MACKENZIE VALLEY ENVIRONMENTAL
IMPACT AND REVIEW BOARD

GIANT MINE REMEDIATION PROJECT
ENVIRONMENTAL ASSESSMENT 0809-001

TECHNICAL SESSION

The Facilitators: Alan Ehrlich
Paul Mercredi

HELD AT:

Yellowknife, NT
October 17, 2011
Day 1 of 5

APPEARANCES

Alan Ehrlich	) MVEIRB staff
Paul Mercredi	)
Jessica Simpson	)
Darha Phillpot	)
Doug Ramsey	) Tetratec
Dave Tyson	) Tetratec
Cesar Oboni	)
Lukas Arenson	) BGC
Jack Seto	) BGC
Joanna Ankersmit	) AANDC
Lisa Dyer	) PWGSC
Adrian Paradis	) AANDC
Dr. Ray Case	) GNWT
Mark Cronk	) PWGSC
Daryl Hockley	) SRK
Darren Kennard	) Golder
David Knapik	) AECOM
Yose Cormier	) AANDC
Henry Westermann	) PWGSC
Katherine Silcock	) AANDC
Erika Nyyssonen	) GNWT
Dave Abernethy	) PWGSC
Bruce Halbert	) SENES

LIST OF APPEARANCES (Cont'd)

Rudy Schmidtke	) AECOM
John Hull	) Golder
Octavio Melo	) AANDC
Michael Nahir	) AANDC
Dan Hewitt	) SRK
Doug Townson	) PWGSC
Ricki Hurst	) DPRA Canada
Chris Greencorn	) City of Yellowknife
Morag McPherson	) DFO
Amy Sparks	) Environment Canada
Lisa Lowman	)
France Benoit	) Alternatives North
Kevin O'Reilly	)
Ed Hoeve	) EBA Engineering
Bill Horne	) EBA Engineering
Todd Slack	) YKDFN
Randy Freeman	)
Lukas Novy	) ARKTIS

TABLE OF CONTENTS

LIST OF UNDERTAKINGS

--- Upon commencing at 9:30 a.m.

THE FACILITATOR EHRLICH: Okay, good morning. I'm going to start up now. My name's Alan Ehrlich. I'm the acting manager of environmental impact assessment of the Review Board. Normally I'm the senior environmental assessment officer of the Review Board. And it was as senior environmental assessment officer that I'm the lead on the Giant Mine file.

Thank you all for coming. You can tell it's a technical file because there's quite a few unfamiliar faces, which means there's a lot of consultants in the room, which means we're going to spend some time doing a round-robin a little later.

But the venue that we've got here, we've got the comfiest chairs we've ever had but not a whole heck of a lot of space. And some people who are not at the grown-up table, are in the rows at the back, they're here and they're parties and involved as well. And if they have any questions we'll be taking them, and I'll talk for a minute on what that is.

So we've held technical sessions a couple times before. For those of you who know the Review Board process, well, in general, environmental assessment has a sometimes I would say undeserved reputation for trying to bury people under paper. And we've discovered that we can maintain the focus of a lot of what we do if we have an opportunity for a verbal exchange partway through, far enough into the assessment so that people understand the technical issues and they understand pretty much what's being proposed but not so far in that they don't have time to work stuff out.

This worked pretty well in some of our past environmental assessments. And so that's what we're trying to do. At this point in the assessment I'll take you back. Remember, after referral the developer produced a developers assessment report describing what was their project as seen at the time. And then this underwent a confirmative review, and the Board went back to them with certain questions. They've answered the questions.

And then there was a round of Information Requests. These were the, more or less, formal written requests that came from the Review Board and from various parties. The developers responded to those. And there's another round of Information Requests coming up later.

We deliberately hold the technical session in-between the two (2) rounds of Information Requests because you have answers to the first set of questions you've got. At this point, a little bit of discussion might be enough to take some issues that aren't that important off the table if you can get clear answers to them between the First and Second Round of Information Requests. So that's -- that's a lot of what the point is here.

I would like this session to stay constructive. What we've got here are largely technical specialists and parties here to talk about technical matters. I -- I don't want it to take on an adversarial tone. Respectful, constructive dialogue is the purpose of this. We're -- we're trying to get ahead with it.

Looking at the Information Requests, there were questions in -- in a huge range of different subjects, and where we're able to address those subjects through a short technical discussion here, we will. And with any luck, this will help parties better focus the remaining Information Requests, which I think makes for a more efficient and -- and likely more timely process overall. These things are important to the Review Board.

I'd like parties to make a particular effort to stay within the scope of the environmental assessment. Unlike most environmental assessments, the Review Board put out a detailed reasons for decision pertaining to the scope of this project.

The scope of the project isn't the

environmental impacts of mining at Giant. What the Board is trying to figure out is is the project that's proposed, which is the project proposed by the Giant Mine remediation team, likely to cause a significant adverse effect on -- on people, or on the land.

But this is about the proposed project, and -- and what the developer is proposing here. That's quite different from focussing on the impacts of the -- the decades of mining at Giant. Now, in some cases that's relevant because you need to understand the baseline where this project is starting to understand where this project -- what kind of impacts may occur.

But outside of establishing a baseline for this assessment, I -- I don't want people chasing the environmental impacts of -- of gold mining at Giant. And I tend to chair this pretty informally, but if it goes right out of the scope, I will be bringing it back to the scope.

In past environmental assessments, we've found that sometimes there are commitments that a developer can make that matter a lot to the parties, but are -- are not particularly a big deal to the developer. The developer is open to a couple of things. And the technical sessions have proven to be a pretty useful place for that to happen. So in some cases, I would really strongly encourage the developer to -- to listen with open ears, and try and understand -- if you see an opportunity -- hold on a second. If the developer sees an opportunity to resolve issues with commitments that it's comfortable making here, that's a very worthwhile undertaking, and again helps to further focus the assessment.

The developer has been very accommodating at bringing in senior management. You know, there are -- are people here who can -- who can make important decisions, and we think that that's part of the recipe for a constructive technical session.

Please try your very best to answer the questions here today. I mean, I know that sounds obvious but some of these questions are very technical, and there will be some that you cannot answer here today. For those, you can take back undertakings, which are -- are more or less homework.

We would very much like it if whatever homework you walk away with, you produce your undertakings by November the 14th. We're looking carefully at the work plan for the assessment, and we -- we really are conscious of trying to make environmental assessment timely, and that way we will be able to keep on rolling along without delaying the work plan.

Now, obviously -- you know, you do the best and it'll depend on -- on what you have, but my point was to encourage you to answer what you can here because it's not constructive if every single question you get is, Well we'll -- we'll have to take that back and we'll respond in writing. Because then parties walk away from this without having resolved any of the issues, without having gone any further than you were when you walked in.

But, you know, make a real effort to answer here, and those which you can't, you can't. And, you know, try to have that back to us. We're going to try and keep careful track of what goes into the -- the undertaking list.

You'll also note that we've got Wendy Warnock, our -- our transcriptionst, so there's verbatim transcription that will be added to the public record. Because this is a session mostly for technical specialists, or for parties to discuss highly technical issues, the Yellowknives have been accommodating in saying that -- that we don't need to have translation here, which will help.

It means we can go quite a bit faster because we don't have translators running to keep up with highly technical terms. But we do have the transcript on the record and if anyone wants that transcript translated we'd be happy to -- to translate, hopefully just the sections that -- that they'd like. These transcripts are searchable. You can search them by keyword, and I think you'll find they're a valuable resource to -- to parties in general.

When you start talking, Wendy will get rough with you if you don't say your name first. I'm not going to because I expect I'll be doing a fair bit of talking and Wendy knows my name well.

But please when you start talking use the microphone because that way it -- it's captured and will be transcribed, even though it's a small room. And -- and start with your -- your name. If you want to throw in your organization, you're welcome to.

For people who are not sitting at the table -- Randy, can you put your hand up there? That's Randy Freeman. Next to him is a microphone, and next to that microphone is an empty chair.

So if we weren't able to pack you around the table, also France Benoit, can you wave your arm up? There we go. And then the -- the chair next to France is also open, and there's a microphone there.

Anyone who's in the house who has questions, whether you're at the table or not, this is a public technical session and -- and so long as it's on topic I encourage you to come up and -- and ask what you need to ask, if you think it will help the environmental assessment.

The driving rationale behind what happens here, and that I'd like you to think about before you ask questions is is this information going to help the Review Board make a better decision about this project, because that's ultimately what we're trying to move forward with. And so, you know, bear that in mind please as an overarching thing. We know that sometimes you're going somewhere indirectly, and -- and you've got your own reasons but bear in mind the goal of good decision-making as a result of the environmental assessment, please.

For the developer, we know that a bit of time has passed since the developer's assessment report was produced. In the start of each day you've got a presentation describing what you're going to be doing. Please be particularly clear if information that you're presenting has changed since the time of the developer's assessment report. It's a lot of information for parties to keep track of, and if you can make it clear where parts of project design have evolved, or new information has come to light, that would be, I think, particularly useful to the parties and to the Board.

We have been informed that there is some media interest -- are some media interest -- media is plural -- that the media will be showing up at some point. I will not have the technical session become an interviewing spot. This is not supposed to be a grilling. If any members of the media want to interview anyone who's in this room, I'm going to ask them to go outside. Do it at lunch time, during the breaks, or after the sessions.

It's a public session so anyone can be here who wants to be here, but I -- I don't want to turn this into a media scrum, and I -- I don't expect it to be, but there have been a few different inquiries, and so some people will be showing up, and I want everyone in the room to understand that.

In terms of the order of questioning, this is not like a hearing. With a hearing, there's a specific order of questioning, either the order the parties -- parties were registered or -- in this case, we found it's more productive to -- to let people have questions on -- on whatever matter is at hand, go ahead.

We'll try and do it in a -- in a -- an orderly fashion, but if there's a subject going on that's being discussed, and you didn't initiate that line of questioning, I -- I don't want you to wait until this comes up at the end of the day. For example, for our own experts, if -- if you hear a subject that is being discussed and you -- you have, you know, a question that you want to add to that, please do let me know that you have a question because I -- I want to try and deal with each subject comprehensively as it comes along.

Now, something that's a little bit different about this project is it involves -- it -- it's not only on a large scale, but it involves a lot of interacting systems. And I -- I very much appreciate the efforts of the parties in trying to produce a draft agenda that would touch all the subjects in an orderly fashion, but that still let's people know what happens when.

There is still going to be some overlap. It's impossible to think of dealing with the surface of the mine site on day 3 without having some discussion of the water that will actually have largely happened on day 2. A lot of the water management has to do with what happens underground, but that's all described on day 1, and what happens when you put them all together and try and practice them has a lot to do with the risk assessment. There's day 4.

So I'm not going to ferociously defend the subject matter of the day alone. I understand there will be overlap, and that's how the real world works. The subjects do overlap. We're going to try and keep the subject matter focussed on the days that it's meant to happen. But where there's a little bit of subject creep, if it makes sense according to what we're discussing, then fine, no problem.

So if you hear something on day 1 about underground that brings to your mind a pressing question that happens to involve water as well, please don't defer it to day 2 because we want to make sure that all the experts who are here to answer the questions are actually present at the time the questions are asked, for obvious reasons.

I'm going to very quickly go through the agenda. Each day is going to start with an opening remark but it's going to be shorter than today because today there's a little bit more introductory stuff.

And then, after that, there's going to be a de -- a presentation by the developer. We'll have a break. Then it's questions until lunchtime, questions until the next break, and questions until the wrap-up.

At the wrap-up we're going to try and hit on what the main undertakings were that came out of the day. The agenda says that the Review Board's experts are going to be going later in the day. But, as I said before, if there's relevant discussion going on and if there's a valuable contribution I'm going to let the questioning go ahead as it does, but I certainly would want the emphasis to be on the parties' questions starting after the developer's presentation.

Lunch will be from noon to 1:15 each day. And the wrap-up starts at 4:45. That doesn't mean we're out of here at exactly 4:45. It depends on what happened on the day and what there is to recap. But I'm going to try very hard to get us out of here by five o'clock every day.

Day 1 will be dealing primarily with the freeze and underground. Day 2, the Tuesday, will be dealing largely with water treatment and management. That includes groundwater, but also includes stuff like the diffuser and Baker Creek. Day 3, the Wednesday, will be focussed largely on surface remediation, and that'll include stuff like tailings pits, future land use, and air quality. Day 4 will focus on risk assessment. That'll include the developer's models of risk assessment and other questions regarding failure modes and some matters regarding perpetual care. The last day, the Friday, we'll be focussing largely on long-term monitoring evaluation and management. This includes stuff like adaptive management but will also include consultation and project management. And I suspect some perpretu -- perpetual care stuff may go in there as well because it's hard to divide that too neatly.

Adrian, do you have a question or comment? Start with your name.

MR. ADRIAN PARADIS: Hi. Adrian Paradis, INAC. I will probably largely speak to perpetual care, a little bit on the failure modes a little bit, but a lot of what we heard at the perpetual care workshop from three (3) weeks ago now will be -- we've got some incorporated into the presentation for the fifth day.

THE FACILITATOR EHRLICH: Good stuff. The other little technical point that I want to make is that the washrooms are down the hall. The key is in the little dish next to the mints on the bar over there. For the benefit of the transcript I'll point out that although the glasses are at the bar, there are no liquids in the glasses at the bar. Just the venue that we happen to have is the Champagne Room, but no actual champagne will be ingested throughout this process, at least before 5:00.

I'd like to introduce the Review Board staff who are here now. Our community liaison, Jessica Simpson, is here. And our Review Board staff will change a bit day-to-day, but Jessica helped do a lot of the organizing and setup for this and it's the reason why we've got what I think is a pretty good venue for this.

And then Darha Phillpot, an environmental assessment officer who's going to be helping, as is Paul Mercredi. I'm going to be facilitating most of the sessions, but we're going to be trading off a bit as well because even I can only talk so much. So there's going to be a little bit of back and forth.

I expect more people to come in in the mornings for the developer's presentation who might not have questions but who want to understand the project. Well, I know because I've been getting questions from other organizations, like the Land and Water Board, and I point out to them, yes, it's a public setting and there will be a presentation that might be valuable.

So I see this as a real opportunity for parties and the public to come up to speed on the project, but that doesn't mean that the number of people you see here when you start giving that presentation will be the number of people involved in the discussion, and so be reassured we may have a few more seats than we see now.

That's pretty much it for my opening comments. I'd like to do a round-robin, but before that we've got a question from the Yellowknives Dene First

Nation. It's Todd Slack.

MR. TODD SLACK: Sorry. Before you move -- Todd Slack, YKDFN. Before you move on, Alan, I just would like some clarity in terms of the agenda. So on day 1 today we're going to be talking about frozen block. Let's say we were finished at three o'clock here. Is INAC -- or the developer and the proponent committed to doing the -- moving on with the agenda or are they preferring to wait until day 2?

From, I think, most of the parties -- well, sorry, I shouldn't speak for others. Certainly from the Yellowknives' point of view, the critical issues are at the end, so we need to make up as much time or ensure the others as much time as possible.

THE FACILITATOR EHRLICH: Thanks, Todd. And Lisa, you've got your hand poised over the speaker button.

MS. LISA DYER: Thanks, Todd. Lisa Dyer. Currently we have our people here from wi -- to do with the freeze and, where possible, we can try and move on. We don't have -- we have different consultants or experts that are coming each day. So if those experts are available we'll try and start earlier.

Some of them are not currently in Yellowknife right now, so it may be where we can accommodate we will try. But if the experts aren't in town it's going to be difficult for us to start with the presentations.

And -- and because it was -- it's a small venue, we kind of stage when people were coming up and flying into Yellowknife. So we will talk about that a little bit further. Let's see where we get to today. And then we can see if we can accommodate if things are moving quicker than we anticipated.

THE FACILITATOR EHRLICH: Thanks, Lisa. It's a full week from a subject matter perspective. If we do finish one (1) subject a bit early I would like to try to press on with the next subject with the caveat that if the people who can't -- who need to be here to answer the questions aren't here, then those questions are going to have to wait. But that would also give you the benefit of being able to give a heads-up to those people about what was asked the day before that they should be ready to discuss, you know, the next day.

So I just want to be quite sure we're able to get through the agenda because it's all important. And because we finish at the end of a Friday we don't have wonderful opportunities for overlap into the weekend. I know that logistically that would be challenging for a number of reasons. So where there is time in the schedule, we're going to take advantage of it in as efficient a manner as possible.

Does that satisfy you, Todd? Todd's nodding. Okay, so on this side of the room, so people understand the general layout that I see here, on this side of the room, aside from the Review Board staff, Paul and I, we have the experts for the Review Board. And I'll let them introduce themselves when we get to the round-robin.

And then, at the end table there I see Alternatives North and the Yellowknives Dene First Nation and some experts who are working for them. Across from me I see the Giant team and their experts and DFO and Environment Canada at the -- in the row over there.

And some of the seating will change because, you know, DFO, for example, will want to be at the table when we start dealing with Baker Creek. But I just want to remind people that just because they're in that row doesn't mean they're not going to be asking questions if they feel any need to at all today.

Now, I know I didn't get everyone, so now we're going to do a quick round-robin, just your name, your organization and, you know, if it's not evident from your organization, who you're here for.

Let's start with Jack.

MR. JACK SETO: I'm Jack Seto, with -- I'm a permafrost engineer with BGC Engineering, here as an expert to the Review -- Review Board.

MR. LUKAS ARENSON: Okay, Lukas Arenson, with BGC Engineering, as well. I'm also expert on the Review Board, most -- mainly on the permafrost, cold regions, aspects, engineering.

MR. CESAR OBONI: Hi. My name is Cesar Oboni. I'm here with the Review Board and my subject is risk assessment.

MR. DAVE TYSON: I'm Dave Tyson. I'm with Tetra Tech and I'm here as an expert for the Review Board.

MR. DOUG RAMSEY: I am Doug Ramsey and I'm also with Tetra Tech, and I'm here as an expert with the Review Board.

MS. FRANCE BENOIT: France Benoit with Alternatives North.

MR. KEVIN O'REILLY: Kevin O'Reilly with Alternatives North.

MR. ED HOEVE: Ed Hoeve with EBA Engineering representing Alt -- or on behalf of Alternatives North.

MR. BILL HORNE: Bill Horne with EBA Engineering for Alternatives North.

MR. LUKAS NOVY: Lukas Novy, Active Solutions on behalf of the Yellowknives Dene.

MR. TODD SLACK: Todd Slack, YKDFN.

MR. RANDY FREEMAN: Randy Freeman, Yellowknives Dene First Nation.

MR. DAVID KNAPIK: David Knapik, AECOM with -- talking about the freeze.

MR. DARREN KENNARD: Darren Kennard with Golder Associates. I'm here as an expert for the developer.

MR. DARYL HOCKLEY: I'm Daryl Hockley with SRK and technical advisor to the Giant Mine project team.

MR. MARK CRONK: Mark Cronk with Public Works on the Giant Mine project team.

DR. RAY CASE: Ray Case, GNWT lead on the Giant Mine remediation project team.

MS. JOANNA ANKERSMIT: Joanna Ankersmit with Aboriginal Affairs and Northern Development Canada.

MR. ADRIAN PARADIS: Adrian Paradis, I -- Aboriginal Affairs and Northern Canada.

MS. LISA DYER: Lisa Dyer, Public Works and Government Services Canada with the Giant Mine team.

