and eventually they'll have to cross the Winnipeg aqueduct, and if those slurry lines leak in the aqueduct with acrylamide, they're going into the aqueduct, into Winnipeg's water system, and does Winnipeg test for acrylamide? Who the heck tests for acrylamide? No.

So, but I was told of course that's not an issue because this project is only for five years, and they won't cross that line until ten years from now. Well, maybe sooner because they can't go in the middle there where it's recharging flowing wells, and they can't go to the east, although they haven't accepted that yet, where east of 302 because the limestone is thickened -- is -- so, they're -- they're getting less places. Maybe they have to cross that line -- aqueduct sooner, and -- but they can go to the director after five years and say well, we have to cross the aqueduct, and there's this highway, Highway 302, we'll just put it in the ditch there, no need

to bother the city. And the director will say well, yeah, okay then. You're the experts. And we've seen this over, and over, and again.

I mean, who's the boss here? Mr. Samoiloff told us the decisions -- he explained to us the decisions, he's from AECOM, to make it -- split the project in two, and just for five years, and he gave us a long -- but an explanation. Well, this is a directors, and the ministers decision. Where were the minister and the directors? So, who's the boss? It's AECOM who's telling them what to do. And -- and they're there to protect you, the regulator? And okay. Here -- here -- here is -- and I got this from Eva Pipp's submission in the public comments, no, the one on the right, somebody took a picture. I think this is their -- no, it's their track hole I believe.

Any case, this is the light they have in their facility at night. Is this not disturbing? And -- and here's their -- an example of how you would protect a drill rig against noise. Are they going to do that when they moving all these rigs around? But there was a measurement from noise made. "52 decibels at 100 metres from the noise source of the DR22 extraction rig." This isn't published anywhere, but how many of these extraction

rigs are going to be running at once? And what else is there, drill rigs running, and trucks running around? I don't think that's an adequate noise measure, and why hasn't the noise measurements been made up until now? And I asked them what about the RM, have you consulted with the RM about the bylaws of noise and light? And there are bylaws. There's a noise bylaw says it's past 11 o'clock at night, somebody -- if they're being disturbed by noise, they can make a complaint, and as they responded, they -- they hadn't consulted the RM.

So, here's another huge issue here. It's not only your water. It's not only subsidence. You've got this noise and light problem that's going on if you're living near Vivian right next to you. Now, what -- what else -- issues are there here? Well, in order to take this to a high purity market, you need to purify your sand. It's called beneficiation -- beneficiation. It's French. But in any -- it means -- bene, well that's probably -- I don't know, it -- it means good.

Anyway, here's Sio Silica's report from a conference they went to, and you can see the sand there isn't any more purer than they're doing up at Wanipigow now because they found a glass area. I -- I'm quite sure

they found areas that is more pure in this -- in Sio Silica's area because there's a lot of spatial variability. And you can see this from (inaudible). They got iron oxide content from as low as .031 to .52 percent, but all that has to come out. You have to get below 100 parts per million of your iron oxide, and your aluminum oxide, and your contaminants in there for high purity. So, how did they do this?

Well, they won't tell us, but at Wanipigow for the same level of purity, they had to tell you because they're publicly traded, and they have to put out an NI43101 technical report, and in order to get their sand down to the purity required, they had to have extensive acid washing, but that was only on a bench scale. You can use -- no, magnetic means, but they couldn't get it down low enough. They needed acid wash, and that creates another way stream, and it -- it actually makes it -- you wonder if they really can do this for high purity means.

And of course we hear they're allied now with another company, but you look it up, and they're a consulting firm, a consulting services. So, and there's a memorandum of understanding, which is not legally binding. So, it makes us wonder, doesn't it?

Now, what works? I've got a whole list of here that I can reiterate. A long, long list of problems here, and I ran out of room because there's so much of it, and -- and I've talked for so long, and all of it's a problem. I maybe can read this list, but maybe I'll just whip back through my slides.

THE CHAIRMAN: Chair. So, you have about six minutes left. I'll let you use them as you see fit, sir.

MR. LENEVUE: And like problems. Infrastructure problems, permission -- toxic slurry lines, no sustainability calculations, kyoto sand won't work, (inaudible) removing heavy metals. Here's an example of pollution underground that is a real example, and that's -- is that what your water's going to look like? Well complaints, and complaint of the regulator. They dismiss it without investigation.