THE FACILITATOR EHRLICH: Thanks. Trevor, right? Trevor is the gentleman who's doing the sound today. We weren't able to set up a roving mic for this venue so I'm going to ask people who are not at the table and haven't introduced themselves to just come forward. There's microphones all over the place. You're not escaping this round-robin so easily.

MR. OCTAVIO MELO: Octavio Melo. I'm with Aboriginal Affairs and Northern Development on the Giant Mine team.

MR. MICHAEL NAHIR: I'm Mike Nahir. I'm with Aboriginal Affairs and representing Giant Mine team.

MR. DAN HEWITT: Dan Hewitt with SRK Consulting, technic advisor -- technical advisor to the project.

MS. KATHERINE SILCOCK: Katherine Silcock. I'm with Aboriginal Affairs and Northern Development on the Giant Mine project team.

MR. GREG NEWMAN: Greg Newman, I'm a ground freezing consultant working with SRK as part of the Giant Mine team.

MS. ERIKA NYYSSONEN: Erica Nyyssonen, Department of Environment and Natural Resources, GNWT.

MR. JOHN HULL: John Hull with Golder Associates working for Public Works for the Giant Mine team.

MR. RUDY SCHMIDTKE: Rudy Schmidtke,

AECOM, on the Giant Mine team.

MR. BRUCE HALBERT: Bruce Halbert, SENES Consultants. I'm part of the technical advisory team to the -- to the project.

MR. DAVE ABERNETHY: Hello. Dave Abernethy with Public Works and Government Services Canada on the Giant Mine team.

THE FACILITATOR EHRLICH: Is there -- are there people at that side of the room who haven't introduced themselves? If so, please.

MR. CHRIS GREENCORN: Chris Greencorn representing City of Yellowknife Engineering.

MS. MORAG MCPHERSON: And Morag McPherson with Fisheries and Oceans.

MS. AMY SPARKS: Amy Sparks with Environment Canada.

MS. LISA LOWMAN: Lisa Lowman with Environment Canada.

MR. YOSE CORMIER: Yose Cormier with Aboriginal Affairs and Northern Development Canada.

MR. DOUG TOWNSON: Doug Townson with Public Works and Government Services Canada, Giant Mine team.

MR. RICKI HURST: My name's Ricki Hurst with DPRA Consultants supporting the Giant Mine team.

MR. HENRY WESTERMANN: Henry Westermann from -- with Public Works and Government Services Canada on the Giant Mine team.

THE FACILITATOR EHRLICH: Certainly appears to me that we have an impressive amount of technical background in the house and I hope that we've got everyone we need to deal with any question that could come up here.

That's it for my opening. Now it's time for the developer's presentation on the freeze and underground.

Would you like the lights down?

MS. JOANNA ANKERSMIT: Yeah, if it's okay I'd just like to make a few opening remarks before we get started, Alan?

THE FACILITATOR EHRLICH: Just -- it -- it would be okay, but there's a question from DFO that I -- I want to take just before we do that.

What's the question? Into a microphone, please. Oh, sorry, correction, it's not from DFO; it's from YKDFN.

MR. TODD SLACK: Do you want us to wait to the end of the presentation before we ask questions, or ask them along the way? Todd Slack, YKDFN.

THE FACILITATOR EHRLICH: I -- I'm

inclined -- if they're big questions -- if they're not tiny points of clarification, I'm inclined to have you hold onto them until the end because there's a lot of ground to cover in this presentation.

And the rest of the day is more or less questions about what's proposed, which is entirely what the subject of the presentation is.

So if it's -- if it's just a tiny bit of something that's unclear during the presentation, okay. If it's a question with any meat on it, please wait until after and we'll -- we'll get into it when we have the real chance to.

MS. LISA DYER: Lisa Dyer. That would -- that approach would work for us.

THE FACILITATOR EHRLICH: Joanna, you said you had some opening remarks on behalf of the developer.

OPENING REMARKS BY AANDC:

MS. JOANNA ANKERSMIT: Thank you, Alan. And I'd like to echo Alan's comments and thank the Review Board staff for finding a room with such cozy chairs for us to spend our week together.

And also thank the -- the parties that -- that worked collaboratively to come up with the agenda that will guide us through the week.

My name is -- is Joanna Ankersmit. I'm the program director for the Contaminated Sites Program in Ottawa for Aboriginal Affairs and Northern Development Canada.

I've been with the program since 1999; coincidentally the same year the federal government took on responsibility for the management of Giant.

The federal government's priority for Giant Mine in '99 was the protection of human health and safety and the environment, and that priority remains unchanged a decade later.

It's important to point out that this project is a public sector remediation project supported by all Canadians from coast to coast to coast.

To date, there has been a significant level of resources invested, and the Government of Canada has made Giant Mine and the remediation of this site its priority as evidenced by the already $135 million spent at the site.

Significant progress has occurred since '99. We've brought in competent contractors to implement care, maintenance, and to manage the property and keep contaminants at the site from entering the environment. At the same time, we've maintained a focus on planning for the long term.

This approach has included a significant engagement of both technical experts, and the local community. This input was considered carefully, and resulted in the government's decision to pursue the frozen block method for the long term management of arsenic trioxide at Giant.

In 2003, the Giant Mine team developed the remediation plan based on the preferred frozen block method, but also included all other site elements of concern.

That plan was presented in 2007 to the Mackenzie Valley Land and Water Board. In 2008, the Review Board completed its decision for the scope of assessment. The developer's assessment report of 2010 was submitted, and now is the topic of our discussions at these technical sessions.

This week is very important to the Giant Mine project team. It gives us an ex -- an opportunity to explore with the interested parties and the Review Board staff the components of the remediation plan, as well as various responses to the Information Requests received to date.

The timing is also such that the ideas and challenges that we will discuss this week will inform us as we progress on the various elements of design.

As most folks in this room will recognize, the site is very complex, and there is a huge amount of information to understand and absorb.

Our team is here this week to share the knowledge they have on the specific elements of the project, and to answer to the best of our ability the questions that you have.

Of course, there will be further steps in the process giving us numerous opportunities to review more and more details as they become more and more defined.

As folks have noticed, work on Giant Mine never stops. As we speak, work is being done on Baker Creek to address the situation of ice damming this past spring. Study continues on the freezing of the chambers, as well as the ongoing care and maintenance.

The site is dynamic and we continue to act on risks in a proactive manner to protect human health and the environment. We continue to investigate risks that are present and prepare ourselves to take action in response to further deterioration of certain site elements.

Some of the elements of the site that we are actively conducting investigative work on are Baker

Creek infrastructure such as the roaster building, and the underground stopes.

We are engaging with the regulators, including the Land and Water Board, the Review Board, DFO, Environment Canada, and the City of Yellowknife to ensure that they are aware of the changing risk profile of various elements at the site. We will continue to work in a collaborative way with the regulators and with the community.

I think it's important, and I want to acknowledge the long history and complex legacy of the Giant Mine site for the Yellowknives Dene First Nation, the communities of N'Dilo and Dettah and the City of Yellowknife.

I appreciate the mine has affected folks in different ways, some positive, and others less so, in the over sixty (60) years the mine has been in your backyard.

I understand from the Information Requests received and the various communications with our team, that
other issues related to the past legacy of the Giant Mine are top of mind for many of the -- many folks in this room. I respect that these issues are important to you; however, I feel it is important to be frank and honest

about what this team, and specifically myself, can address at these technical sessions.

We will listen to the concerns and opinions you have. Where we can address those, we will. And where we can't, we will commit to communicating information gathered to the appropriate folks within Aboriginal Affairs and Northern Development Canada.

The Giant Mine team is tasked with the remediation of the Giant Mine site and we are here to answer your questions in these technical sessions to the best of our ability.

This week we are here to gather at these technical sessions to contribute to the assessment of the impacts of the Giant Mine Remediation Project. The project will have positive impacts on the environment and the community. Addressing risks from the site will provide not only long term environmental stability and safety for the local people, but a significant investment of resources will have positive economic benefits to the communities of the area.

In closing, I would like to reinforce this team is genuinely interested in a constructive dialogue over the course of this week. The technical sessions are one (1) step that will allow us to share information, but also to hear from you ideas that can further improve the remediation plan and enhance the positive impacts this unprecedented project will have for the environment and for the citizens of Yellowknife.

As you all know, we are co-proponents on this project with the Government of the Northwest Territories, and I would like to give Dr. Ray Case, Director of Environment, the opportunity to share a few opening remarks with you before we get into the frozen block technical presentation.

Thank you.

THE FACILITATOR EHRLICH: Thanks Joanna. Dr. Case?

OPENING REMARKS GOVERNMENT OF THE NORTHWEST TERRITORIES:

DR. RAY CASE: Thank you, Alan, and thank you Joanna. Ray Case, for the Government of the Northwest Territories.

As highlighted by Joanna, the Giant Mine Remediation Project is a unique project, both in the -- the risk that it poses and for the location.

The Giant Mine is within Akaitcho territory, on Commissioner's land, within the City -- boundaries of the City of Yellowknife, and a result of mining activities conducted under federalation (sic) -- reg -- legislation over decades.

As a result, the GNWT has been a part of the discussions and planning for Giant Mine early and often. The GNWT was engaged in the process to establish the deal -- or sorry, to deal with the bankruptcy of Royal Oak Mines. The GNWT has been engaged in the review of options for addressing arsenic trioxide dust and in the preparation of the remediation plan.

In 2005, the GNW -- GNWT signed a cooperation agreement with Canada that recognized that in situ underground freezing was the appropriate approach for addressing the arsenic trioxide dust; that the remediation of surface set out in the plan would address risk to the environment and public health posed by the site; and that the GNWT would contribute financially to care and maintenance, project planning, and surface remediation. And we'd undertake to be a full partner in the -- in the planning for the site.

As co-proponents, the GNWT has worked closely with Canada on the remediation plan submitted to the Mackenzie Valley Land and Water Board in 2007, the developer's assessment report filed in 2008, and, most recently, on the responses to Information Request filed this summer.

I can say from discussions with other GNWT staff who have been involved in the project previous to my involvement and from my personal experience that the GNWT's input has been sought, respected, highly regarded, and is reflected in the ma -- material that we're here to discuss today.

So I -- I look forward to a very constructive and fruitful discussion that will help take us a step closer to addressing the environmental and human health and safety risk posed by the Giant Mine and addressing any residual risks following remediation that the site may pose over the long-term.

With that, I'd like to turn it over to Mark Cronk to launch us into a technical discussion of the plans for addressing the underground risks.

THE FACILITATOR EHRLICH: Thanks, Ray.

Just before Mark starts there's one (1) point that I omitted from the opening comments that I should make very clear. I want everyone in the room to understand that this is not a hearing. If this were hearing the Board members themselves would be sitting here hearing the evidence; they're not, which is why you can engage in, you know, a free discussion of the technical matters.

And I don't want people to edit themselves too carefully here. The point is to get to the bottom of as many of these issues as we can.

As a technical session, it will be considered, among the rest of the body of evidence on the public record, by the Review Board, but just because we're talking into microphones and sitting upright doesn't -- it doesn't make it a hearing. And so I just want to, you know, encourage a informal exchange where possible and I think the opening remarks we just heard from the GNWT and INAC have set a good stage for this.

Sorry to interrupt, Mark. Please go ahead.

OPENING REMARKS BY PWGSC:

MR. MARK CRONK: Thank you, Alan. Mark Cronk.

A couple of things I'd like to mention here today. I think it's important to give a general sense of where the engineering team and the technical advisor teams are in their own internal process of design. Then I'll go on to try to describe a little bit of the roles of two (2) groups that you're going to hear about. And, finally, I'll introduce the speakers for the frozen block concept and give you a little bit of an idea what they're going to do.

Public Works and Government Services Canada is working with the GNWT and INAC leading the design process. We are quite early on in that. We are viewing the remediation plan as a well developed concept and we are in the early stages of preliminary design. So if you'll keep that in mind as we go through the presentations over the next few days, that would be great.

You will hear two (2) general teams described. There is the technical advisor, which has been led by Daryl Hockley for over ten (10) years. They were the group that were engaged by INAC to undertake a comprehensive review of the problem of Giant and generate the remediation plan.

There is another group which we're referring to as the Engineering Design Team, and that is a combined team of AECOM and Golder, and they are the group that is carrying forward from the work that Daryl, the technical advisor, did on the remediation plan with preliminary design. So there's kind of two (2) different groups here.

Depending on where we are at and the nature of the questions, some will be referred to the technical advisor and some will go to the design team.

And with that, I'd like to introduce the speakers that are going to speak to you today about the frozen block concept. Initially Daryl Hockley, who has been leading the technical advisory team for over ten (10) years on the Giant Mine project.

He is a civil engineer with about twenty-five (25) years experience primarily related to environmental issues on mining projects. He will lead you through a review of the frozen block concept and how we got to that decision.

Followed by that will be Mr. Darren Kennard from Golder Associates. He is a mining geotechnical engineer with sixteen (16) years experience in both mining and civil projects, primarily around the aspect of rock mechanics. He will talk about the underground stability program and the preparation of underground to receive the frozen block concept.

After Darren will be Mr. Dave Knapik, who is a senior civil engineer with AECOM, and he has been tasked with trying to come up with the more mechanical electrical process aspects of the freeze system.

And so with that, I would like to turn it over to Daryl Hockley.

PRESENTATION BY DEVELOPER:

MR. DARYL HOCKLEY: Daryl Hockley. I'm going to start by reviewing how the frozen block option was selected and why we continue to believe it's the best option for long term management of the arsenic trioxide dust.

As Mark mentioned, Darren and David will then present some of the current thinking of the design team regarding implementation of that concept, and then I'm going to provide a short update on the freeze optimization study to -- to round things out.

Most of what I'm going to say in this first presentation, Alan, is -- is in the DAR, or in responses to the IRs, we have picked a few points to highlight and help people see -- see what we think are the -- the most important parts.

(BRIEF PAUSE)

MR. DARYL HOCKLEY: The process leading to the recommendation of the frozen block option took place largely from 2000 to 2003. It included three (3) years of work by other thirty (30) engineers and scientists from about a dozen of Canada's top engineering companies and universities.

It also included over forty (40) public engagement sessions, including three (3) multi-day workshops, and all of the findings were reviewed by an independent peer review panel consisting of experts nominated by DIAND, GNWT, the North Slave Metis, and the Yellowknives Dene.

Initial brainstorming sessions identified over fifty-six (56) methods that could be used in the long term management of the arsenic trioxide.

We widdled (phonetic) those methods down to four (4) options, four (4) example options, that were taken to the first public workshop. As a result of that first public workshop, we were instructed, or we -- we went ahead with a total of twelve (12) alternatives for a detailed assessment.

After about a year of -- of technical assessment at the pre-feasibility level in -- in most cases, we took the two (2) best options to a second public workshop.

And we selected one (1) option that left the arsenic in the ground, and one (1) option that took the arsenic out of the ground because it -- it was clear from the public that they wanted to have one (1) option of -- in both of those classes.

At that second public workshop we were asked to look at a third option. I'll explain later what -- what that is.

All three (3) of the options were then taken to the -- to the final public workshop in -- in

2003. All of this was reviewed by the independent peer review panel, the IPRP, in March of 2003, and our final recommendation to INAC was made in August of 2003.

This list here shows the twelve (12) options that were considered. Some of them were concluded to be infeasible fairly early in the process, so in fact there is -- there is less than twelve (12) here, and -- and some of the letters are missing. The -- the letter -- the missing letters are those that were taken off the table within a couple of months after that first public work -- workshop.

B3, the frozen block, is the one (1) we're going to spend most of our time talking about it. It was the -- the preferred in situ remediation option. The preferred ex situ remediation option was Alternative G: removing the dust and encapsulating it in cement. Those were the two (2) that were taken to the second public workshop.

Participants in that workshop asked us to consider a third option where we took the material out of the ground, reprocessed it, and put it back into the ground. That became a variant of what had previously been Alternative C.

So it's the three (3) options that you see here highlighted that were taken to the third public workshop for discussion.

These are the factors that were considered in all of the option assessments. The terminology here is option assessment terminology and it -- it can be translated into environmental impact assessment terminology.

The first one (1) here, short term risks of arsenic release during implementation, could be translated in environmental impact terms to the risk of significant environmental impacts during construction and operation.

The second long -- long-term risk of arsenic release after implementation can be translated to the risk of significant environmental impacts over the long-term.

The third one, risks to worker health and safety, I think is -- is the same terminology in -- in the impact assessment.

The fourth one (1), total life cycle cost, relates to socioeconomic impacts and benefits.

I'm not going to walk you through all of the methods that were reviewed, but I would like to point out some of the overarching limitations that became apparent in the review process.

This slide shows the main problem

associated with any method that requires the dust to be taken somewhere else. It shows the number of 20 tonne trucks that would be filled with arsenic trioxide dust and driven down the highway each month over a total period of five (5) years.

We did other things like estimating the likelihood and consequences of truck accidents, et cetera, but most of the public were very surprised at just the number of trucks and I think generally agreed that this was a fatal flaw for any of their take it away options.

This slide illustrates a central concern associated with all options that involve reprocessing the dust; mainly that there will be a large quantity of reprocessed arsenic remaining somewhere on the site. In short, the arsenic does not disappear.

Again, there was a lot more work than this simple picture illustrates. For example, the pyrometallurgical specialist who looked in detail at the option of autoclaving the dust concluded that it would be, at best, 98 percent effective, so that 2 percent of the arsenic would remain in soluble trioxide form. Well, 2 percent of 240,000 tonnes is still a lot of soluble arsenic.

And as the picture in the lower left

shows, it would now be distributed throughout a very large mass of autoclave product that would need to be stored somewhere on the site. That storage area would be a hazardous waste facility and re -- would require perpetual monitoring, seepage collection, maintenance similar in scope to what is being proposed for the frozen blocks.

The small blue shapes in these figures indicate the water treatment requirements associated with each option. We concluded that all of the options that we assessed would require long-term water treatment.

This slide illustrates the major concern associated with any options that required taking the dust out of its current location. We had at least six (6) very senior mining engineers looking at the problem of how to get the dust out safely.

We found a number of methods to extract the bulk of the dust from surface, and this first picture shows a borehole mining machine. It's a good method because nobody has to enter the dust-filled chambers, but it still results in pipes full of arsenic slurry running around the site for about five (5) years with at least some risk of spills the whole time. The next one.

And there are remote mining methods that could be used to remove much of the dust that would be left behind in the draw points and crosscuts at the base of the chambers, again, not requiring human access but with risk of spills.

Most significantly, all of the extraction methods eventually require workers to enter these areas to remove the last few percent of the dust. Some of these areas are over fifty (50) years old and probably highly unstable in addition to being full of the highly toxic material. None of our engineers and none of the mine safety inspectors who attended the public meetings were at all comfortable with these risks.

(BRIEF PAUSE)

MR. DARYL HOCKLEY: After completing the assessment of all twelve (12) options they -- it was concluded that option B3 presented a low risk to workers mostly because the arsenic stays where it is; a very low risk of short-term arsenic release, again, because the arsenic stays where it is; and a low or a very low risk of arsenic release over the long-term. "Low" was our assessment and "very low" was the assessment of the independent peer review panel.

This is a brief summary of the -- of the long process by which -- or sorry, that -- that was a brief summary of the long process by which the frozen block option was selected. And now I'll move on to a brief description of the option itself.

This a cartoon version of chambers and stokes full of arsenic trioxide dust. We normally call these things chambers. These are regular sided excavations constructed specifically for the purpose of storing arsenic trioxide dust.

Much of the dust is -- is, however, stored in stopes, which are the excavations resulting from mining gold ore, much less regular in shape and much -- much more convoluted, particularly at the -- at the bottoms.

Darren and -- and David will show you some more realistic pictures of chambers and stopes in -- in a few minutes here.

The first step in the -- in implementing the frozen block option would be to develop access underneath the chambers and stopes, and Darren will -- will talk about this in con -- in -- in more detail in a couple of minutes.

They would then install freezing pipes, both from the underground and from surface. David will present a bit more on the -- on the current thinking as to -- to how that will be done.

We'd hook up the cooling systems and create a frozen shell around and under each chamber and stope. My presentation results from the -- the freeze optimization study will show you a bit more of the current thinking on -- on that step.

We would then add water into the frozen shells and continue active freezing until the frozen blocks are established.

After working on this project for ten years and it was only last night that I realized there -- there has been a confusion of this terminology with some of the people we've been talking to all this time.

The frozen shells are there initially to form a bathtub and to keep the water in. The frozen blocks form subsequently.

I think what I've realized is that some people think there's a frozen shell and a frozen block but the concept is that the frozen shell is that thing that's there initially to get us started. The whole -- the whole shell becomes incorporated into the final frozen block at the end of the day. So when we talk about the frozen block being in there in perpetuity, we -- we mean the original shell that has now been encapsulated in the block and becomes part of the long term block. Okay.

The next step would be to remove the -- once the frozen blocks are -- are complete, would be to remove the active freezing system and convert the system to thermosyphons for a long-term passive operation.

This is a picture of the -- the completed frozen blocks as they were shown in the DAR. Again, you'll see some slightly different variants on locations of pipes. There's about six hundred (600) surface freeze pipes and about two hundred (200) underground freeze pipes in -- in this picture.

We think it will take about ten (10) years to create the frozen blocks but the -- the emphasis of the -- of the DAR terms of reference and the information -- many of the Information Requests is on the long-term robustness of the system. And we think that's one of the -- the real strengths of the -- of the frozen block option and, in fact, is the primary reason why it was -- was selected.

It allows fully passive operation, meaning no energy or intervention necessary, with minimal maintenance and, as you'll see, is very easy to monitor its performance over the long term.

To give an indication of how robust the frozen blocks would be in the long term, we did some simple calculations of heat flux into chamber 12. Then we calculated how many thermosyphons would be needed to remove that heat. Thermosyphons work by effectively taking cold from the air and putting it into the ground, so they -- they work better when the air is colder.

Under -- under the current climate conditions, we -- we calculate that eight (8) thermosyphons would be sufficient to keep chamber 12 -- or to remove all the heat that would flow into chamber 12.

Under the IPCC's best estimate of global warming for this area, the mean annual air temperature of minus 1.2 degrees centigrade, chamber 12 could be kept frozen with -- with only fifteen (15) thermosyphons in this -- in this simplified calculation.

Even in the IPCC worst case, mean annual air temperatures of -- of 1 1/2 -- 1.35 degrees Centigrade, only thirty-two (32) thermosyphons would be needed to keep the chamber 12 frozen.

The actual number of thermosyphons in the -- in the -- the DAR design for chamber 12 is sixty-six (66), and that's enough thermosyphons to keep chamber 12 frozen even if the mean annual air temperature went as high as 3.4 degrees centigrade. Again, it's a very simple calculation.

We're not proposing to -- to change the

design and -- and drop down to -- to eight (8) thermosyphons. Amongst the simplifications in this, we're assuming that things are perfectly located. Obviously, if we had eight (8) thermosyphons working on one side of the chamber and none on the others, that would be a problem. So -- so there's a lot of simplifications in here. It's -- it's merely intended to illustrate how robust the system is over the -- over the long term.

Another theme in the DAR terms of reference in some of the IRs is long-term monitoring of the frozen block. We have yet to work out the details of -- of where the monitoring instruments will be located, but we -- we are committed to broadly three (3) -- four (4) levels of -- of monitoring.

There will be thermistors in the ground to measure temperatures in the -- in the ground itself. There will be annual surveys of the thermosyphons to establish that they continue to -- to remove heat at the expected rates.

The mine water system -- anything that escapes the -- the frozen blocks would enter the mine water system, and it would be -- it -- it needs to be monitored because that water's going to be treated. And the water treatment staff would be on site year round to inst -- to carry out daily and weekly inspections, et cetera.

What will we do if the monitoring indicated a problem? Again, these details will -- will depend on exactly what problem is -- is identified. But, in general, we would investigate the causes, replace defective components, and then take more extreme action, such as modifying the ground surface, installing additional shallow or deep thermosyphons.

Another option that we would have would be to convert the system back to an active freezing system if necessary and that -- that would provide intensive cooling over a short period.

The DAR, and some of the Information Requests talked about an absolute worse case scenario, where somehow all of the thermosyphons become ineffective. It's very unlikely that that would happen, but even if it -- it did happen it would take another twenty (20) years before the dust would begin to thaw.

There is a -- there is a section in the DAR, and it's repeated in -- in one (1) of the responses to a deficiency statement, that has a series of bullet points. I believe there's eleven (11) bullet points. We call it a chain of events analysis; all of the things that would have to go wrong before failure of the thermosyphons led to an impact on the environment.

I won't go through all of those steps here, some of the important ones are first of all, nobody would notice. None of the monitoring would -- would be -- would be noticed or acted upon when the thermosyphons were -- were going out of -- out of operation.

And then there'd be the twenty (20) year period while the ground would have to thaw before the -- before the dust -- before the thawing front reached the dust.

Then, any arsenic that rel -- was released from the system would still end up in the mine water treatment system and -- and would be collected and treated.

That -- that -- that water is going to be monitored because the cost of treatment depends very much on how much arsenic is there. So we'd have to postulate some system where nobody noticed a significant increase in arsenic in the water.

In fact, before we can get to an environmental impact we'd have to postulate a complete failure of that water collection system. The water would have to flood the mine and raise up to the level that it started to spill into the pits.

It would then build up in the pits for

months or years and again, we'd have to postulate that was completely unnoticed and unremediated before the water got high enough that that arsenic could actually make it into Baker Creek or into Yellowknife Bay.

That, in -- that, in a nutshell, is why we believe this is the best option for managing the arsenic trioxide dust in the very long term. It is extremely robust, even to a hypothetical case of -- of effectively no human intervention whatsoever.

A number of the Information Requests asked about whether we could reverse the freezing if a better option became available in the future.

Where -- we think it's -- that there is unlikely to be a -- a superior option in the -- in the future, a markedly superior option, for two (2) reasons.

One (1), the -- the current methods were very thoroughly investigated in -- in 2000 to 2003. Perhaps more importantly, the overarching risks such as the ones that I showed on those earlier sl -- earlier slides are -- are still going to be there.

So, for example, even if there was a better thing to do with arsenic trioxide once it came to the surface, we'd still have all the problems associated with getting out of the underground. Those risks will -- will pertain -- will be pertinent for all future options.

Realistically, the threshold for any new options are going to be very high. The -- the -- the government will have spent a good deal of money on -- on building the freezing system. Once that freezing system is in place, the risk associated with the arsenic trioxide are going to be very low. So I -- I think, realistically, that the threshold for any new -- new thing that comes along is -- is going to be, yeah, very high, so.

But the concerns in the -- in the IRs were -- were addressed in our responses.

In response to the question could we reverse the freezing, the answer is yes. How we do that would depend on the overall plan. Wh -- why we were reversing the freezing. We do present a pretty thorough example in our response to the Review Board's Information Request number 5.

To the question, will we continue to review new research. The answer is yes. The expectation is that new research would be reviewed and findings would be presented in statement of environment reports on a roughly ten (10) year timeframe. And, again, there's -- that's all documented in -- in one (1) of the responses to a Review Board Information Request.

So that's a brief summary of how the frozen block option was selected and why we think it's the best way to manage the arsenic trioxide dust over the long-term. Now I'll hand off to Darren and David to discuss the current design process.

THE FACILITATOR EHRLICH: Just before the handoff I want to say thank you for that. You've compressed a lot of information into a few very informative slides.

And I just want to remind all of the parties to keep track of your questions. I mean, I know I said it before for the bigger questions wait until we have -- we get into the questions from parties in general, but I really encourage you, if you see things that are raising questions marks in your mind, record them, keep track of them, because you will have an opportunity to ask them in a short time. I don't want you to lose them just with the delay or when something else catches your attention.

And remember that if it is just a short clarification, wave your hand or something so that I can see you so that we can get the clarification made. But I haven't seen any of those. And so I just wanted to say thanks, Daryl, for the presentation and recognize Darren Kennard.

MR. DARREN KENNARD: Okay, good morning. My name's Darren Kennard. I'm going to provide you with some background on the underground aspect of the project just to warm us up for nomenclature, et cetera, for the technical session and provide some updates on some of the current design thoughts on the work required to support the remediation.

I'll start us off with an aerial view of the project site focussing on the arsenic chamber area. We have fifteen (15) arsenic chambers or stopes that contain arsenic trioxide dust. One (1) of them is empty. That's chamber 15. And some of the critical surface elements around these arsenic stopes and chambers that we'll talk about are open pits, which include open Pit B1, open Pit B2. Of course, Baker Creek comes through the project site. We've got Highway 4 and some of the existing surface mine infrastructure.

The key aspects of the underground that I want to talk about are -- are to enhance the stability of the arsenic stopes and chambers so that they can be frozen. The second aspect is to prepare the underground for the freezing.

We just want to show an example of the 3D underground mine model, which is a powerful and important took in visualization and also the design of the underground elements of the project.

This is a view looking northwest over the current mine infrastructure and -- and, of course, B1 Pit here. I want people to get used to this view because we use it quite a bit in this presentation just to sort of highlight where some of these underground elements sit. Again, the key aspect is just to get people centred, B1 Pit, Baker Creek, Highway 4, and the surface mine infrastructure.

THE FACILITATOR EHRLICH: Darren, I'd like to jump in just for a second.

For the benefit of people who are familiar with this site, I was wondering if, Adrian, can you, in terms of -- that people from Yellowknife are familiar with, I mean, I know that the Ingraham Trail towards Tibbet Lake is off the top of that diagram, and the highway going backward up the hill towards the dump is off the bottom of that diagram, and that Back Bay is to the lower right of that diagram.

But is there anything else you want to give to provide familiarity with people who know the area in town?

You might want to turn your microphone on there.

Just -- Darren, just forgive the

intrusion, but if this is important I want people to have an intuitive sense of the area they're looking at.

MR. ADRIAN PARADIS: I think some of the other important features here that you're talking about is just where you see the surface mine infrastructure where it comes to a point up towards the Highway 4, that's the edge of the bag house and the roaster, right in that little area.

So Baker -- yeah, so right in that little area right there. Then you have Baker Creek. And just behind Baker Creek in the little knoll is B2 Dam and B2 Pit. So B2 Dam is the little grey -- right in there. Sorry. Thanks, Mark. And B2 Pit is just in behind there. So Baker Creek comes along in that face to the dam and then comes around.

And I think you've -- everyone else has successfully managed to say where, you know, the Yellowknife River's up and off to the top hand corner there, and coming back to town is off the back bottom corner towards the -- towards the surface mine infrastructure there.

THE FACILITATOR EHRLICH: Thanks, Adrian. Please go ahead, Darren.

MR. DARREN LENNARD: Okay. Thanks, Adrian.

Again, we do use this view commonly in the presentation, so we're -- we're going to try and keep on it. There are other views of the underground model, but we'll -- we want to focus on this one.

We now show the same view as the last slide, but now with some of the critical elements of the underground model, and this again is -- is a digital 3D model that we use as part of the design process, and for visualization. That's now showing through the transparent air photo.

So important individual elements of the underground will be explained further in the following slides.

This view, now with the air photo gone, shows the underground access tunnels, which we term 'development' in the underground mining world, and also the arsenic stopes and chambers near B1 Pit. Note that we only show a portion of the arsenic stopes and chambers in this view, just for the sake of resolution.

The arsenic stopes and chambers are the large red shapes that we show here. The remaining elements are the underground development openings. There's no real significance to the colours for the sake of this presentation other than some of this development that's shown in red, and -- and these are underground development openings that are directly connected to the arsenic stopes and chambers.

As Daryl mentioned, the arsenic stopes were originally mined to extract gold ore, and they follow the irregular shapes of the mineralization. The arsenic chambers were purpose built to hold arsenic dust, and they generally have regular sides -- regular shaped sides -- vertical sides.

Moving on to some additional important components of the underground. Bulkheads were constructed to isolate the arsenic chambers from the connected underground development openings prior to arsenic dust being placed in them.

This is just an example of the location of existing bulkheads near the B1 Pit. There are up to seventy (70) bulkheads present on the -- on the project site.

Some of these bulkheads, particularly some of the lower bulkheads, are currently not accessible for -- for inspection or monitoring purposes.

This particular photo shows an example of one (1) of the existing accessible bulkheads. Some or all of these bulkheads are not anticipated to perform under the changing surface conditions that will be imposed on them during future wetting and freezing adding more com -- adding or bringing in more complexity of the underground mine model.

The green elements and -- and some of the -- some of the line work down here is now showing the location of some of the non-arsenic stopes that are present near the arsenic stopes and chambers.

Some of these are open voids, and some are partially backfilled with tailings, sand, and wasterock. The complex nature of the underground openings, and the importance of knowing where they are for the future engineering design of the project, is -- is highlighted in this slide.

The existing 3D mine model was ex -- has been expanded significantly in recent engineering work, yet not all the underground workings are included in the underground mine model and additional work is required.

Some of the detailed and mining specific nomenclature that we use in the project documents, and also these presentations, is described here for -- for clarity.

Now this is a slightly different view than what I have shown you before. This view shows a portion of the 3D mine model in the AR.2, which includes arsenic Chamber B10, arsenic Chamber B9, and arsenic stope C2-12. This particular view is looking southwest.

Again, I won't get into the details of every single piece of nomenclature on this slide, but I do want to highlight some of the important items that impact -- or sorry, have with respect to the stability and the freeze.

We have one (1) arsenic stope; two (2) arsenic chambers. We have a lower arsenic drift that is connected to the bottom of the arsenic chambers. There's also lower bulkheads that were built to isolate the dust fro -- in the chambers from the rest of the mine.

Obviously, we've got the dust that was subsequently placed in the chamber. And in many cases, there remains a void above the arsenic dust in this -- in the chamber.

One (1) more view here to try and give some clarity. This is a vertical cross-section that runs through arsenic stope C2-12, and also arsenic Chamber B10. It's a vertical cross-section, and it's oriented east/west, and it's looking towards the north.

Again, just to highlight some critical important items with regard to stability here. We've got the ground surface. There's dust in the arsenic stopes and chambers. There remains a void on the top of the dust between the dust and the top of the arsenic stope or chamber.

Important for stability is the crown pillar that separates ground surface from the void or the opening of the arsenic stope and chamber.

There's also a sill pillar which is another mining term that describes the pillar between, in this case, an arsenic stope and an underlying non-arsenic stope.

Finally, we show a person for scale. I'll bring him in one more time.

There's also some models around the room that were brought over, thankfully, by the mine staff and they also give some scale perspective on some of these -- these underground unknowns.

We're going to talk a little bit about stability now. The existing stability assessments of the arsenic chambers and stopes was updated during recent engineering work firstly to address any public or worker health and safety issues, both on surface and underground; and secondly, for ongoing project engineering studies.

These stability assessments are ongoing as we continue to further characterize the site through investigations, analysis and monitoring.

The arsenic chambers and stopes are currently predicted to be stable but some of them are in a state that suggests prudence is required due to inherent uncertainty related to the complex geometry of the mine workings, the non-homogenous nature of the rock mass, and time dependent changes in the rock and also installed ground support that could degrade stability over time.

The arsenic chambers and stopes will also be subje -- subjected to changing conditions that could further degrade stability during the wetting and freezing and this needs to be taken into account in the stability assessments.

Any potentially unstable arsenic stopes should be mitigated prior to the remediation, and planning for this work is ongoing.

Our current design thinking includes supporting the crown pillar in selected or specific arsenic stopes by tight backfilling the void above the dust.

Additionally, some non-arsenic stopes that are adjacent to the arsenic stopes themselves also need to be backfilled to shore up rib pillars and sill pillars. I describe the sill pillar as a pillar between -- a vertical pillar between two openings. A rib pillar is simply a pillar to the side of an opening.

Just some current thinking on the backfill design that we mentioned previously, I'll outline that here. At this point in our design thinking, the void backfill material will consist of a lightly cemented tailings paste backfill. That tailings will be sourced from the south and central tailings ponds.

The backfill will be placed primarily through vertical holes drilled from surface into the voids themselves. Existing roadways, pads and new pads that will get -- we -- will be built for vertical freeze drilling will be utilized for backfilling.

A certain amount of ground support rehabilitation and barricading underground with wasterock is required to control the distribution of the paste backfill. This backfill will be designed so that it does not compromise the goals of the frozen block concept but these design studies are ongoing.

We will also design the backfill so that it can handle some potential movement of existing fill or dust from below it in foreseeable events in the future.

Again, just some more current design thinking on the void backfilling system. Sorry you can't read the writing here but I'll highlight the important elements.

The tailings sand will be stockpiled in the tailings basin. The material will then be moved over towards the -- the tempor -- or, sorry, it will be moved to temporary stockpiles where it is needed and as required.

Cemented tailings paste backfill will be created in a mixer truck where cement and water will be added to the tailings. The paste will be delivered to the delivery bore holes using a pumper truck or, potentially, gravity feed. The ultimate goal is to tight backfill the void above the dust in the chamber.

Any human health risk factors due to handling of this tailings and the resulting dust created will be subject of ongoing design.

These photos show an example of cemented tailings paste backfill. The photo on the right shows some actual cemented paste and the photo on the left shows an example paste delivery system that uses common construction site tools, notably a mixer truck and a concrete pump. They're all common tools seen on construction sites.

So on to preparing the underground for freezing. Again, this is the -- the same slide showing AR2 with arsenic Chamber B10 and some of the -- the freeze optimization study freeze holes shown. And I want to discuss a little bit more of what needs to get done to prepare the underground for freezing.

Again, I won't get into all the particular details here, but I'm going to try and highlight the important aspects.

Firstly, we'll need to excavate some new underground development for various reasons, which I'll get into next.

In the -- in the case of AR-2, this development has already been put in place to drill the horizontal freeze holes under arsenic Chamber B10.

We'll also need to install lower arsenic drift and raise plugs, and I will -- I will discuss this in detail again.

Drift plugs are plugs that will be placed in horizontal drifts, whereas raise plugs are placed in -- in vertical raises. Again, more -- more mining nomenclature there.

And finally, we will backfill, or place backfill in -- in the lower arsenic drifts. And I'll get into some details on all these aspects next.

So, as mentioned previously, the existing bulkheads are not anticipated to handle the changing service conditions that will be imposed on them during wetting and freezing.

These existing lower bulkheads will be enhanced or replaced with new drift plugs. The location of currently proposed drift plugs near B1 Pit is shown above in this slide.