Here's what Black Island tells you. Look (inaudible) back. Here -- here's what's in the sand, and they won't -- they don't have a proper sample. What happens if all their sand is full of pyrite like this,

what are they going to do? That's their -- that's what they're mining. And there's the analysis, and there it is again, Black -- they're in Black Island member, they say in the Carman Sands. They're not. They're in the Black Island member, and they're (inaudible) test showed the -- what about the soil? They won't talk about the (inaudible). They say, 'Okay, that's (inaudible) water. Prove that it'll happen down there.' Well, prove it won't. It's -- you're putting the onus on the wrong people. And they never analyze it, so won't accept this. Their geochemist said I haven't seen that. Well, I'm showing it to you, and I've shown this since 2021, and it's been ignored for how many years? And -- and their sand sample out of the sand pile that they say was covered in a tarp, it wasn't. And the two samples of the area, and not enough samples, and -- and not proper procedures, and spilling water on the ground, and -- and these well sealings.

What the heck is going on here? Opening them up to the carbonate. No proper protection and acknowledgment about worker exposure to silica dust. You want your children working in this facility? Inappropriate indiscretion. Is your regulator going to protect you? They don't follow the -- what the permits --

even now. Like they don't follow them. Are they going to follow them in the future? Here's subsidence. It's going to happen. Here they've got flowing wells they have to contend with, and they -- this is -- this evidence is incontrovertible. It can't go east of 302. They won't accept that. They're going to go there anyway.

Then this crazy extraction plan with only specified backwards way about the number -- what about the size of the clusters? How the heck do they know that? That's the critical thing. And this analysis I did. I can tell them the size of the clusters. They need -- that equation tells you. Equations are beautiful. I love equations.

And that crazy plan they put out that was no good and was replaced immediate. Does that give you confidence in what they're doing? And their slope stability. Purposely putting in an overhang value of -- that's not even in the literature to misrepresent the stability of your sand pillars. And the fast transport to -- between these, and the heads problems that they won't acknowledge. Yes, there's stability problems. And -- and the mixing tank. This is going to go on forever and degrade your -- your sandstone water. That -- that's

forever, and it's going to occur, that mixing. It's not diffusion. Okay. I'm done, right? Am I -- have I got time? Okay.

I took this pile of sand -- this bag of shale, and I had held it up a press conference, and I told them that's the end of the project, you can't do this, you can't pull out this pyritic material that dissolves heavy metals and selenium. You're going to pull it out with your sand. (inaudible) two years ago, and they reported it in The Free Press that I was holding up a bag of soil. This is shale from under the ground, and I explained the problem for it, and you see, I thought aren't I stupid? I thought this pathetic bag of shale would be the end of the project. They said no. And it's not. And all I've got is my bag of shale.

I cannot -- I've done the best I can. I cannot protect your water. All I've got is a little bag of shale. It's up to you now because they don't listen to me. Maybe they'll listen to your voices if there's enough of you. And so, I -- I'm done here with my bag of shale. It's the best I can do. I can't help you.

THE CHAIRMAN: Chair. Thank you very

much for your testimony, Mr. LeNevue. Would the proponent like five minutes, or are you good to go?

MR. DUNCANSON: Thank you, Mr. Chair. Sander Duncanson. I can think -- if we could take five minutes, that would be great.

THE CHAIRMAN: Chair. Five minutes it is. I have 3:29. So, 3:34. Chair. So, being the stickler I am for time, it is 3:34. So, let's get ourselves back to our seats please. And the proponent will begin the questioning of Mr. LeNevue on his testimony. Please proceed.

MR. BAKER: Thank you, Mr. Chair. This is Jesse Baker speaking. Hello, Mr. LeNevue. I guess I'll start by saying that a fair bit of what you said has been addressed previously in the hearing, so I don't have that many questions for you, and they shouldn't take very long if we stay on track. So, with that, I am going to start with some questions about your qualifications. You did not file your resume in this proceeding. Is that correct?

MR. LENEVUE: I thought I did. Did they not receive it?

THE CHAIRMAN: Chair. Mr. Secretary, can you advise please? Chair. We will look into that. Sorry.

MR. BAKER: Thank you, Mr. Chair. Perhaps I'll continue in the -- the meantime then. Again, this is Jesse Baker. Mr. LeNevue, can you confirm that your degrees are in education, physics, and geophysics?

MR. LENEVUE: No. They're in -- yeah, in honour physics, biophysics, and Bachelor of Education.

MR. BAKER: Yes. Thank you for that clarification. This is Jesse Baker again. You are not an engineer, is that right?

MR. LENEVUE: No, I am not an engineer.

MR. BAKER: Thank you. Jesse Baker. And you are not a geoscientist?

MR. LENEVUE: I am not a geoscientist, but I am not an engineer. I just qualify that because I did become a member of the Canadian Society of Professional

Engineering, but -- but that -- that required experience, and -- yeah. Submission from your supervisors and a certain body of work before you're accepted, but it's not an engineering discipline you get from the university.

MR. BAKER: Okay. Jesse Baker. Thank you. I -- I think we'll -- we'll take that. Thank you. And one more, do you have any degrees in engineering, geochemistry, geology, or hydrogeology?

MR. LENEVUE: No, but I had to work with all those people, and absorb that knowledge from them when I was doing the vault model for Canadian nuclear fuel waste concept. So, I worked with all these people, and had to interact with them, and absorb that knowledge to the extent I could develop it into a -- a computer software and model.

MR. BAKER: Sorry. Were you finished, Mr. LeNevue? Okay. Thank you. And just to confirm, that work you were just discussing, when did you do that approximately?

MR. LENEVUE: That finished in 1998, started about 1985, somewhere around there.

MR. BAKER: Thank you. Jesse Baker again. And hopefully one final question on this line. To confirm, are you registered with The Association of Professional Engineers and Geoscientists of the Province of Manitoba, which is also known as Engineers Geoscientists Manitoba?

MR. LENEVUE: No, I am not.

MR. BAKER: Jesse Baker. Thank you. And so, this will start a slightly different line of questions now, Mr. LeNevue. Are you familiar with the Engineering and Geoscientific Professions Act of Manitoba?

MR. LENEVUE: I'm somewhat familiar with it. I'm certainly not -- I can't quote it for you, but I have looked at it. Yes.

MR. BAKER: Jesse Baker. Thank you. Are you aware that that act prohibits any person who is not registered as a professional engineer or professional geoscientist in Manitoba from engaging in a practice of professional engineering, or professional geosciences, or acting as a -- in a manner that would lead other persons

to believe that they are in fact authorized to act as a professional engineer or professional geoscientist?

MR. LENEVUE: No. I'll take your word for it.

MR. BAKER: Jesse Baker. So, is that yes, subject to check?

MR. LENEVUE: I accept that. Yes.

MR. BAKER: Thank you. Jesse Baker. Now we're just going to have some questions about your submission that you filed in this proceeding on February 13th, and a few that will lead into your slides from today as well. In the submission and presentation today you included a number of diagrams showing Sio's extraction wells and other things. That includes figure ten on page 18 in your submission, and slides 32 and 40 today. To confirm, are those all diagrams that you prepared, the ones showing Sio's -- Sio's wells, you prepared those?

MR. LENEVUE: The schematics of the extraction wells I prepared, and beside them I put the information from Manitoba publicly available information

from Manitoba Groundwater so that you could see if the illustration can form to the information on the publicly available -- that was publicly available. Now, I suppose I could've just put up that information -- written information, but that wouldn't have conveyed any meaning. So, if there's -- yes, you certainly could go to the illustration and see if I properly incorporated that. I mean, it's not just scale. I have to admit, it's not to scale. It's simply an illustration to show -- well, it's a schematic. It's not the scale.

MR. BAKER: Thank you, Mr. LeNevue for confirming that you prepared those. Have you ever designed water well construction programs and reports over the course of your career?

MR. LENEVUE: No.

MR. BAKER: Jesse Baker. Thank you. So, this next question is specific to one of the pages on your submission that you filed on February 13th. It's figure ten that was on page 18 of that submission. Do you have that with you?

MR. LENEVUE: I'm on page ten. I don't see

a figure there.

MR. BAKER: If I may help, it's Jesse Baker. So, it should be page 18, figure ten.

MR. LENEVUE: Yes. I see this figure. Figure ten. Yes.

MR. BAKER: Jesse Baker. Thank you. I don't think we need to talk about what's shown there for the sandstone aquifer, but for the carbonate aquifer, your figures show water being returned to the carbonate aquifer from this extraction well. Are you aware that Sio is not proposing to reinject any water into the carbonate aquifer?