This particular photo shows an example of a new drift plug installed for mine water management at an existing operating mine. This is not Giant Mine.

The proposed drift plugs for Giant Mine may or may not have some form of pressure control conduits built into them as shown in this particular example.

Our current design thinking on the drift plugs is summarized here. These drift plugs are required to reinforce existing bulkheads, to block the movement of arsenic dust, and to limit leakage from the arsenic stopes and chambers during wetting.

The plugs will be built adjacent to the existing bulkheads. Remote plugs are avoided where possible. The freeze system will be designed to reduce the potential for frost pressure to impact these plugs and the plugs will be designed to anticipate the anticipated conditions imparted on them during wetting and freezing.

And -- and our current engineering thinking includes thirty-three (33) new drift plugs. Some of these will require new underground development -- new tunnels to get to them, and some remote plugs will be required.

One (1) example of our current design thinking on the location of new underground development is shown in this slide. This new underground development and rehabilitation of existing underground development is required for several reasons.

First, we need to replace existing underground development that is no longer safe to use. For example, the use of shee -- C Shaft was recently lost for safety reasons.

Secondly, we need to reestablish access to the currently inaccessible bulkheads to provide monitoring and also for ultimate pro -- plug construction. We need to provide access for drilling the horizontal freeze holes.

And lastly, the existing surface portal that's used for underground access may become unusable in the future. For example, that particular portal that's used is called the UBC Portal in B2 Pit may no longer be viable in the future as it -- one (1) particular scenario in the future remediation includes backfilling B2 Pit.

Wasterock from this new development will result. We plan to -- we will need some of it underground associated with barricading for control of paste backfill. Some potentially acid generating material will be generated and it will be used underground, but any non-potentially acid generating rock will be used on surface for future construction needs.

Selected lower arsenic drifts will be backfilled to prevent the migration of arsenic dust from the arsenic chambers and stopes during wetting, as shown in this slide.

This backfill that we propose to place in the lower arsenic drifts will not be placed tight to the back and therefore will not be watertight as the plugs will provide the -- the ultimate check against dust migration.

Many of these lower arsenic drifts may already be partially filled with -- with arsenic dust now. Oops. What have I done.

THE FACILITATOR EHRLICH: I think we're going to take the 10:20 health break now. We're overdue anyway and it gives us time to fix some stuff. Thanks, we'll start again in ten (10) minutes.

--- Upon recessing at 10:54 a.m.
--- Upon resuming at 11:12 a.m.

THE FACILITATOR EHRLICH: Okay. Turned out it was a power blip that caused it to go off and it takes a while to warm up again. Let's resume the presentation.

MR. DARREN KENNARD: Okay. Again, Darren Kennard, with Golder Associates.

So we were -- we left off talking about preparing the underground for the freeze. One (1) of the last things that'll get done, and this is back to stability again, is once the arsenic stopes and chambers are frozen we plan to -- to backfill the remaining void above the frozen dust after freezing is completed for -- to enhance long-term stability, so again we'll...

We mentioned that these two (2) arsenic stopes need some mitigation prior to their mediation, but all the remaining arsenic stopes and chambers will be backfilled.

Similarly, there's some near surface non-arsenic stopes that -- that may underlie critical surface infrastructure, such as surface working areas, public roads, Baker Creek, et cetera, and -- and some of these will need to be backfilled to enhance long-term stability.

And we just simply show an example here of one (1) particular non-arsenic stope that is close to Baker Creek that -- that again may be backfilled for long-term stability, but these are the subject of ongoing geotechnical investigations.

So just to sum up some of the current design thinking that may represent an update or a slight change to some of the information presented in the DAR. I'll summarize that here. New development will be excavated to the currently inaccessible bulkheads, hopefully reducing the need for remote plugs.

The new drift plugs will be built adjacent to the existing bulkheads. Select lower arsenic drifts will be backfilled prior to wetting.

Upper arsenic drift pubs -- sorry, upper arsenic drift plugs may not be required and select non-arsenic stopes under critical surface elements, such as Baker Creek, may be backfilled. Of course, these details will evolve during the course of the ongoing engineering design process.

Some of the next steps in the remediation design are -- are issues that re -- require addressing in the near future. We'll continue to incorporate more of the existing historical mine geometry information. I should also include the anecdotal information that's present in some of the -- the project staff that have experience working on the mine site, and we need to get as much of that information as we can into digital mine design tools.

We need to continue to investigate or carry out geotechnical investigations to refine our stability assessments. And we'll continue to investigate the geotechnical aspects of wetting the dust and their impact on stability.

We also need to do -- to inve -- continue to investigate the impact of -- of mine water on the underground stability. And that has several aspects, including checking the impact of seasonal fluctuations in mine water levels that are -- that will occur as a result of mine water treatment plant operations; the geotechnical aspects of any unexpected flood events where underground water may get into the underground; and, lastly, geotechnical aspects of -- of near surface stable mine water levels over some period in the -- in the -- the project, and that may include scenarios where mine water level is -- is raised to higher levels in the future of the mine project.

And that concludes my presentation. I'd like to move on to David.

MR. DAVID KNAPIK: Thank you, Darren. David Knapik. I'm part of the design team working on the design of the freeze system infrastructure.

I'm going to provide an overview of the current design thinking about the freeze infrastructure, freeze plants, piping, cable tray, that -- that sort of infrastructure. We're looking at potential locations of drift plugs and drift backfill. We'll look at a summary of chamber stope geometry and talk a little bit about how it affects the freeze pipes. We'll look at monitoring the progress of the performance -- and performance of the freeze including data collection, management, and reporting. And finally what the next steps in the design process should be.

Thus far, we have been focussed on the major components such as the underground civil work, the drilling, and the mechanical. And we realize that electrical and instrumentation systems are a much smaller part of the total project, and they are important. Their design will be tailored around the major design components.

The initial thinking was based on the concept outlined in the DAR. The FOS was designed and constructed, and data is being gathered, and the evaluation is ongoing.

THE FACILITATOR EHRLICH: I'm just going to jump in for one (1) second, David. For the benefit of people in the room who don't know what a FOS is, it's the freeze optimization study, which is the -- the current freezing that's happening on mine site.

CONTINUED BY MR. DAVID KNAPIK:

MR. DAVID KNAPIK: Perhaps I should point out that Daryl will speak to that a little bit -- when this presentation is done.

We have been able to take experience from the design and construction, as well as the initial operation of the FOS, and start looking at optimizing the freeze systems design. We're currently looking at a modular design that will allow flexibility in developing the frozen shells around one (1) or multiple chambers at a time -- chambers or stopes. In addition, we can focus freeze capacity on individual chambers or stopes for creating the frozen blocks.

Part of the flexibility is that the design will allow for one (1) plant to be in place and start cooling or developing the -- the frozen shell and adding additional plants as construction progresses. As an example, the slide shows a typical freeze pad layout around AR2. The existing FOS infrastructure is -- is around Chamber B10. We've got Chamber B9, and Chamber C2-12 in the area.

This shows a potential layout for how we might incorporate new freeze pipes, freeze plants, and other infrastructure around the FOS. We're proposing to create a freeze pad that is large enough and will provide a suitable base for construction activities. The pad would allow for equipment access across the site for construction, and access around the freeze infrastructure for futner -- future maintenance purposes.

The freeze system design is based on active freeze systems. A standard industrial-type ammonia refrigeration plant is being considered to cool the secondary coolant. The secondary coolant for the FOS is a food-grade propylene-glycol based fluid that is circulated through freeze pipes and is -- is being considered for the main freeze system, as well.

In the case shown, we're considering two (2) additional substations and freeze plants connected to common header piping, and off the header piping we have individual cooling loops around and beneath each of the arsenic chambers and stopes.

Setting it up this way, we can allow for staged construction. As stated, the FOS is currently in operation. We can construct the rest of the pad and then start installing the other infrastructure, and we can begin developing the frozen shell when construction is complete.

The secondary coolant flows through the cooling loops from the -- the main header and they will be tailored to provide sufficient cooling to generate the frozen shell.

As you can see, there's gaps in the loops. This allows access to the inside of the chamber both for getting instrumentation in the chamber to allow for place for filling, adding water to the chamber for the wetting process, and also to convert from active cooling to passive cooling later. The conversion to passive cooling will require cranes and -- and other equipment to have access. So we've allowed for that.

We're looking at piping being installed on sleepers on grade for ease of construction and deconstruction. And we're looking into separate cable tray system. We know the -- the active freeze piping will be removed. However, the -- the instrumentation will remain so the cable -- cable trays would remain in place at the end of active freezing.

Further optimization will be included in the design as more details are being worked out or will -- are worked out.

This slide shows potential locations for drift plugs. Again, it's the same area. Shown in red are the vertical projection outline of -- this is B -- Chamber B9, Chamber B10 and here is Stope C2-12. And we're proposing the lower drifts be backfilled. And you can see where the -- the drift plugs -- locations for drift plugs that we're looking at.

This slide shows potential freeze layout -- power for the freeze layout, pardon me. Power will be required for the mine site for continued care and maintenance and will be required during demolition and for post-remediation activities.

Existing overhead lines shown in red are Giant Mine overhead lines and shown in green are Power Corp. lines. We're -- we tried to look at options for keeping infrastructure in place until demolition activities are completed. We'll have to move some existing overhead lines to allow for the installation of the freeze system, especially in AR1. And we'll have to look at moving some Power Corp. lines to give us access for the freeze system in this area, as well.

And we're proposing a new line route so -- that will allow power for all of the freeze areas for the long term, as well as power for the water treatment plant for the long term.

Looking at chamber and stope geometry, they have an impact on design details. Chambers, as discussed previously, are generally regular in shape and because they were purpose-built, stopes are generally irregular and they were the result of mining the ore.

Most of where the arsenic is stored are in regular-shaped chambers, and most of them are narrow, which is going to help with the freeze.

This slide shows chamber 12 in the middle and the connection to the lower arsenic drift. As an example, it's regular in shape, generally long and narrow. And this particular one has draw points. This chamber is 60 metres long, about 30 metres in height, and about 14 metres wide. For interest, this is Chamber 11 here, Chamber 14 in behind, and this is Chamber 15 which is currently empty.

This is an example of Stope C2-12. It's got two (2) -- two (2) views, trying to show the long -- if my pointer will work -- it's rather long. It -- it is -- the well is connected to lower arsenic drifts through draw -- draw points. It's quite irregular in shape. It's curved in -- in two directions. The -- in -- in the vertical and in the horizontal. It's about 90 metres long, about 50 metres in height at the highest, and about 20 metres wide.

This is an example of a larger, irregular stope. This happens to be Stope B2-08. It's connected to draw points at the lower end and there's some other draw points at this end. It's quite irregular in shape. It's about 80 metres long, 55 metres in height, and about 30 metres wide.

And the last of the difficult shapes. This is AR4. It shows Stopes B2-12, which is the large one; B2-13; and B2-14. This happens to be the -- the underground model the current model shows rib pillars, which are believed not to be there. They were mined out according to anecdotal evidence.

This is a very large chamber. It's about a hundred metres in length. About -- varies from about 30 to 60 metres in height and that's going to present some of the challenges because we've got much shallower bottom of part of it and a much deeper portion on one (1) end. And it varies from about 20 to 40 metres wide. You can see in this view.

Chamber and stope geometry is -- is one (1) aspect of the design. The geometry must be considered for thermal modelling and when evaluating freeze pipe locations, such as placement and orientation, instrument placement and wetting the dust.

As part of future design phases, monitoring and maintenance plan for the freeze systems will be developed. Management plan for the instrumentation and the -- and the data will be developed. Part of the plan will apply to maintenance of the instruments and part will apply to data management, which will include the collection and evaluation of the data. A plan for monitoring performance of the frozen block will be developed. It -- it will include reporting on a regular basis.

Underground development that provides access to the drift plugs will be maintained during post-remediation monitoring period, to allow personnel to visually monitor plug performance.

Looking at next steps in the ongoing design. Design development needs to continue and we need to include further design optimization. When data from the FOS has been analyzed and published, the results will be used as part of the optimization. A monitoring plan will be developed and the wetting plan will be developed. The final design will be completed with a view to construction sequence.

I now turn the presentation over to Mr. Hockley to provide an update on the FOS.

THE FACILITATOR EHRLICH: While Mr. Hockley prepares himself, I'm just going to ask the Giant team. Roughly, how much time do you think you'll need for the remainder of your presentation?

MR. DARYL HOCKLEY: About twenty (20) minutes, maybe fifteen (15). Daryl Hockley.

THE FACILITATOR EHRLICH: Is anyone else from the Giant team presenting anything further after

Daryl?

MR. ADRIAN PARADIS: No.

THE FACILITATOR EHRLICH: Okay, so if you can keep it tight. We'll -- we want to have time for some questions before lunch if possible. Thanks.

MR. DARYL HOCKLEY: Daryl Hockley. We promised to provide an update on the freeze optimization study.

The objectives were stated in the DAR, and -- and include to providing a demonstration of ground freezing at a scale and level of complexity relevant to subsequent design; collecting data needed to calibrate thermal and economic models of the full-scale program; testing implementation methods, including methods to sample and test surficial contaminated soils; methods to drill and complete freeze pipe and instrumentation holes; methods for the remote repair and replacement of underground plugs and bulkheads; methods for active and hybrid ground freezing; and methods to transition from the initial active or hybrid freezing to long-term passive freezing systems; developing methods to collect, store, manipulate and interpret performance-monitoring data; developing insights into project delivery methods and procurement issues; and identifying and examining unknown unknowns, i.e., topics that are relevant to the project but have yet to be identified.

Alan, that's really all that is in the DAR so far. One (1) of the Information Requests has a brief summary of the construction, but -- but I'll present photos of that, and then I'll also present results that -- that will be quite new. This will be the first time presenting results from the -- from the FOS.

The freeze optimization study is taking place at Chamber 10 shown here by the arrow. Highway 4 runs through the property and in -- it runs from -- from the city to the south out to the Ingraham Trail to the north in this picture, again, Baker Creek, B1 Pit, C Shaft, Chamber 10 right there.

Chamber 10 is one (1) of the smallest arsenic containing chambers. It's also very regular in shape allowing several different variants of the freeze system to be installed around its perimeter in roughly similar geometries. It's about 25 metres in this direction. I'll have to check this number, but I believe it's about 75 metres in that direction.

The construction started with removal of arsenic-contaminated waste rock and soil, thanks, from the project footprint. Clean rock was brought in from a quarry to raise the excavation up to the proper elevation. The fill was grated to form a working pad and compacted to prevent settlement.

Three (3) different drilling methods were tested. This is a rotary drilling rig with a steerable drill bit. Here the drillers are installing the steel pipe used for the active freezing system. Each pipe connection was tightened -- or threaded connections. Each one (1) was tightened to prevent leaks.

A crane was used to install the thermosyphon pipes into the drill holes. Two (2) of the pipes shown on the bottom of this photo have been connected and are ready to be put into the -- to the holes.

Here they are installing a thermosyphon pipe into a drill hole with the crane. The -- the tubing over the worker's shoulder is attached to the pipe as it goes down the hole, and it was used to pump grout into -- into the hole, and withdrawn as -- as the grout was placed.

There's also blue thermistor cables you can see here and here that -- that are attached to some of the thermistors that are on the freeze pipe in -- in this case. This -- this guy is testing welds on the thermosyphon pipe. This is one (1) of the downhole survey tools that was used to check orientation of the drill holes.

We took core from a selection of the holes and -- and logged it. Later we sent samples for a petrographic analysis, and we used the results to estimate thermal properties of the rock. Here you see some of the cabling attached to the thermistors that read temperature in the ground. There were thermistors placed along with the freeze pipes in -- in many of the holes, and also in independent holes drilled solely for the purposes of monitoring ground temperatures.

Here are the thermosyphons in place installed along one (1) side of the chamber. We have several groups of pipes testing different combinations of active or hybrid freezing with different pipe sizes and different plumbing arrangements.

These are connections to the cooling units that convert passive thermosyphons to hybrid thermosy -- to hybrid freezing systems. By actively cooling the thermosypons, it can be kept running all summer.

Another view of the thermosyphons with the cooling units attached, and these -- these pipes are leading to the -- to the refrigeration units. This is a refrigeration unit for the coolant that circulates through the active freezing pipes. It took two (2) cranes to lift it off the flatbed.

A few views inside the refrigeration unit.

The large horizontal vessels by the wall are where the coolant is chilled to a temperature of about minus 35 degrees centigrade. The pumps on -- on the -- on the floor circulate the coolant through the chiller and out to the freeze pipes.

The minus 35 degree centigrade coolant from the refrigeration unit falls through these large distribution pipes and into the black hoses which are connected to headers on the freeze pipes. The coolant then flows down the central tube in the middle of the freeze pipe, then back up the outsides of the freeze pipe, there's -- recollected in the header, and then con -- continues in -- through the piping back to the freeze plant.

These are shots of the underground freezing system. It consists of a series of freeze pipes installed hor -- horizontally underneath Chamber 10, and these pictures are taken from the tunnel that was created to allow the pipes to be installed.

You can see humid air in the mine building up as frost on the freeze pipe headers initially, and later on the rock wall itself. That's very direct evidence that things are working.

Here's a planned view of the completed system. The pink blob in the centre is -- is Chamber 10.

The red and blue lines, red lines here, blue lines here, indicate the original access drifts above and below the bottom of the chamber. The red circles are vertical freeze pipes, mostly in groups of four (4) shown by these clouds here, and I'll explain what -- what the groups are later. The blue diamonds indicate temperature monitoring holes. So these are examples of holes drilled specifically for -- for measuring temperature.

These black lines on the right are the outline of the drift that's underneath the -- the new drift that was built underneath the chamber to allow the underground freeze holes, and the underground freeze holes are these black lines that are shown across.

This picture explains what's being tested in each of the groups of pipes. The main tests are Groups A, B, F, and G. Group A is a conventional active freezing system. Groups B, F, and G all have hybrid ther -- thermosyphons with different pipe diameters.

Smaller diameter pipes would be less expensive, but more importantly they could be installed in smaller diameter drill holes that are a lot less expensive. However, if a thermosyphon pipe gets too small it simply can't move enough gas up and down to effectively cool the ground, and we want to know the size cutoff for effective performance.

Okay, here are the first results. These are temperature contours as measured in the thermistors, and then interpolated using a -- the model Temp W. The contours you see here are the 0 degrees centigrade, minus 5, minus 10, and the -- the bright blue, minus 15. The pipes themselves, at least the active freezing pipes, are -- are minus 35 degrees centigrade, or very close to minus 35 degrees centigrade.

This light teal zone here around the -- around the Group A pipes is about 11 metres wide, and is all at less than minus 5 degrees centigrade. And this dull blue zone is about -- sorry, this -- this dull blue zone in the middle here is about 5 metres wide, and is all less than minus 10 degrees centigrade. That's just after about six (6) months of operating the freezing system.

This table summarizes measurements of the -- the same kind around each of the other groups. All of the systems were operating in early March, so all of these results represent about six (6) months of operation.

The active freezing groups are performing similarly well everywhere. The thermosyphon groups are lagging behind, as expected, but they are still cooling the ground.

I apologize for the fact that these next figures are -- are busy. We -- we debated whether to provide a simplified version, or -- or could show you the whole data, and we thought you would be interested in seeing what the whole data looks like, so we -- we kept them in there.

These fig -- this particular figure compares cooling rates measured at various distances to predictions that we get assuming different values for the thermal diffusivity of the rock. In all cases, the best fit thermal diffusivity is higher than we had assumed in the calculations shown in the remediation plan, or the DAR. In other words, the rock cools faster than we predicted. One (1) consequence is that we might be able to install freeze pipes at a wider spacing than initially planned.

This figure shows results from the Group F and Group G thermosyphons. The thermosyphons were charged with carbon dioxide in late February, and that started the ground freezing process. After commissioning, the cooling loops were turned off and the systems operated passively. This dip around April 20th is a three (3) day test of the cooling system. So these are hybrid thermosyphons operating mostly passively, but with the cooling system turned on during commissioning and then again for a three (3) day test here.

At the end of the time shown here, it only goes to -- to end of May here, the -- the active components that were -- were switched on again and the -- and the system was run in active mode for the rest of the summer.

So far we think that this thermosyphon diameter is -- is not limiting. The small ones seem to work just as well as the large ones. But because the system wasn't started up until March, we didn't see many weeks of passive operation before we had to switch on the cooling units.

Also, there were some difficulties in running the cooling units and we don't think we have really had these systems cranked up to their maximum performance yet. So we may still see some differences between the smaller and larger diameter pipes over the next few months.

One of our goals is to test the various equations for estimating passive cooling performance. This chart shows the heat removal calculated from ground temperature measurements in red and green lines. And it also shows the rate of heat removal estimated from air temperature and wind speed using a predictive equation in this blue line.

And the blue line is generally lower than the other lines, indicating that the predictive equation conservatively underestimates the rate of heat removal. In plain English, the thermosyphons are working better than we expected. The actual heat removal was about 10 percent better than the predictions presented in the DAR and -- and used as a basis for the assessment of environmental impacts.

This is reassuring, not just for the system design but also for our assessment of long-term thermosyphon performance and the ability to cope with future climate change.

Here are some -- some results from the active freezing systems. Group A in red has 4-inch pipes connected in series. Group C in blue has 3-inch pipes connected in parallel. Group E has, in green, has 4-inch pipes connected in parallel. There is no significant difference between the temperatures measured on the 3-inch and 4-inch pipes.

Now the blips that you see on these curves are caused by power outages. The -- the measurements are -- these measurements were taken directly from the freeze pipes so you see an immediate response when -- when there's a change in power. In all cases, once that power is re-established, the pipes quickly return to the lower temperatures.

Here's a comparison of one (1) hybrid freezing group in blue and one active freezing group in red. The active freezing system clearly reaches much lower temperatures than the passive freezing system.

Pipe temperatures alone can be a bit misleading when you're talking about thermosyphons. So this chart shows calculated heat removal by one (1) hybrid group in blue, compares it to calculated heat removal by one (1) active group in red. In part, the -- the red lines are well above the blue, indicating more effective heat removal by the active system.

In part that might be -- might have been because the hybrid theromsyphons were not initially operating full-out. Modifications in late May that resulted in substantial improvement in the -- in the hybrid thermosyphon performance, and the hybrid thermosyphon is now removing heat more effectively, though still not as well as the active system.

One of our objectives was to learn as much as possible of -- about obtaining, storing, manipulating performance monitoring data. The design and setup of the data management system took much longer than expected and we still see anomalies in some of the data records. The causes remain under investigation.

The temperature monitoring devices installed in the ground have been very reliable, as you can see from these numbers in the -- the lower bullets here.

This slide and the next slide show how we are taking the results of the testing and feeding them back into design questions. The question being addressed here is: How long will it take to achieve the initial freeze?

This table compares the estimated times to create a frozen shell using either active freezing or hybrid thermosyphons. Their predictions were generated using the sim -- simple model shown in the upper right, calibrated now with -- with the FOS data. The freezing times shown here are shorter than estimated in the DAR. Again, this just indicates that the modelling for the DAR was conservative.

This slide show has predictions generated by the same simplified model. In this case, we're looking at the effective pipe spacing on times to achieve frozen shells. You can imagine how this sort of thing would be applied in design optimization.

We want to see -- we will continue to operate the FOS over the coming winter. We want to see how well the thermosyphons can work under the coldest air temperatures. Then, we should have a full year of data so we can assess overall power costs and update our predictive modelling.

Plugs in the former access drifts still need to be completed and -- and frozen as well.

To summarize this -- this update. We're -- we're happy with what was learned in the construction process. Well proven methods are available for all of the steps that we have tested so far. All of the freeze systems are operating and the ground is cooling even faster than expected.

Results to date indicate that the designs and estimates used in the DAR as a basis for assessing environmental impacts were conservative.

Thank you.

THE FACILITATOR EHRLICH: Thank you for that.

I'm looking at the agenda. The agenda has us starting back after lunch at 1:15. I'd rather go now and start at 1:00. This way you get a jump on the lunch crowd and we'll get right into questioning right away.

I see two (2) -- I see one (1) hand coming up. Kevin, is there -- is there something that you would rather do now than wait after lunch? Okay. Go ahead.

QUESTION PERIOD

MR. KEVIN O'REILLY: Thanks, Alan. I have a few --

THE FACILITATOR EHRLICH: Please state your name and --

MR. KEVIN O'REILLY: Sorry. Kevin O'Reilly, Alternatives North. I just have a few introductory remarks I want to make and then I want to get into some questions if I can.

First off, I want to acknowledge --

THE FACILITATOR EHRLICH: Hold -- Kevin, before we go ahead, I do want to get out of here at least five (5) minutes to 12:00, because I want to make sure we're able to start up again at one (1) o'clock. I don't want to run out of time too much. So, if -- if you can do it in then, I say go for it.

MR. KEVIN O'REILLY: Thanks, Alan. Kevin O'Reilly, you cut me off when you need to, please.

First off, I wanted to thank Aboriginal Affairs and Northern Development for the participant funding. This is the first time in thirteen (13) years under the McKenzie Valley Resource Management Act that participant funding has pro -- been provided for an environmental assessment.

I think it's a -- a very significant

development and I do sincerely want to thank them for their work on -- on moving that forward, and I hope that it becomes part of a regular program.

Alternatives North, we're a social justice coalition. We've been around for nineteen (19) years, based here in Yellowknife. We were active Intervenors before the Joint Review Panel and the National Energy Board, on the Mackenzie Gas project.

I've lived here for over twenty-five (25) years. My personal involvement with Giant Mine goes back to at least 1987, when I worked with Chris O'Brien (phonetic) and we filed the very first request for an investigation under the Environmental Rights Act with regard to the air emissions from Giant, so.

I think our objectives in this environmental assessment are to try to minimize perpetual care requirements, have a much better understanding of what those requirements are, and ensure that there's proper oversight for the project.

So with that, I'd like to move on to some questions if I may. And I guess I have two (2) ways of approaching this. I -- I want to provide some comments or questions on the very first presentation that was given by Mr. Hockley with regard to the process that was used for the evaluation and selection of the frozen block.

And I think this is important to get on the record, because we heard from the proponent their view of what happened but I think there's a very different perspective from the community, or at least some parts of the community, that needs to get out on the record as well.

And it's not so much, I think, what -- what the developer said in the presentation, it was what wasn't said in the presentation, so.

I -- there was a couple of slides there -- Slide 5 and 9, that talked about evaluation criteria and how they were applied to the alternatives. And there's actually a much more detailed table in the developer -- development -- developer's assessment report on page 6-8.

And I guess my first question is, I'd like to know what direct involvement the community had in the development of those evaluative criteria and then the application of those criteria.

THE FACILITATOR EHRLICH: Okay, Kevin, I'll -- let's go one (1) question at a time here. To the Giant's team, are you able to respond to that now?

MS. LISA DYER: Yes, we'll -- we'll respond to that now. Well, I guess there were two (2) questions that I heard from you, Kevin, is how were the criteria developed, was there public input or involvement in that, and how was the public involved in applying the evaluation criteria.

MR. KEVIN O'REILLY: Thanks. Kevin O'Reilly. That's not exactly what I asked. I -- I want to know what direct involvement there was in -- from the community in developing the -- the evaluative criteria, and then applying them before we actually got to the workshops. I was there, and what direct involvement did the community have in developing those criteria for presentation at the workshop, and then in the application of them.

MS. LISA DYER: Okay. Thank you. I'm going to ask Daryl Hockley to provide some comment on that. He was involved in those workshops, and we'll follow up with that.

MR. DARYL HOCKLEY: Daryl Hockley. I'm going completely on -- on my recollection here, and I -- and my recollection is that we went to the first workshop, the one where we had the four (4) examples, and the community and -- and others asked us to -- to go back to look at twelve (12) in -- in more detail.

And I -- I believe at that time we said these are the -- the broad categories under which we intend to -- to evaluate these options, and we asked for feedback on those. That -- that is the extent of asking for public participation in defining the objectives as -- in -- in my recollection.

THE FACILITATOR EHRLICH: Kevin, do you have a followup on that particular question?

MR. KEVIN O'REILLY: No, I -- I thank you. Kevin O'Reilly, Alternatives North. I think Daryl basically said that there really wasn't a lot of public involvement in -- in the development or application of those criteria --

THE FACILITATOR EHRLICH: Okay.

MR. KEVIN O'REILLY: -- direct involvement.

THE FACILITATOR EHRLICH: Kevin, because of the timing, I'd like to start with you right after lunch.

MR. KEVIN O'REILLY: Sure, if you want a break.

THE FACILITATOR EHRLICH: But I do want to get out the door now so that you can get your restaurant orders in ahead of the rest of the city so that we can start at one o'clock sharp because I want to make the most of the time we've got. Thanks.

MR. KEVIN O'REILLY: Thank you.

THE FACILITATOR EHRLICH: We'll be back

at one o'clock.

--- Upon recessing at 11:53 a.m.
--- Upon resuming at 1:07 p.m.

THE FACILITATOR EHRLICH: Before we start where we left off, I just want to ask the Giant team, because the presentations finished a little bit later than we expected them to I expect that there may be more questions than we can fit in to all the time that we've got.

Are the people who are in the know about underground and freezing that you have there definitely leaving at the end of today or are they going to be around for a bit tomorrow?

MR. ADRIAN PARADIS: These folks -- the folks will be around tomorrow. Adrian Paradis. Sorry.

What we've tried to do is, if we were bringing folks in, to have them a half a day beforehand and half a day afterwards.

THE FACILITATOR EHRLICH: Thanks. That's a clever move. Just -- I want to reassure the parties -- a couple of parties have expressed some anxiety to me regarding timing, that if we can't get through all the freezing today we're going to try and slip a little bit over tomorrow.

We're still going to work hard to try to get back onto it today.

Todd, do you have your hand up for a comment, or you're just holding it? Okay.

Then we're going to go back to -- welcome back, everybody. Thank you for being willing to take a slightly shorter lunch than the agenda dictated. Again, it's our effort to stay back on track.

Kevin, I'm going to give it back to you. You were in the middle of a line of questioning when we left.

MR. KEVIN O'REILLY: Thanks, Alan. Kevin O'Reilly with Alternatives North. Nothing like a good lunch to interrupt your line of questioning.

But I wanted to ask the developer whether there was any funding provided to community groups, or members, to engage in the process of evaluating the alternatives?

(BRIEF PAUSE)

MS. JOANNA ANKERSMIT: Kevin, I don't believe there was. Sorry, Joanna Ankersmit.

MR. KEVIN O'REILLY: Thank you. Kevin

O'Reilly, Alternatives North. Yes, that's the answer I expected.

I know that for Port Radium, Colomac, and Faro, these are abandoned mines that the developer has undertaken remediation efforts, or at least developing plans towards that. In all of those cases, there was much more serious community engagement, involvement, even funding provided. So I -- I just want to draw that in contrast to what's happened here at Giant.

I want to move on though quickly, unless they want to offer any explanation or comment on that. I -- I do want to move on if that's okay.

I just want to talk very briefly about how do we end up where we are now in this environmental assessment. And on page 610 of the develop -- developer's assessment report, there's a quote from the technical advisor where the technical advisor was making the recommendation of moving forward with the ground freezing or frozen block.

And they talk about what the alternative was. The last sentence though reads as follows:

> "The project description should then be submitted for formal environmental review, licensing, and subsequent implementation."

So I'm just wondering why the developer did not accept the part of the recommendation that talks about this being submitted for a formal environmental review?

Why didn't the department voluntarily refer this for an environmental assessment?

THE FACILITATOR EHRLICH: Giant team...?

MR. ADRIAN PARADIS: Adrian Paradis for INAC.

Kevin, the application was submitted, and was -- was referred. Regardless of how it got there, the app -- the process has been followed.

MR. KEVIN O'REILLY: Okay. Kevin O'Reilly here for Alternatives North.

Just for the record, it wasn't the department that made the referral, it was the City of Yellowknife. The department could have made the -- the referral but did not do it. It did not follow the recommendation from its own technical advisor.

Now, is there any evidence though that the developer can point to from either the City or the Yellowknives Dene First Nations, showing support for the frozen block method. Is there a letter of support? Is there a -- a council resolution that they can point to as evidence that there's broad support for the frozen block?

MR. ADRIAN PARADIS: Adrian Paradis for INAC.

No, at this time there is no rec -- formal letter of support.

MR. KEVIN O'REILLY: Thank you.

And so that the referral was actually made by the City; the first time that a municipal government in the Northwest Territories had ever made a referral under the Mackenzie Valley Resource Management Act, I think that's significant.

The referral was made as a result of public presentation at city council from -- or based on a series of presentations by the -- the Member of the Legislative Assembly for Weledeh; one (1) of the chiefs for the Yellowknives Dene First Nation, the first time that a chief ever attended a city council meeting; and a number of private citizens.

So, all of this I needed to get out on the record, because I think these things are important in establishing a context as to why we're here and at the base of this is a lack of trust, quite frankly.

So I'm hoping that we can move forward on the issue of trust and maybe talk some more about this on Friday. But it was important to get this out on the record, because these are things that were not in the presentation and I think they do reflect a big sentiment that's held in this community.

Thank you.

THE FACILITATOR EHRLICH: So what I'm hearing from you, Kevin, is that you're going to have specific questions that follow up within the context of the agenda of the technical session, at later days.

MR. KEVIN O'REILLY: Thank you. Kevin O'Reilly from Alternatives North.

Yes, we do have some technical questions around the frozen block and we'll -- we'll get to those. And on Friday, we do have a number of questions that we want to raise around trust and oversight and related matters.

Thank you.

THE FACILITATOR EHRLICH: Okay. Thanks, Kevin.

Does anyone on the Giant team want to add anything or should I go to other questions? Joanna?

MS. JOANNA ANKERSMIT: Joanna Ankersmit, Aboriginal Affairs and Northern Development.

We agree that the issue of trust is very important, Kevin, that's why we want to engage with -- with folks around this table and the community, have a constructive dialogue, and be able to move forward on this site.

THE FACILITATOR EHRLICH: Thanks, Joanna. Any questions from the Yellowknives on what you've heard today?

MR. TODD SLACK: Hi, Todd Slack, Yellowknives Dene First Nation. This is a good segue into my question, actually.

During the opening comments from Joanna, she -- and I'll -- might get some of the words wrong and don't hold that against me. You indicated that you wanted to address the long history and impact of the mine on the Yellowknives Dene, or words to that account.

I have three (3) questions along this line of inquiry. And the first is, from your perspective, just what do you think those concerns of the Yellowknives Dene are?

MS. JOANNA ANKERSMIT: I believe my words were that I wanted to acknowledge that there was a complex legacy there and that there were concerns expressed. They were expressed in the IRs and these sessions are an opportunity for people to express those concerns and we will be taking note of those as we move forward.

THE FACILITATOR EHRLICH: Just a small point of correction. But if the concerns are the ones that pertain to historical events, I mean we're -- we're hoping that this session will actually focus more on the project that's proposed and its potential impacts. So it sounds like there may be other venues for starting to pursue the concerns that relate more to historical aspects.

MS. JOANNA ANKERSMIT: The --

THE FACILITATOR EHRLICH: I just wanted to -- to make that clear. I --

MS. JOANNA ANKERSMIT: Yeah, I mean, our intentions here are to talk about the positive impacts that the -- the project is likely to have on -- on the environment and on -- and on the people, and we are looking forward.

I think it's important to acknowledge that we have heard in the IRs and various sessions, and we're open to hearing more about those. Not at this session; I don't think that's the appropriate place.

THE FACILITATOR EHRLICH: Fair enough. Todd...?

MR. TODD SLACK: Okay. I'll -- I'll have to ask one (1) -- one (1) follow-up question in terms of the commitment that you made to take this back to see -- take concerns not related to this process back to senior INAC management.

With respect, this is something that's been stated numerous times. There are reports on the record from 2010 that indicate this same concern. At those meetings there was significant concerns or issues raised in terms of compensation and apology.

Now I'm not inquiring as to that but following up on the issue of trust, numerous times the Yellowknives have emailed staff with the project. The most comprehensive email was on August 18th to Lisa Coleless (phonetic) and Adrian, and this asked for -- and I can either make this available or I can read it out -- this asked for some comment and just what actions had been -- hadn't been taken since 2010 in terms of raising these concerns with senior INAC management and what any responses were -- were from that process.

The reason that this is a real issue is because when these comments are made that will take this back rarely does it seem that these are being brought back, number 1. And number 2, if they are being brought back we aren't seeing any results from them.

So I'm wondering if you can comment, one, on what happened in those 2010 meetings and, number 2, what commitment can you make in terms of bringing this back and informing the Yellowknives Dene?

THE FACILITATOR EHRLICH: Joanna...?

(BRIEF PAUSE)

MS. JOANNA ANKERSMIT: I can't speak to the email that you're referring to, but I -- but I -- I can commit to ensuring that there is an opportunity for the YKDFN to sit down with the most senior person in -- in the regional office here, the RDG, and provide an opportunity to express directly your thoughts and concerns on this.

MR. TODD SLACK: Sorry. Well, per -- perhaps Adrian can comment on this because I followed up with this email numerous times. There has to be -- and within this email there's the phrase "closing the loop." You know, it is not enough to just say, We'll take this back, and then it -- it doesn't go anywhere.

What is going to be the closing of the loop, to use the -- the phrase, and the return on this information and any actions that will come from it?

MS. JOANNA ANKERSMIT: Joanna Ankersmit. What the project team can do is -- is what I've just offered, which is to arrange to have a session and a meeting with -- with -- between yourselves and -- and senior management here directly outside of this forum to be able to express clearly your concerns around these issues.

And I -- I think that that is, at this time, an opportunity for folks to be able to take these issues, have those discussions, and at least be able to provide an opportunity for you to engage and express your concerns and thoughts in -- in an appropriate manner to the staff that's here. And we'll have to see where it goes from there.

THE FACILITATOR EHRLICH: Well, I think that's probably about as far as that particular discussion's going to be productive right now. Todd, do you have any last thought on that before moving on to other technical matters? Okay, Todd's indicating, No.

I mean, I get the sense that certainly the Giant Team has heard the message that the YKDFN have delivered here. But I do think that they correctly evaluate that it isn't -- that a technical session on the proposed project might not be the best place to try to really hash it out. And what I've heard is that there will be an opportunity, face-to-face opportunity with some pretty senior folks to do that properly. It sounds hopeful.

Does anyone have any questions regarding the underground and freezing?