MR. LENEVUE: Yes, I am. When I repeated this figure on my slide, I put a question mark there. I -- I didn't mean to indicate here, I hope I haven't written it there, that this was done. It's meant to show that there's a potential to do it, or -- or question -- raise a question of why it was done like that, but I am certainly aware that -- that there -- there was not -- well, there -- there's a prohibition against returning water to the carbonate aquifer. So, yes. If -- I agree there's a

problem here. This should not -- it's not meant to indicate it did occur. It's meant to indicate that it was constructed such that it could occur, and I'd have to read my submission carefully to make sure I put in that caveat, but when I put it up on the slides, I just put a question mark there, and made it sure that that information was conveyed. So, the information was why was it like that, you know, it -- it was built so that could occur, but I'm not saying it did occur.

And as well, I mean that -- that could be just from surface contamination entering there, nobody pumping there. It could just be surface contamination entering that well because that was exposed on the surface. So, I don't think it indicates that anybody was -- well, it does say excess aerated turbid water from sandstone aquifer, but you know, those -- that water that was pulled out there was I think put on the ground. So, I suppose it could've potentially have come back just by flowing around on the ground. So, but I did not mean to indicate that it was pumped back or intentionally put there.

MR. BAKER: Jesse Baker. And thank you, Mr. LeNevue. You also included quite a few photos in your

submission on February 13th and in your slides today. They always indicate that they were taken -- or sorry, that they were used with the photographer's permission. Can you tell us who the photographer was for these photos?

MR. LENEVUE: I have to ask the Chair for a ruling on that because I don't want to expose the photographer to any legal liability, and unless I'm forced to divulge that information, I'm not going to.

THE CHAIRMAN: Chair. Sorry, I was momentarily distracted. Let's try it this way. Can you confirm that you were not the person that took the picture?

MR. LENEVUE: Yes, I did not -- I did not take that picture. I don't think I took any of the pictures.

THE CHAIRMAN: So, again, Chair, I'll remind you, you have been sworn in. So, I'll let the proponents take back over, but ---

MR. BAKER: Thank you, Mr. Chair. And Mr. LeNevue, this is Jesse Baker speaking, do you know if the

photographer, whoever it was, had permission from the landowner to be on the property when they took those photos?

MR. LENEVUE: Well, I think some of them were taken from Crown land. I know that some were -- I think, yeah, they were on -- for a quarry who the owner was in Germany, and I know somebody had written to them, and didn't get a response. So, I think it was very difficult to get permission at the time, but the locals had been frequenting that land, and hiking on it, and riding their snowmobiles or ATV's on it for quite some time. So, there was a precedence set that that land was certainly used by the public, and the other wasn't making any objections or posting or anything a note, signs of no trespassing. So, I'm not a legal expert. I do not know the legalities of that, but my goodness, I don't know how many people of Vivian, lots of them, walked around on that land, and quite a few took pictures.

MR. BAKER: Jesse Baker. And thank you for that. So, I -- I guess I'll just maybe re-ask my question, make sure I got the answer. It sounds like you do not know whether the photographer had permission from the landowner to take those photos?

MR. LENEVUE: No, I do not know if there was any explicit permission from the landowner, but I do know -- well, this is only third hand, that there was never any complaint that I'm aware of from the landowner, or suggestion, or even indicated that people were not welcome on there because it certainly had been extensively used publicly around Vivian.

THE CHAIRMAN: Chair. Are -- are we planning on proceeding much further down this path about the legality of pictures that were obtained?

MR. BAKER: Jesse Baker. No, Mr. Chair. That was the final question on that line. And so, now Mr. LeNevue, this is still Jesse Baker speaking, I'd like to refer to page 51 of your submission. Sorry, I think I may have been cut off. So, this is Jesse Baker speaking. Page 51 from your February 13th submission. Hopefully you still have that open.

MR. LENEVUE: Yes, I have -- I see two illustrations there. Figure 31 and figure 30.

MR. BAKER: Jesse Baker. Yes, that's

right. And we'll be -- I'll be referring to figure 30. So, figure 30 on page 51 of your February 13th submission, that references ALS lab results from testing of silica sand in the spring of 2020. Is that correct?

MR. LENEVUE: Yes.

MR. BAKER: Jesse Baker. Thank you. Those are the same lab results that Ms. Jeanine Gibson talked about during her presentation in Steinbach two weeks ago, and attached to the printout she provided?

MR. LENEVUE: That's correct.

MR. BAKER: Jesse Baker. Thank you. Were you involved in the collection of the sand samples for that testing in the spring of 2020?

MR. LENEVUE: Yes, I was.

MR. BAKER: Jesse Baker. Thank you. Can you confirm that the test results referenced on page 51 of your submission are for two sand samples delivered to ALS? Sample -- Jesse Baker still. Two samples, and those samples were described as number -- yeah, number four sand

and number seven sand?

MR. LENEVUE: As I understand it we sent one large sample, and that ALS routinely breaks them into two, and analyzes two samples from what was sent in. I don't think we packaged two samples. They just separated -- I believe this is the case, separated them into two samples.

MR. BAKER: Jesse Baker. Thank you. On page 51 it does list two samples, and it shows that the weight of one was 0.88 kilograms, and the other's weight was 0.92 kilograms. Is that correct?

MR. LENEVUE: Page ---

MR. BAKER: Jesse Baker. If -- if I may help. So, this is still figure 30 that we're looking at, Mr. LeNevue, and specifically it's the -- towards the upper left corner under ALS, it would be the second column just to the right of the black line, if that helps.

MR. LENEVUE: Yes. I do see that. Thank you.

MR. BAKER: Thank you. Jesse Baker. So,

that -- those figures there, that would translate to 880 grams and 920 grams for the two samples. Is that correct?

MR. LENEVUE: I see 880 grams and 920 grams.

MR. BAKER: Jesse Baker. Yes. Thank you. And I'm going to refer to something that was included with Ms. Gibson's printout from two weeks ago. It was a sample submittal form that was attached, and it listed the quantity of samples as being 200 grams each for sample number four and sample number seven. Can you explain why the -- the quantities are different here?

MR. LENEVUE: Sorry. Could you explain again what Ms. Gibson said, or where you got that information, and you know, it's not on here. Is it something she said verbally, or is this written down somewhere?

MR. BAKER: Jesse Baker. So, two weeks ago Ms. Gibson provided a printout, either shortly before or shortly after her presentation, and it includes several -- it included, excuse me, several attachments, one of which, Attachment B, was an ALS lab silica sample submittal form. If you'd like, I could show it to you. I

have a copy here. I will bring it up. One sec. Jesse Baker. You may notice your name appears on the form as well about halfway down. So, my -- my question, if I can re-ask it, and actually perhaps I'll orient you a bit better. So, on this form, if you look most of the way down, in fact the table at the bottom, it lists the two samples, number four sand and number seven sand, and for each it gives a quantity of 200 grams. Do you see that?

MR. LENEVUE: Yes, I do.

MR. BAKER: Thank you. Jesse Baker. And so, my question before I provided you the copy of that form was if you look at the 200 grams here for each sample and the 880 and 920 grams for each sample that we just agreed on in your submission, can you explain why there's a difference in the weights?

MR. LENEVUE: No, I can't explain why they're different. But I'm not quite sure this sample submittal form if Ms. -- Ms. Gibson prepared it, or -- or it came from Sio Silica. Let's see now. There's a signature on here, but I don't know whose signature that is. It says -- okay. It's a submittal form. So, oh, submitted by -- yeah, it says submitted by Ms. Gibson.

So, I assume that she put this -- these numbers on there. Yes.

MR. BAKER: Jesse Baker. Thank you. Those two samples that were provided were testing using the PUL-31 method. Is that correct?

MR. LENEVUE: I can't respond to that. I don't know. I just know what the report says that they -- that is shown on figure 30. They did send some literature with it, but I have that somewhere. I could look it up, but I'm not familiar with exact -- what exact tests they used. Well, it was an acid base accounting test for at the top, and I know they were analyzing total trace metal content. How they did that, the particular chemical procedures, I'm not that familiar with.

MR. BAKER: Jesse Baker. Thank you, Mr. LeNevue. And maybe I could help by providing -- this would -- was another attachment from Ms. Gibson's printout. This one would've been attachment C I believe, and I'll bring it up in a second, but you'll see that it includes the same information as your figure 30 on page 51 of your submission.

MR. LENEVUE: Okay.

MR. BAKER: Jesse Baker. So, I'm going -- I'm going to give you page one of that document. Jesse Baker. So, if you look at the top right hand, going off memory, I believe there's a box, and in that box it indicates that the samples were tested using the PUL-31 method. Can you accept that they were tested using that method subject to check?

MR. LENEVUE: I see a PULQC, pulverizing QC test, is that what you mean?

MR. BAKER: Jesse Baker. So, I was referring I think it's directly below or perhaps directly above that where it says PUL-31.