(BRIEF PAUSE)

THE FACILITATOR EHRLICH: Well, then we're going to wrap it up for today. I'd like to thank you all very mu -- oh, wait a second. We do, in fact, have some questions on this subject. And are they coming from Ed or Bill?

Okay. And please say your name and -- but also which party you're here on behalf of. Thanks.

MR. BILL HORNE: Okay. Bill Horne, EBA Engineering. I've got some questions about the thermosyphons that are going to be used for the freezing chambers and some of the -- the modelling that's -- that's going to be done to support it.

I was glad to recognize or to hear that you consider the thermo analysis that's been done to date is preliminary and you're -- you're basically going to update that analysis with a -- information from your freeze optimization study.

Specific question: I was just wondering how -- how you've calculated the heat flow that's -- that you're getting out of the freeze optmi -- optimization study from the thermosyphons and how you're -- how you're going to model the thermosyphons in your next round of analysis.

(BRIEF PAUSE)

MR. DARYL HOCKLEY: Daryl Hockley. The -- currently the thermosyphons are working in active mode. So we have thermistors on the loops for the coolant going in and out of the -- the hybrid thermosyphons and we can calculate from that knowing the temperature and the temperature or properties of the fluid, the flow rates, we can calculate the heat flux that way.

We can also calculate the heat flux from the temperature measurements in the ground once we have an estimate, of course, of the ground's heat capacity and thermal conductivity. So we have two (2) ways to -- to do that calculation of current performance when they're operating in the active mode.

When they're operating in the passive mode we no longer have those cooling loops, of course, so we no long -- so at that point we have to rely on the ground temperature data to tell us the heat flux from -- from the vicinity of the thermosyphons.

Were you also asking about the calculation of the -- of the thermosyphon performance? That's an empirical relationship. There's a few of them in the literature. We -- we have an updated one (1) actually that -- that we're using now, which is slightly different than the one (1) in the DAR but it comes to very similar results and it's a relationship between air temperature and -- and wind speed, radiator size.

I think you've probably seen variance of that calculation before.

MR. BILL HORNE: Bill Horne. Thanks. Sorry, you're -- you're next -- I think it's just -- so your data to date is -- has shown that the -- in the passive mode of the -- the calculations in the literature are conservative, if I understood you correctly this morning?

MR. DARYL HOCKLEY: Yeah, the -- the formulas in the literature tend to underestimate heat removal in comparison to what we're measuring. Daryl Hockley, sorry.

MR. BILL HORNE: Bill Horne. Okay. Thanks. So are you -- the next round of thermal modelling, are you going to do a three (3) dimensional model of the thermosyphons as opposed to the simplistic estimates of how many thermosyphons you're going to need for the long-term?

MR. DARYL HOCKLEY: Daryl Hockley. Yes, we -- what I presented on the slide today was the very simplest way you can do these analyses. Of course, that -- that was a plan view, and just assuming that the thermosyphon represents some section of that plan view.

Even in the DAR and in the Remediation Plan we did present the results of two (2) dimensional simulations, two (2) dimensional sectional simulations and they -- they're quite important because they -- they show that the -- the times estimated from that thermal -- from that simple model are -- are lower than the times needed in reality, that you have to -- have to close the -- the -- the frozen zone over the -- over the top of the -- of the chambers.

That's the slowest part to close. That's why the -- the numbers we quote for the total freezing time are ten (10) years, whereas the number we're showing up there were eight (8), nine (9), ten (10) months.

So we do have those two (2) dimensional models already.

We have a three (3) dimensional model. It's -- we -- we're not entirely happy with it at the moment. In the -- in the first place, we think there are relatively few truly three (3) dimensional phenomena going on there.

The reason we built a three (3) dimensional model is to look at the corners of the -- the chambers, and at some of the complex topology at the base of these chambers. We think there may be genuine 3D effects going on there.

So that's a work in progress. Most of our design calculations to date are the -- certainly all the work in the DAR has -- has been based on the two (2) dimensional model.

We -- in -- in regards to what's going forward, we -- we now have estimates of -- of the -- the rock properties that are -- are different than -- than we had before. That's, of course, the basis for any further modelling.

Step number 1 will be to take those properties, put them back into the same 2D simulations, and see if there's any change in -- in design parameters. So far we -- all indications are that the design is conservative.

Step number 2 would be to have a full year of data so that we can better verify the passive performance of thermosyphons, and also do coefficientive performance calculations to -- to see how much -- we -- we can calculate how much heat has been removed.

We want to compare that to how much energy has been put in -- an electrical energy is being put in, and -- and we need that information for -- for optimizing designs as we go forward.

THE FACILITATOR EHRLICH: Thank you.

Mr. Horne, does that satisfy you?

MR. BILL HORNE: Yep, that's good.

THE FACILITATOR EHRLICH: Okay. We've got a question from Ed Hoeve, consultant for Alternatives North.

MR. ED HOEVE: Correct, Ed Hoeve on behalf of Alternatives North. Just to follow up on the thermosyphons, not quite as technical perhaps, but just go -- going forward, you're -- you're envisioning active freezing to create your frozen block, then maintaining the block with passive.

What wasn't clear to me is, in that time will the thermosyphons that are under the chambers or stopes, will they be also operating passively, or will they not be needed? Will you be just relying on the vertical kind of ring after -- after the initial freeze?

MR. DARYL HOCKLEY: Thanks for the question because it allows me to clarify. I -- I perhaps was -- wasn't quite clear before.

The -- the bottom of the -- the chambers are -- are active freeze pipes only. They are not thermosyphons. They are -- currently there is no in -- intention of -- of turning -- of converting those to passive in the long term. So the passive operation would only be from the ones around the chambers.

We -- we did look at -- in earlier design -- rounds of analysis, we -- we did look at creating the freezing zones only with vertical pipes, and we can do that. The pipes would just have to be a bit longer, and extend further below the depth, and then the freezing zone would still close.

So it takes a lot longer to do that, and you have much more expensive holes from surface. So on a co -- cost benefits basis, it turned out to be smarter to drill some holes underneath. It also gives you a little more ability to -- to control that -- control the process.

Over the long term, the vertical thermosyphons extract enough heat to -- to keep the thing frozen, so...

THE FACILITATOR EHRLICH: Mr. Hoeve, would you like to follow up on that, or are you satisfied --

MR. ED HOEVE: No, that -- that answers that question. Thank you.

THE FACILITATOR EHRLICH: Next.

MR. LUKAS NOVY: There. Lukas Novy. So this is just a follow-up question to our Information Request Number 8, and it was related to contingency measures for the passive system, and what would be done.

And it's just a clarification on the statement that when readings would be obtained they're lower than expected temperatures, and I wanted clarification on what that exact criteria or temperature value would be to -- to implement kind of a trigger for a contingency measure on the passive system.

MS. LISA DYER: Lisa Dyer. Sorry, Lukas, I'm not sure I fully understand your question. Could you just maybe reiterate that, or say it a different way?

MR. LUKAS NOVY: I guess the -- the question is -- is on the readings that will be obtained for the thermistors in passive mode, what level, or what temperature value will be looked at to implement a contingency that they're working properly.

And there was an outline of measures to do that, but it's not clear on what exact temperature value would be looked at to implement those contingencies.

MS. LISA DYER: Lisa Dyer. So thank you for that clarification. I'm going to turn that over to Daryl Hockley and Mark Cronk if he can add some support to that, please.

MR. DARYL HOCKLEY: Daryl Hockley, I -- I'll start. There -- there was another Information Request with a similar line of questioning and I don't quite remember the number of it. But it -- we gave a --

a more fulsome response in -- in one (1) of those. And, essentially, the -- what it boils down to is that we're reluctant to -- to put forward a -- for example, a table showing temperature and action, temperature and action, temperature and action.

We -- we do understand that that will be needed at some point, but we think it's preliminary now. We're -- we're still really defining the design, and that, of course, will change the relationships between temperatures and actions.

Even once the design is done, arguably future operators of the site will -- will want the flexibility to respond appropriately to -- with -- to different -- different changes in -- in the monitoring.

So what we've tried to do in -- in all the responses is to demonstrate that a number of contingency measures are available, number one (1). And number two (2), that there will be lots of time to -- for due consideration of the appropriate responses.

So, for example, if we were dealing with a system where a reading went wrong at 9:00 in the morning and by noon there was an environmental impact, that might require a very explicit set of responses, but in -- in our case I think we -- we've shown -- well, we -- we certainly believe, I guess, that -- that responses will be monitored early, be discovered early, and there will be months if not years and years and years to -- to come up with appropriate contingency measures.

We -- we haven't -- this time we -- we didn't feel it was appropriate to start tying the hands of those future -- future operators as to -- to what to do in any circumstance.

THE FACILITATOR EHRLICH: Lukas, are you --

MR. LUKAS NOVY: Well, it's just like there's an established amount of minus ten (-10), that was indicated that active mode is successful. And it's just an overall concern that it -- I know that the minus five (-5) was kind of thrown around in the DAR in certain sections, and like, it's just -- there's a concern of what type of contingency at what value, and I guess it just would be an idea as -- if you guys have an expected idea of what you would like as a value for that.

MR. DARYL HOCKLEY: Daryl Hockley, again. Thanks, Lukas, that -- I guess I answered a different question the first time. I thought you were talking more about the long term, you know, what would people do ten (10) or fifteen (15) years from now.

You're absolutely right. In the freezing process itself, in the design of the freezing process itself, there will need to be firm criteria.

The current criteria, and there has -- there has been some confusion over this, there are -- are -- the criteria now are specified for the frozen shell and that criteria is -10 degrees Centigrade, over a width of at least 10 metres. Okay.

And the contingency -- there is already a contingency defined for that if we -- if we don't meet it. The contingency is simply keep the freezing system operating in active mode for longer.

So -- so you're right and we -- we have thought through those and it might have been in response to your question that that was made -- made clear.

The -5 degrees refers to the frozen block -- the -- the later step, after it's wetted, right? So that's -- that's why there's some -- at some point we weren't clear about that and it got confused. But it's minus ten (-10) over minus -- over 10 metres for the frozen shells. Contingency being we just wait a little bit longer, or as long as necessary, months or years if necessary, to establish that before adding the water.

Then the minus five (5) applies in the case of the frozen block. There is no time -- time frame set on the minus five (5). We know it will reach that eventually and -- and the cooling systems will be operated as long as necessary to -- to reach that.

MR. LUKAS NOVY: Okay. So just to clarify that, it's the shell is the minus ten (-10) and then the block becomes the minus five (-5), and that remains in passive mode until it reaches that complete value of minus five (-5)?

MR. DARYL HOCKLEY: It remains in active mode, yeah, until it -- until it reaches minus five (5), and then we switch the whole thing over to passive mode.

THE FACILITATOR EHRLICH: I have a follow up question for that. Okay, I know that you add salt to water, it changes the freezing point. I don't know what happens when arsenic trioxide is dissolved in water. Is minus five (-5) going to be -- is this going to be a frozen mass at minus five (-5)?

(BRIEF PAUSE)

MR. DARYL HOCKLEY: Just -- just checking. Daryl Hockley again. The -- the testing that we've done of saturated arsenic trioxide solutions, they -- they freeze at -- or they begin to freeze at zero point -- sorry, negative 0.7 degrees centigrade, so a little below zero.

One (1) thing to keep in mind slightly

different than when you're dealing with most salts, when you're trying to freeze salt solutions you can expel the salt from some of the solution. It freezes. The salt becomes more and more concentrated in the remaining unfrozen zone.

But arsenic trioxide is -- is slightly different chemically and that it's -- it's at saturation. It -- it's a powder and it's dissolving to put this arsenic trioxide in the water. If you try to concentrate that by any means it will re-precipitate. So, in other words, the -- the concentration of arsenic trioxide in the water won't change when we -- by -- by any freeze exclusion process.

So we're fairly comfortable that the minus 0.7 degrees centigrade will apply in -- throughout the -- the arsenic dust. And again, just to state, that's where the freezing begins. There were some other Information Requests about the extent of freezing and the unfrozen water that remains afterwards, and maybe we'll get into that in later questions.

THE FACILITATOR EHRLICH: Okay. I don't see parties with their hands raised, so I'm going to take the opportunity to ask a very simple clarification. In the earlier descriptions of the project I recall that the water level was going to be lowered while the frozen chalices were created, and then after they were made and it was frozen, the water would be raised up.

I remember some interim communication where there was the idea that the water level would remain below the level of the chambers throughout the long term. And I thought that I heard this morning that there was talk about bringing it back up to the height of part of the chambers.

What is your plan with respect to the water level relative to the height of the chambers? The groundwater level I'm referring to.

MS. LISA DYER: Lisa Dyer. We're actually going to discuss this more thoroughly tomorrow, and it's part of the presentation on water. And I'm not sure why I'm making this buzz like that. Oh, is it glass? Cool. Anyways, so we're going to go through this in more detail tomorrow. But I am going to ask Mark to give a kind of a summary of what we'll be showing tomorrow about our thoughts on water management in Giant Mine.

THE FACILITATOR EHRLICH: A very brief indication would be useful right now just because it does relate to your underground freezing.

MR. MARK CRONK: Mark Cronk. You are picking up on some refinements of thinking by the design team is really what you're seeing. Our current thinking, which will be explained in greater detail tomorrow, is that we will hold the water level at its current level, which is below seven fifty (750), for a period of time during implementation.

The design team needs to do more work on upper level stabilities that would be affected as the water level comes up. The plan is consistent with the -- the current plan is consistent with the remediation plan in that it will allow for future raising of the water level once the engineering team and other aspects of the implications of raising water levels have been fully understood.

THE FACILITATOR EHRLICH: Thanks. A question from Kevin O'Reilly.

MR. KEVIN O'REILLY: Thanks, Alan. Thanks for raising this because I -- I have this issue on my list for today, and if it didn't come up today, then it was going to come up tomorrow.

I want to look at Figure 6.8.1 which is on page 670 of the DAR. And this -- we asked this in an Information Request, Alternatives North, and it was number AN9. And in response -- we asked this question about the frozen blocks being submerged. And the response was, No, it's not -- they're not going to get submerged.

Well, if I look at table -- or sorry, Figure 6.8.1, this clearly shows the blocks being submerged after they're frozen because the water is proposed to come up to I think it's the two fifty (250) level. And if you look at the text on the page before, it says you might even have it come up to the one hundred (100) level, just below the bottom of A2.

So wh -- where is the bottom -- where's the -- the top of the water after this stuff is frozen? I asked in the IR. You said you weren't going to have it above, in -- but in the DAR it does show that.

So what's happening here?

THE FACILITATOR EHRLICH: Respecting the -- the developer's point that they're going to go into more detail about it tomorrow, if you could just give a -- a summary answer now so that we can -- we can keep trucking on our current theme, it would be helpful.

(BRIEF PAUSE)

MS. LISA DYER: I'd just like to reiterate what Mark said is that there has been some design work that's been done, there's some current thinking on water management, and we're going to have Bob

Boon come tomorrow and he's been focussing on water management of the underground.

And so this is our current thinking. It is different from the DAR and we'll -- I think if you'll give us an opportunity we can have proper diagrams and maps tomorrow to show things to people.

THE FACILITATOR EHRLICH: Thanks, Lisa. I see Kevin --

MR. KEVIN O'REILLY: Okay. It's -- sorry, Kevin O'Reilly with Alternatives North. Then if the -- the -- the thinking's changes then you should have responded to my IR on this by saying that the stuff in the DAR is no longer valid. That was not done. You -- you have to change what's in the DAR.

I -- we can look at this again tomorrow, but when I see what's in here and then the way you responded, it's not very clear. Happy to talk again tomorrow about it, but if you're changing what's in here you need to specify that in the -- in your response and I don't think it was done very clearly at all. Thanks.

MS. LISA DYER: Thanks for that, Kevin. Lisa Dyer again. We're -- it's not a change from the DAR. What it is is current thinking on the design. And there -- as I said, we'll be explaining it more in detail about our understanding of the underground workings, the stability there, and about the need to manage the water.

And it's -- it's really a refined thinking to look at the current understanding of the underground and how we want to manage the water. Mark's going to just add to that.

MR. MARK CRONK: Mark Cronk. Kevin, if I can, what you're picking up on is more an implementation sequencing issue more than a final state of the water. The design team is looking at implementation as their primary focus.

And for that implementation period the current thinking is to keep the water level down. It allows us more response time. If we get upset conditions it allows us access to under the chambers, makes a bunch of benefits.

At some point in the future when everybody's happy and comfortable we can look at lifting the water level. There's nothing that we're doing right now that would stop us from doing that at some point in the future. It's more a sequencing issue. Thank you.

THE FACILITATOR EHRLICH: Ed Hoeve, please go ahead.

MR. ED HOEVE: Yeah, Ed Hoeve on behalf of Alternatives North. Just a small point, I -- in reviewing everything that I've seen, I've had a hard time relating all of these water levels to the lake -- Giant Mine lake levels.

So in terms of the mine datum, where is the lake level, just out of curiosity?

THE FACILITATOR EHRLICH: So if I understand the question correctly, you're saying that these things are all above sea level in terms of -- no feet below surface, and the question is, how far down is the surface of Great Slave Lake so you can compare the levels of the water, is that correct? I see him nodding affirmative. Ed Hoeve's nodded.

MR. ED HOEVE: Yes, sorry.

MR. MARK CRONK: Mark Cronk. And I don't have the specific elevation of Great Slave Lake. The current mine water level is normally 800 feet below surface at the central point of Giant Mine, so it is well below the lake level. We do that for hydraulic trap reasons, to pull contaminants in at this point in time.

THE FACILITATOR EHRLICH: Ed, do you have another question?

MR. ED HOEVE: Well, just a follow-up. I don't need to know that right now, but it is something that I've sort of grappled with. So perhaps by tomorrow if you could sort of just sort of relate the two (2)?

MR. MARK CRONK: Will do.

THE FACILITATOR EHRLICH: And Lukas from ARKTIS on behalf of the Yellowknives.

MR. LUKAS NOVY: Lukas. Just -- just as a further to that, it -- it's just -- I don't want the point lost that the water management and the levels, there's -- you guys are indicating there's a freeze optimization requirement and a water balance management and I just hope that that will come across tomorrow and not just that it becomes a water balance issue.

(BRIEF PAUSE)

THE FACILITATOR EHRLICH: I'm -- I'm taking the question is, Will that be communicated by the Giant team tomorrow?

MS. LISA DYER: Lisa Dyer. Yes, we will answer those questions tomorrow.

THE FACILITATOR EHRLICH: Do any of the experts on the Review Board's behalf have questions pertaining to the line of discussion we've just heard? Please go ahead.

MR. DOUG RAMSEY: Doug Ramsey. I noticed in your presentation this morning that with respect to considering climate change scenarios, and its influence on your freezing approach and the number of thermosyphons you -- you will need, and so on, you referred to the IPCC worst case climate prediction of the area.

And with respect to that prediction, what does that scenario cover in full? For example, what -- for what period into the future did you look at that as being the worst-case scenario?

(BRIEF PAUSE)

MR. DARYL HOCKLEY: None of us has that information. Daryl Hockley. We don't -- we don't have that information offs the top of our head. We'll have to get back to you on that.

If -- if your question is, How long would the thermosyphons work in that circumstance, it's -- it's a steady-state calculation. If your question is, Are we talking about the IPCC in one hundred (100) years, two hundred (200), or three hundred (300) years, that we're going to have to check our -- our numbers, and get back to you.

THE FACILITATOR EHRLICH: Doug, can you please spell out, in your responding to -- to this question, exactly the information you're looking for because it sounds like it's going to go back as an undertaking, and I want to be sure that the record is quite clear on -- on what the undertaking is for them to return with.

MR. DOUG RAMSEY: Doug Ramsey. First to follow up with clarification. As you requested, it's with re -- respect to a number of characteristics of the scenario, one (1) of which being the time horizon over which the worst-case prediction was used. For example, whether it's the fifty (50), one hundred (100), two hundred (200), five hundred (500) year worst-case climate prediction.

And, secondly, with respect to what aspects of climate change were considered. Is it just air temperature? Is it also with respect, and this will flow into tomorrow's questions as well with respect to precipitation and its potential effect on water management, both on surface and underground.

THE FACILITATOR EHRLICH: So is the -- the Giant team willing to undertake -- are -- are -- is this something you think you will be able to respond to tomorrow, or is this something you're going to need as a -- as an undertaking for later on?

(BRIEF PAUSE)

MR. MARK CRONK: Mark Cronk. We think we

can do that tomorrow, but one (1) of the individuals we need to check with is out of the country, so we'll make our best efforts.

THE FACILITATOR EHRLICH: Okay. Thank you. If -- if it doesn't work out tomorrow there's always the alternative of taking it as a take-home undertaking, and -- and sorting it out. It -- it sounds like an important question, and I want to make sure that there's a, you know, solid answer available.

Question from Ed Hoeve...?

MR. ED HOEVE: Okay. It's -- it's a bit of a follow-up question to that in a sense, and it's to come to grips with the terminology around long-term. And, you know, I -- I can appreciate you've used a certain scenario, and there may be other -- the scenarios change all the time, and -- and I don't think it's that productive to try and debate a degree or two (2) either way.

But if we kind of go with the example you had in your presentation this morning, and your sixty-six (66) thermosyphons, and your -- I think the comment was made that the passive would remain in effect up until a mean annual air temperature of minus 3 -- or plus 3.4.

Just very crudely again, just conceptually working that forward into the long term I -- I figure that somewhere in a hundred and twenty (120) to a hundred and fifty (150) years you'd appre -- you'd approach that point.

And I -- I'm not sure if this is within scope because the scope of the project is twenty-five (25) years, but what's the thinking in terms of a hundred and fifty (150) years out? Will everybody -- will our great grandchildren convene in a room and try and decide what to do at that point?

I recognize one (1) option is to swi -- you know, probably by then replace them all and switch to active, but is -- what's the thinking, kind of, or -- in terms of the project description report, what's long-term? How far have you gone into the future?

THE FACILITATOR EHRLICH: Thanks. Let's go a bit at a time, because I heard a few questions in there. One (1) of them, I can help address after you respond, dealing with the scope of the environmental assessment.

But, can you start off with describing what you mean by long-term, when you mention it in the DAR? Does that characterize the question properly?

MR. ED HOEVE: Ed. Yes.

THE FACILITATOR EHRLICH: If I -- if I may ask for further clarification on that same question, I mean, my understanding of a term -- short-term, long-term, is a period of time. A period of time has a beginning and an end. If when you say "long-term," you are in fact not referring to a period of time, but you're referring to perpetuity, please make that clear as well. Thank you.

MR. DARYL HOCKLEY: We use the term "long-term" -- Daryl Hockley, sorry.

Alan, I -- I guess I think your term would be perpetuity. The -- the -- for some -- for rhetorical reasons, we prefer the reason "long-term" -- the term "long-term" but it does not have an end point. But by no means do we mean to imply that long-term stops after year 75 or year 100 or year 300. We -- we believe that the project should be evaluated on the basis that it's -- that is going to be the perpetual solution for managing arsenic trioxide dust.

There are some areas where we -- we hope we've been conservative and we -- we think that things might actually be better in a hundred (100) years or two hundred (200) years than they are now. But we don't believe that it's fair to bring those into the evaluation at this point, so.

I guess those are all of the things that are hidden in our use of the term, "long -- long-term."

THE FACILITATOR EHRLICH: I -- I'm a bit concerned though that that's -- that's a fair bit of baggage for one (1) syllable. Term, right?

So, I -- I understand you're proposing a project that -- that you're saying will -- will work for a long time, but I'm trying to understand what "a long time" is. I mean, it sounds like five hundred (500) years is a long time, and it sounds like five thousand (5,000) years is a long time. Are you suggesting this will continue to work for fifty thousand (50,000) years?

MR. DARYL HOCKLEY: Yes. The -- Daryl Hockley. The -- the individual components probably won't be around for fifty thousand (50,000) years, but the project consists not just of the components we propose to put in the ground now. They -- it -- it includes the monitoring system, the commitment to maintenance, the commitment to long-term funding, the commitment to long-term treatment, annual inspections, et cetera, et cetera, et cetera.

And -- and that -- that -- that is, that in theory, it could last for fifty thousand (50,000) years. I'm -- I'd rather not put my professional reputation on the line for predictions quite that far in -- in the future. But -- but -- but -- but yeah, that is the intent, that this -- this should last as long as it's needed.

THE FACILITATOR EHRLICH: And -- I -- I don't want to go too far with this just because we've got -- day 4 deals with risk assessment, day 5 deals with ongoing monitoring, and stuff like that. And, you know, in some ways, that's a -- that's a more useful setting to deal with issues relating to how long you need this project to keep working, or we all need this project to keep working.

I -- I guess that's just what I was perhaps reading too much into Ed Hoeve's question, but think you've -- you've clarified. I'm not going to pursue that any further right now, but it's because there's probably a better time later on to look into that.

I see Ed still has a -- a question.

MR. ED HOEVE: Yes, Ed at -- on behalf of Alternatives North. And perhaps it's best discussed Friday. But I'll just restate it slightly.

And that is that the intent that we see here is that it will, once it's actively frozen, will convert to passive, and without trying to pin it down because no -- none of us in this room know what's going to happen in a hundred (100) years. But without trying to pin it down, it can be reasonably foreseen that those thermosyphons at some point in time, a hundred and twenty (120) years, two hundred (200) years, will not do the job of keeping the ground frozen. So has a response to that been considered? That's all.

THE FACILITATOR EHRLICH: And if I may add to that question before you respond. Also it would be helpful if you could describe a bit about the life of the thermosyphons in your answer.

MR. DARYL HOCKLEY: Okay. Daryl Hockley again. I -- I think there's a misunderstanding of the graphic that I showed earlier. That graphic showed that under the worst-case climate assumptions available from the IPCC over a time frame yet to be -- yet to be determined the -- there -- there is far more than needed thermosyphons to keep the gro -- to keep Chamber 12 cool. Chamber 12 was selected because it's the one (1) that is closest to the ground surface. It's surrounded by bedrock on three (3) sides and is likely to get warmer faster than -- than any other one (1), okay.

At the bottom it says that the thermosyphons would be adequate to keep up. Or at the end of my comments I said the sixty-sixty (66) thermosyphons around Chamber 12 would be adequate to remove heat even in the case where the mean annual air temperature went as high as 3.4 degrees centigrade, which is well beyond what the -- the worst-case scenario is.

Even above that thermosyphons will continue to function. Thermosyphons function effectively as -- in Canada as far south as Winnipeg. Assisted thermosyphons, hybrid thermosyphons can function, well, presumably anywhere. We -- we know that, at the very least, that they -- they've been tested in Washington DC but, of course, with enough cooling energy they could be made to function anywhere.

But even in the purely passive mode I guess that's -- that's more important for the longer term. And the purely passive mode, we believe they will continue to -- to function indefinitely within all reasonable predictions of future climate change.

With regard to the performance of an individual thermosyphon and how long it lasts, the -- we -- we looked for data on that or -- or guidance on that or experience on that. Thermosyphons have been around for about forty (40) years -- I guess closer to, yeah, forty (40) years. They're -- the largest scale application -- the largest number application of them was with the Trans Alaska Pipeline.

There were problems with some of those thermosyphons after five (5) to fifteen (15) years. Was -- I believe that it's been determined that all of those problems were related to the use of ammonia gas in the thermosyphons. Yes. Yeah, it was that they were using ammonia in those thermosyphons, and ammonia tends to liquify and -- with -- if it has impurities in it.

The current proposal is to use carbon dioxide in the -- in the thermosyphons, and no such problem has been noted with those. So the actual life of a single thermosyphon is -- is yet indeterminate. We know it's at least forty (40) years. We saw no -- we saw re -- no reason why they should stop working after -- after that.

But we, nonetheless, have in the -- in the project cost estimates a provision to replace I believe it's 1 percent of the thermosyphons every year over the -- and that's -- that's a perpetual -- that's per -- that is a perpetuity. In other words, it's a cost that occurs in -- indefinitely to -- to fund that level of complete replacement.

THE FACILITATOR EHRLICH: Thank you. Back to Ed Hoeve...?

MR. ED HOEVE: No, I think that -- that we've gone as far down this path as we need to. Thanks.

THE FACILITATOR EHRLICH: Okay, Todd Slack, of the Yellowknives Dene First Nation.

MR. TODD SLACK: Thanks, Alan. Just a

quick point of clarification. You just mentioned that you were going to -- you -- carbon dioxide. Earlier I heard, and this is how I have it written down, something something propylene something something. And I was going to ask if the MSDS could be submitted for that to begin with, but now it seems like you're using carbon dioxide.

What am I -- what am I not following here?

MR. MARK CRONK: Mark Cronk. Todd, two (2) different freeze systems. The freeze optimization study is looking at what we call a active system which has conventional ammonia over glycol, similar to a rink, ice sheet plant. And then we're also looking at the hybrid thermosyphons which do run carbon dioxide and a halocarbon. So two (2) different systems.

MR. TODD SLACK: Thanks. And just in terms of number 1, can you submit the MSDS for that product?

MR. MARK CRONK: Yes, we can. Mark Cronk.

MR. TODD SLACK: Thanks. Thanks, Mark.

THE FACILITATOR EHRLICH: Hold on one (1) second there, Todd. Just to make it clear that -- so it's an undertaking. And can you please, Todd, carefully word the undertaking that you've requested of INAC, without using the acronym. Just spell it out in full so that it's nice and clear.

MR. TODD SLACK: Geez. If INAC could submit the Material Safety Data Sheet for the cooling products that are currently in use during the freeze optimization study.

THE FACILITATOR EHRLICH: Okay. And, Mark, do you want to comment on that?

MR. MARK CRONK: Mark Cronk. Todd, just to clarify, that's the glycol that you're interested in?

MR. TODD SLACK: Any -- any freezing products that are being used as -- within the thermosyphons and the cooling system. In -- the idea being in case of a spill, what are the effects to the local environment?

MR. MARK CRONK: Okay. I'll take that as three (3) products then? Four (4), including carbon dioxide. Okay.

THE FACILITATOR EHRLICH: Now you're -- you're emitting carbon dioxide just exhaling as you make the commitment. So -- so let's just let that -- we'll call that Undertaking number 1. It's the first formal undertaking that I've heard here and was for the Giant team to submit the Material Safety Data Sheets for the three (3) different products used in cooling. Can you do that by November 14th?

MR. MARK CRONK: We could have that for you tomorrow if you'd rather not post as an undertaking. We can clear that up quickly.

THE FACILITATOR EHRLICH: I don't see a technical question attached to that. Todd, is it okay if they just hand you the sheets tomorrow?

MR. TODD SLACK: Yeah. Todd Slack, YKDFN. That would be great.

THE FACILITATOR EHRLICH: Remember, Todd, that if you do want them added to the public record, in that case --

MR. TODD SLACK: Understood.

THE FACILITATOR EHRLICH: -- do submit them. Okay. If you wrap that up here tomorrow then that's not an undertaking anymore, that's just something that's come up and you've dealt with, which is exactly the kind of thing we like to see happen in a technical session.

So that's good. Do you have another question, To -- so please strike Undertaking number 1. That's not Undertaking number 1 unless it doesn't happen. Wendy, I've never seen you undo an undertaking, but I imagine you have the technology. I see some nodding.

Okay. Back to you, Todd.

MR. TODD SLACK: Todd Slack, YKDFN. And

I've been trying to crystalize my thinking on this and I imagine there'll be a follow-up question to further try and crystalize it.

So one (1) of the problems I have is when Daryl was just talking and he was saying that we don't want to constrain the hands of the operators in the future. Well, from the party's perspective, and I know this is perhaps saved for later dates, but in terms of the freeze plan there's -- quote/unquote "plan" in this case, there's a couple of different aspects from my perspective.

The first is, I think that from the Yellowknives Dene perspective they do want to constrain the operator's hands in the future so that if triggers are -- are -- or thresholds are met that requires action. And I understand from the Crown's perspective they want all the flexibility in the world, but the concern is that this is going to become an afterthought at a later date.

So along those lines of thinking, two (2) things. One (1) -- and in the -- in the DAR it was recommended that the EM -- or it was stated that the EMF and EMES, like the environmental management framework and whatever the other one stood for, it's escaping me right now, would be submitted by the end of 2011.

So whether it be that or some other scheme that indicates what the future commitments are going to be for the frozen block system, I think that that's a -- a fairly important thing from the party's perspective to be submitted during the environmental assessment phase.

Now this isn't unprecedented, because the Board required this of Avalon. So having this in part of the reviewing and having these commitments made in public, in a transparent manner, albeit maybe conceptual at this phase, but something that can be argued is a -- a critical issue for the future moving forward.

THE FACILITATOR EHRLICH: Giant team, what can you offer on that?

MS. LISA DYER: Lisa Dyer. So, Todd, I'm -- there was a -- I think a few questions in there and I'm just trying to clarify if I understand them right. You kind of asked about what controls would be in place for the -- for the freeze in the future, if I understood, because you were talking about kind of constraints on -- on the contractor. But I think if I more correctly interpreted it, it's what controls are in place for operating the freeze?

Is that correct?

MR. TODD SLACK: Yeah.

MS. LISA DYER: Okay. And then I think the second question was, you were asking about the environmental management system, and how that's going to be in place, and when that will be available to review.

MR. TODD SLACK: To add something to that. No, that was this first idea. Like, the -- the management commitments that go along with the frozen block, that should -- that should be part of that, and I was using the -- using that as one (1) component of the EMF framework. And that framework's already been committed to by the end of 2011, according to the DAR. And then, third, asking these to be submitted to the Board is not unheard of or unreasonable, as far as I was saying -- or as far as my mind or thinking goes.

If there -- sorry, Todd Slack. If there's any more clarification, please, let's...

THE FACILITATOR EHRLICH: Do you want to just give the Giant team a moment to caucus about this.

(BRIEF PAUSE)

MS. LISA DYER: Lisa Dyer. I'm going to ask Daryl to talk about controls in place for the freeze, and then Adrian's going to follow up with talking about the environmental management system.

And so I'll hand it off to Daryl. But I

should also let people be aware that we have a day dedicated to kind of monitoring and maintenance, and on that we're going to give an update on the environmental management system. So we will have a presentation, and we'll be updating people where that's at. I think that's slated for Thursday. So with that, I'll hand it off to Daryl.

MR. DARYL HOCKLEY: Daryl Hockley. I -- I think -- first of all I share your sentiments entirely, Todd. I think it's a question of timing, and when -- when we can reasonably put details out there.

The -- the DAR and the information -- response to Information Requests already make commitments to a monitoring program, to various types of monitoring, in the ground monitoring, inspections of thermosyphons, monitoring of the -- of the water collection and treatment system. They -- they also make commitments to a series of contingency measures that -- that would be considered at that time.

Ultimately these -- these -- those considerations would be -- would be firmed up and would be in much more of a table that says, If a particular thermistor says a particular temperature, a particular response would be this contingency measure.

But I think that's months or -- at least months in the future. We're -- we're still getting results from the FOS now, and they're helping us to understand how reliable the in-ground monitoring systems are and -- and how we can be portraying that data to pick up changes.

We are -- are still -- again it's only this winter that we'll have the full passive operation of the thermosyphons tested in the FOS. We'll be able then to understand what the reasonable natural fluctuations in thermosyphon performance are.

Layouts of pipes, locations of active and passive things, as -- as David mentioned, are -- are still under consideration. How we backfill some of the surrounding works and whether they end up being full of air or full of cemented tailings is -- is very different to their thermal characteristics. That's all still being considered. And I think we -- everyone would be better off if we waited until some of those details were in place before we tried to put really precise numbers to -- to the system, so...

THE FACILITATOR EHRLICH: I see Kevin O'Reilly has a question.

MR. KEVIN O'REILLY: Thanks. Kevin O'Reilly, Alternatives North. I want to follow up on Todd's question and reinforce the -- how critical this is from our perspective to have actual performance criteria for the frozen block now as part of the environmental assessment.

We don't want to wait. I've been through more EAs than you can shake a stick at, where adaptive management is thrown around as a term and it really means nothing unless you actually specify specific criteria, thresholds, and actions and -- that you're going to take if things exceed them.

And I think -- I spoke earlier about trust being an issue here. And I -- we don't want this left until later. We want to have performance criteria set out now. If they have to change, that's fine. But if -- that -- that needs to be the kind of level of detail that we see in the EMF or whatever it's going to get called on day 5.

We want to see specific performance criteria and specific actions that identify terms of contingencies as part of the environmental assessment. Because if we're talking about doing this forever, we want to have some assurance that there's actually a plan to do it forever.

THE FACILITATOR EHRLICH: The -- I think that, that point is understandable considering that -- that -- and you've clarified that this is a perpetuity project. Are you able to provide a response?

MR. ADRIAN PARADIS: Adrian Paradis for INAC. I think at the moment I'll talk about the EMF and EMS.

Part of what we need to do to actually get the EMF done is to engage the parties. And part of that is, hopefully, what we're going to be doing through the contribution agreement that we're trying to get finalized now -- in the next week or two (2) with the YKDFN. The other half of that is to engage the rest of the public and that is partially going to be done through the Giant Mine Community Alliance.

It is the par -- it is -- it isn't -- you may not agree with it, but that -- so that's going to be through the next year, half year, year and a half -- back and through 2012.

The intent then, is to then take the EMS and the draft, various management plans and have -- I'm not going to say complete, but solid working documents that we can submit to the Land and Water Board. That can be then used through the regulatory phase going forward into that.

THE FACILITATOR EHRLICH: Okay. It's Alan Ehrlich here again.

For the purposes of the EA, while we do

not need a detailed, quantitative account of your thresholds for management activities, at the very least a quantitative summary of what you're going to be looking for in your adaptive management framework and what kind of management actions you have as options available to remedy the -- those things would be quite useful to parties and to the Review Board.

This is not the same thing as a fully detailed EMF, but it does say, These are the kinds of things that our plan is going to be looking for. And, if we see 'X', we're going to do 'Y'. We don't need, you know, number of parts per million or anything broken down. You're right, that can definitely wait for the regulatory side. But we do need a big enough picture to understand that, you know, any unacceptable risk of a significant adverse impact has been dealt with.

MS. LISA DYER: Lisa Dyer. We will be talking about the environmental management system and the outlines for that on Thursday. And in that we will touch upon, kind of, the contingency plans that we have in place. Friday, sorry. Friday.

THE FACILITATOR EHRLICH: Okay. So please be advised that, if the presentations on Friday and the discussions on Friday, don't get to that information, then we'll be looking for it as an undertaking.