MR. LENEVUE: I can see PUL-31. Pulverized up to 250 grams, 85 percent less than 75 micrometres.

MR. BAKER: Jesse Baker. Thank you. So, based on that, Mr. LeNevue, can you accept that the samples that were provided to ALS were tested using the PUL-31 method? If you want, you can accept that subject to check.

MR. LENEVUE: I accept that it does say PUL-31. It does also say PULQC, but I assume that's only a pulverizing test. So, yes, it does say PUL-31. I'm not familiar with what that means.

MR. BAKER: Jesse Baker. Thank you. To confirm, are you aware that the PUL-31 method involves pulverizing the material using steel bowls?

MR. LENEVUE: I see immediately above there pulverizing QC test, but the analytical -- this is sample preparation. The analytical procedures below say that's a base accounting, sulfate, sulphur leachable, total of -- well, inorganic carbonate, so on. So, ones that you're quoting are sample preparation tests, not analytical procedures tests. Even the PUL-31, it says pulverize. So, this is sample preparation. And it does say below that split sample. So, yes, some of the sample preparation procedures, and I guess they're pulverizing them from what I can see, which -- and then they go onto the analytical procedures.

MR. BAKER: Jesse Baker. Yes. Thank you for talking about that preparation work they do. And just

to make sure I got your answer to my question, Mr. LeNevue, are you aware that PUL-31 involves pulverizing the material using steel bowls?

MR. LENEVUE: Using what?

MR. BAKER: Jesse Baker. Whether it involves pulverizing the material using steel bowls. Are you aware of that?

MR. LENEVUE: I'm sorry, I -- I don't understand. Sio holes?

MR. BAKER: Jesse Baker. And sorry, Mr. LeNevue. So, the question was whether you are aware that the PUL-31 method involves pulverizing the material using steel bowls.

MR. LENEVUE: Thank you. Steel holes.

MR. BAKER: Jesse Baker. Steel bowls, as in something a salad would be in. A bowl. Steel bowl.

MR. LENEVUE: Steel bowls. No, I wasn't aware of that. How do you know that? It doesn't say that

here.

MR. BAKER: Jesse Baker. I think I'm the one doing the questioning today, but thank you for answering the question, and I only have one more question for you, Mr. LeNevue, and that is to confirm, are you aware that when silica sand samples are pulverized with that method, the samples become contaminated with trace elements such as iron?

MR. LENEVUE: No, I'm not aware of that. I would've thought that the lab would've done an appropriate test. It doesn't say they were pulverized with steel bowls. I don't know where you got that information from, and I don't know how much iron contamination you would get from a steel bowl. So, I -- I don't know that the iron is an issue here. We were more interested in the acid base accounting and the amount of calcium carbonate, particularly the amount of calcium carbonate and the amount of sulfide because it's the neutralizing potential. Yeah. And iron isn't all that toxic. So, it's more the heavy metals that are toxic that we would be concerned about. So, I fail to see why you're -- what your point is here, and I don't -- I can't confirm what kind of bowls they used, or where you got that information

from, or what relevance it has to anything.

MR. BAKER: Jesse Baker. Thank you, Mr. LeNevue. Those are all the questions we had for you, but I suspect you'll hear some more from us during the rebuttal. Thank you.

THE CHAIRMAN: Chair. Thank you very much. Let's go back the issue of what is and what may not be on the record for Mr. LeNevue in terms of resume. There was a participant registration form, but I'm not sure that you necessarily have that. Can you confirm that that's a no? So, the only other thing I can see on the file would be within his own material itself, his submission, noting that he has a BSC in honours physics, an MSC in biophysics, and a bachelors in education. That's the extent of what we have on record for you, sir.

MR. LENEVUE: Mr. Chair, I'd pleased to -- I'd be pleased to send you my resume. I thought I did. Maybe it was an oversight, but I would be pleased to email you a copy of my resume.

THE CHAIRMAN: Chair. That would be great. If we could do it before the record closes on

March 24th, that would be excellent. Mr. Secretary, is there any other business of the day, or I believe we're -- so, since -- Chair. Since we do have a few minutes, I'll just ensure that there are no questions from any of the other participants, and I'll remind you I am not a fan of sweetheart questions. So, are there any other questions from the participants? No. Then we are adjourned at 4:06 P.M. We will reconvene this evening. It will be a public hearing at seven o'clock. So, I will see you back then. Thank you everyone for your attendance.

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