MS. LISA DYER: Lisa Dyer. Understood.

THE FACILITATOR EHRLICH: Thanks. Any other questions on this general subject? Todd Slack from the Yellowknives...?

MR. TODD SLACK: Todd Slack, YKDFN. And thanks, Alan, for the clarification. But, from the Yellowknives Dene perspective, the -- given the issues and the -- this project in particular, this being Giant Mine, and the -- the legacy of this project, I think we'll be hoping for something more -- more than just conceptual, that we'll have, perhaps, not final commitments, but especially in terms of the frozen block, considering the level of effort that's gone -- gone into it, the -- the expense and how shall we say unpopular this idea is within the First Nation, that the -- the backstop of a thorough adaptive management plan at a minimum for this theme is especially essential.

Yeah, I'll just leave it there.

THE FACILITATOR EHRLICH: I -- I didn't hear a question in that, but I did see the developer and other parties listening carefully, and I think your point was understood. Do you have a follow-up question?

MR. TODD SLACK: No, but I have a new question. We --

THE FACILITATOR EHRLICH: Okay.

MR. TODD SLACK: We've been alternating back over here, but we'll -- we'll double up over here. Be -- because it's actually -- you touched on this, in terms of success and the -- the criteria of this frozen block success. And Daryl touched on this just a touch.

But in terms of the 10 metre wall at minus ten (10), for this parti -- the way that closure plans work in all -- in every other circumstance is that each component has a list of criteria that the inspector can then use, and the parties for that matter, can use in order to tell if it's been successful or not.

Especially in this case given that the inspector is INAC and that you all report to the same person, at what point can we expect criteria of successful remediation to be established?

And if you want to use the frozen block as the initial example here, that's fine. But, in general, this has to be public during the EA phase as well, in my opinion.

THE FACILITATOR EHRLICH: Giant Team, do you need a minute to just discuss the question or do you have an answer ready to go?

MS. LISA DYER: Lisa Dyer here. Sorry, Todd, I -- we're -- we're still trying to figure out the question. Can you maybe clarify that for us?

MR. TODD SLACK: And could I clarify by analogy. So let's say there was a multi-national mining corporation that operated a diamond mine in this territory, hypothetically, and they -- as part of their closure plan they want to cover their tailings and the -- that cover has objectives.

This may apply in your project hypothetically. Well, what is the purpose of that cover? How is it going to be evaluated? How, at the end of the day, will the parties, the inspector and the regulatory boards know if it's been successful?

If the object is to reduce infiltration it will reduce infiltration by X percentage. In this case, and I -- I -- in terms of the frozen block method, one (1) potential criteria I would suggest would be the wall is 10 metres thick at minus ten (10).

And then that is one (1) criteria for that particular objective, that the ups -- the inspector and the parties can then say, Well, they're doing what they said they did. There's no confusion. There's no uncertainty. And there's no -- what's the word I'm looking for here. In -- in terms of language, there's no -- everyone understands the point.

MS. LISA DYER: Thank you. That -- that

was helpful. I think what we'll do is maybe we can focus on the frozen block. We're going to be talking about tailings covers and water treatment and all the rest the next few days, so just, if it's okay, we'll just focus on kind of the criteria for the frozen block right now.

And I'm going to ask Mark and Daryl if they can respond to that.

THE FACILITATOR EHRLICH: And just while you're discussing that, I'm going to turn over the facilitation to my colleague, Paul Mercredi, up to the break.

(BRIEF PAUSE)

MR. DARYL HOCKLEY: Daryl Hockley. The -- just to clarify, the minus 10 degree centigrade over 10 metres is the -- is the design -- is the criteria that's being used to declare the frozen shell to be complete prior to putting water in.

We had not considered it as a regulatory criteria. I think Todd makes a very good point, that it -- it would -- it would serve that purpose as well. In terms of -- I think the -- the broader question though is how would we determine the thing is still working ten (10), or fifteen (15), or twenty (20), or a hundred (100) years down the road.

That's a harder question. It's harder to come up with a quantitative answer to that question. Let's say we don't -- there are lots of ways to determine that it's still working and to -- and to ensure that it keeps working.

But how to -- how to phrase that in terms of a simple criteria that people can -- can use for all the purposes you mentioned in the future, that's -- that is a more difficult question and frankly we don't have an answer to that now.

That -- that I think is part of the development of the Environmental Management Plan for that particular part of the project. I don't think we can say anything more right now.

THE FACILITATOR MERCREDI: Todd...?

MR. TODD SLACK: Thanks. So in terms of follow-up, two (2) points of follow-up. One, is there a commitment for the frozen block example in terms of today's theme, when this information is going to be available?

And number two, just how do you expect the inspectors and the -- and the regulatory boards to agree that this Closure Plan has been successful, at least like in terms of moving from -- and I forget what the terms

Mark talked about earlier, but was it implementation to operations, or whatever phrases you want to move, what is the barrier in ter -- or the -- the point of decision for that -- that break between those phases?

And that has to be a criteria for everyone to evaluate. It just can't be, We're good enough, you know, let's move into operations.

(BRIEF PAUSE)

MR. DARYL HOCKLEY: Daryl Hockley again. I'm just going to clarify the criteria that we have now. That criteria, the minus ten (10) over 10 degrees centigrade is the criteria for declaring the frozen shells to be complete prior to adding water.

The second criteria, minus five (5) over the -- within the frozen arsenic trioxide is the criteria that we're proposing as the definition of -- as when we would declare the frozen blocks to be complete.

And -- and the action it would follow on that is we would then convert the active phrasing systems into passive system for the long term. Okay.

(BRIEF PAUSE)

THE FACILITATOR MERCREDI: Thank you, Daryl.

MR. TODD SLACK: Thanks for that.

THE FACILITATOR MERCREDI: Todd, did that answer your question?

MR. TODD SLACK: Yeah.

THE FACILITATOR MERCREDI: Yeah? Okay. And did the experts have any follow-up questions? Review Board experts, sorry.

(BRIEF PAUSE)

MR. LUKAS ARENSON: Lukas Arenson on behalf of the Board. I got some technical questions, probably about the frozen block or the thawing about the frozen block, and about the criteria, and about the shell.

So the -- even with the minus ten (10) or being at the minus five (5) criteria, the ten (10) seems to be just for the wall, and probably because of the artificial frozen bottom, so you're trying to encapsulate everything around.

But with the minus five (5) here then just kind of looking for the whole block. The most sensitive area is probably the bottom, centre in the bottom.

That's probably where it's going -- once you start rising the water level that's probably the most critical one (1).

Have you considered -- well, how did you address that in your assessment of it, of how the centre of the -- how the centre bottom which will know -- which will not be passively nor actively fre -- frozen in the long term, how would that be addressed?

MR. DARYL HOCKLEY: Daryl Hockley. The -- again, the -- the minus 5 degrees -- the -- the problem I think is that Todd has asked a very good question, and -- and that -- and that there was some confusion over what we're talking about.

And, in fact, we haven't answered the very good question. We've put forward some other answers, so let's be very, very clear about this.

The minus 10 degrees centigrade for the shell -- we've done that. The minus 5 degrees centigrade is simply when we declare the frozen blocks to be sufficiently actively frozen such that we would be comfortable switching them over to passive.

Neither the minus five (-5) nor the minus ten (-10) has yet been proposed to answer Todd's longer term question, What's our criteria five (5), or fifteen (15), or a hundred (100) years in the future, to say this thing is still frozen?

And, Lukas, I think, are -- are you asking now about the long term, the centre of the thing, or are you asking about the -- the short term when we're trying to declare the block complete?

MR. LUKAS ARENSON: It's Lukas Arenson again. No, it's the -- it's the long-term behaviour basically of the most critical point within the frozen block, which I think is the bottom cent -- the centre bottom of the -- of the stope.

MR. DARYL HOCKLEY: I'm -- I'm not sure that this -- Daryl Hockley. I'm not sure the centre bottom is -- is the most important one.

You -- what -- what people don't realize is that some of these chambers are quite thin. They're -- they're 5 or -- 5 or 6 metres only in -- in width, right.

So if you have thermosyphons extending 20 metres below the bottom of those -- those chambers, you can pretty effectively freeze that intervening 5 or 10 metres.

When -- when we do simulations, the -- the first point to thaw in -- in a simulation where we turn off the thermostat, the first point to thaw can be at the base in some cases. And you're right, it's the middle of the base in the -- in the broader -- broader chambers.

It can also be at the top and, in fact, I think in most cases, while certainly in the -- in the case of Chamber 12, it's -- it's one (1) of the top corners tends to thaw first, and that's just related to the local heat balance.

So the -- the point of maximum -- or the -- the point that would thaw first would -- would be different in each of these chambers in each of these geometries.

That's -- that's -- I suppose that's one (1) of the reasons we're reluctant to say at this time that the critical point is here and the critical temperature is there. It's somewhere -- somewhere further in the design assessment and the modelling that we're going to know where all those critical points are.

MR. LUKAS ARENSON: So I -- I guess what we can get out of that is that you're planning on doing more detailed, probably going to 3D models, for each chamber to identify which are the critical areas where you have to probably focus on.

Is that correct?

MR. DARYL HOCKLEY: Yeah, I don't -- I -- I think that's something that would necessarily happen before we had the definitive design of the monitoring system.

Yeah, that -- that's really the -- the best use of -- of -- or one (1) of the best uses of the FOS data is we'll be able to do -- to do enough modelling to precisely define monitoring requirements for the rest of the -- rest of the site.

I don't believe that is on anybody's schedule for the near future. There's a sequence of things, so I'm -- I'm not committing to do that on any schedule here, but I believe it is in the plans over the -- over the longer term, yes.

THE FACILITATOR MERCREDI: Okay, thank you, Lukas. Ed? Sorry, Bill...?

MR. BILL HORNE: Bill Horne. I'm a little confused here now. So five (5) -- minus five (-5) is when everything is frozen. That's your criteria.

So in the long term, maybe we can't say exactly where we're going to apply that criteria, but in the long term what is the criteria then? What temperature?

MR. DARYL HOCKLEY: Daryl Hockley again. I -- I think I should make a diagram because it's minus ten (-10) -- 10 metres is the criteria for the frozen shell being complete.

Minus five (-5) is when we propose to

declare the frozen box sufficiently complete that we can turn off active freezing, and switch to passive.

I think it's maybe important that we -- every time we try to say that in shorter -- shorter terms -- I'm sorry to be repetitive, but every time we try to say it in shorter terms we end up confusing each other again.

Those -- those are the only criteria we have now. We -- we don't have a criteria that says, What are we going to do if twenty-five (25) years in the future it's minus four (-4), or minus three (-3), or minus two (-2)? That, I think is what Todd has brought up as a -- as a deficiency in our current documentation.

THE FACILITATOR MERCREDI: Okay. Alan Ehrlich with the Review Board has a question.

MR. ALAN EHRLICH: It's just a -- just a detail on that.

So, Daryl, what I've just heard is minus five (-5) is -- is where -- when the block's at minus five (-5), that's when active freezing will be turned off and passive freezing will be relied upon.

But, with my limited engineering background, virtually nil, my assumption is that the thermosyphons will continue to cool the mass of the block lower than minus 5 degrees. And so you're not expecting that block to stay only at minus 5 degrees for perpetuity, are you?

(BRIEF PAUSE)

MR. ALAN EHRLICH: While the Giant team is -- is caucusing, I -- here's an idea I want to throw out there.

People have questions in the days moving along and the first part took a little bit longer than we expected. How would people feel about skipping the break and just, you know, anyone who has to use the facilities can wander off when they need to, to do it and try and get back and try and keep up with the thread of things. As well as, you know, we'll certainly forgive anyone who decides to make a coffee run for it. I mean, I've -- I've got my coffee here, so I can say this with some confidence.

But are people generally okay with that, or would people -- you know, I -- I see a lot of nodding from the -- the parties side of things. It would -- it would give us a little more time to ask questions and -- and get on with this more. Can -- can the developer live with that?

(BRIEF PAUSE)

MR. ALAN EHRLICH: I take that silence as a polite no. I -- look, how about we take a short break. Would a five (5) minute break be okay?

MS. LISA DYER: Yeah, if we could take a five (5) minute break, that would be great.

MR. ALAN EHRLICH: Okay, we'll do a five (5) -- it's just that, you know, there aren't that many washrooms here anyway, so people are going to have to go at their own pace setting --

MS. LISA DYER: Maybe make that a seven (7) minute break then.

MR. ALAN EHRLICH: Okay. Let's take a seven (7) minute break starting now. Thanks.

--- Upon recessing at 2:35 p.m.

--- Upon resuming at 2:46 p.m.

THE FACILITATOR MERCREDI: Okay, I believe the AANDC team was caucusing and I hope that we can start off with Daryl?

MR. DARYL HOCKLEY: Daryl Hockley. In answer to -- to the question that was raised, the -- the answer is yes, that the thermosyphons will continue to cool the ground, even after the passive system is -- is disconnected.

I was asking if we had any simulations that could put any numbers on that. We -- we have simulations that put some numbers on that, but nothing that's been updated since we have the new results from the FOS, so we -- we won't present any predictions as to how much cooler it will get, but, yes, in principal, it will continue to get colder even after the minus five (5).

THE FACILITATOR MERCREDI: Okay. Were there any followup questions, Ed?

MR. ED HOEVE: Not a followup question, but a new question. So if we're ready for that, we'll --

MR. TODD SLACK: Can I ask a followup question?

THE FACILITATOR MERCREDI: Yeah, we'll just finish this line first. Todd?

MR. TODD SLACK: Todd Slack, YKDFN.

Well, if that's the case, why wouldn't minus five (5) then be the trigger for future adaptive management? If it's going to continue to cool, that seems to me like the ideal commitment to make at -- at this point.

MS. LISA DYER: Lisa Dyer, Public Works.

I think there's some really good questions coming up here and we've heard that kind of thresholds and adaptive management are something that's really important to the parties of the EA.

And so where we are right now is we are currently developing those environmental management plans, and these thresholds will be developed as part of these. And there are some technical thoughts right now on what those thresholds could be. We hope to be able to sit down with parties and look at what is the -- this is something we're hoping to do in consultation with interested parties. And this will come out more when we talk about on Friday the environmental management system and how we see it fo -- unfolding.

So we're not saying right now we're at a stage in design where we have done a lot of work. We have some good ideas of where we're going. And the next phase is us moving forward is that we do need to be firm on what these thresholds are, and we are looking for input on what these are.

So there's some technical thoughts right now. But, also, there's a important element of what is kind of the needs and concerns and the values of the community to make sure that we're on the right track and monitoring those things that demonstrate to the public that indeed we are meeting the objectives that we set out.

So we may not have all the numbers and details right now, but we are going to be laying out to you our commitment to get there.

THE FACILITATOR MERCREDI: Todd?

MR. TODD SLACK: And sorry, Ed. I think that was Ed down there. A related question in terms of one (1) last followup, I guess.

So if the measures of success between implementation and operations or how -- whatever, we should agree on what jargon we're going to use here, but if that measure of success is minus five (5) for successful implementation, what monitoring scheme -- or what is the monitoring within the block going to look like?

Because if we're saying minus five (5) on just the surrounding, that's one (1) issue, or minus ten (10) in the surrounding, minus five (5) within the block, how do we know what that will be?

MS. LISA DYER: Lisa Dyer, Public Works.

I'm going to actually just kind of start off here, is that again following in the theme that were are in the bi -- we are kind of in the process of design, so all the monitoring points have not been fully defined, although conceptually we know what we want to monitor and what we're monitoring for.

So I'm going to ask Daryl to touch upon kind of what our monitoring approach would be and ask if -- if Mark or David can follow up on that at all. So I'll hand that off to Daryl at this point.

MR. DARYL HOCKLEY: We have thermistor strings -- in the case of Chamber 10 we have thermistor strings around the chamber and within the arsenic trioxide. That -- that is an approximation of what would happen at the others.

But the -- the question's a very good one and -- and the -- it actually co -- comes to -- gets to the heart of why it's very difficult to pick a number: minus five (5), minus six (6), minus twenty-two (22). They're all totally meaningless until you've defined a point where you're monitoring it, a method to monitor it, a frequency to monitor it, acceptable variation from that point.

There -- there's a lot of those questions have to be worked out, and -- and that's -- I guess that's part of developing the environmental management plans and the appropriate adaptive management plans that -- that go with them, so.

I'd just point out someone pointed to me in the break that if you look at some of the curves I showed up there and -- and the response of a power failure on some of those curves, how there's that quick -- quick response to changes, that's -- that's not going to be the case in a passive system, but it's an indication of variable a single monitoring point can be and how misleading a single monitoring point can be.

That's why these things need a lot of really careful consideration.

THE FACILITATOR MERCREDI: Okay. Lukas...?

MR. LUKAS ARENSON: Yeah, Lukas Arenson.

I've got kind of a related follow-up question. Sorry, I didn't want to jump your question. But in your assessment you're saying if you have a failure of your passive system or whatever, if everything stops, it takes twenty (20) years to thaw.

But now you're saying you're not having a criteria of what you start with in terms of the minus five (5) or minus ten (10). What was your criteria in order to come up with a twenty (20) year thaw period?

MR. DARYL HOCKLEY: Daryl Hockley.

The -- the model was run -- I can -- I can check this for you, but I believe it was run for five (5) years of active cooling and twenty-five (25) years of passive cooling and then it was assumed that the -- the thermosyphons were suddenly completely ineffective and -- and it moved forward from then.

So you're right, it -- had we had thirty-five (35), or fifty (50), or a hundred (100) years of passive cooling it might have started off a bit cooler and would have taken a bit longer to -- to thaw.

Had we had slightly less passive cooling it may -- it may cool somewhat shorter, but the -- the real driver of course are on -- is the -- I think, Lukas, you're probably very well aware that the real driver is how much water is in the rock and the assumed porosity and water content of the rock; that's a more influential variable than -- than any of those other model influences, so.

And the thermal conductivity and the heat capacity and other things that we're still determining through the -- through the FOS now.

THE FACILITATOR MERCREDI: Lukas, did you have any other questions?

MR. LUKAS ARENSON: No, that's okay for now.

THE FACILITATOR MERCREDI: Okay. I actually had a -- a question on that. Did the FOS look at -- at how fast things would -- would thaw, and would that at all help?

As in you look at basically turning off a syphon or -- and then -- and then seeing how quickly things would start to heat up?

MR. DARYL HOCKLEY: At the moment that's not part of the plan that -- that we have discussed that as a possible use of the FOS facility in future. I think we can say that it's -- that the physics of -- of freezing and the physics of thawing are -- are the same physics so that the -- the data we collect upon freezing can give us very reliable predictions of -- of thawing.

But you're right, it would be nice to -- to have a demonstration of that at some point and the FOS would allow us to do that in the future.

THE FACILITATOR MERCREDI: Okay. And, Todd...?

MR. TODD SLACK: Sorry, Ed. I -- I -- I'm feeling a great deal of discomfort with this line of inquiry here, because here we have this relatively large DAR document that -- and -- and we have this -- any number of Information Requests, what was it, a hundred and fifty-six (156), or what -- however many, and now we're -- we're here and we still don't know what a successful remediation will be.

The indication is that you're -- there's going to be a frozen block established, but we have no metrics by which to judge whether that succeeded or whether it's failed.

Now there's been discussion that this is gonna come at some later date, from numerous different folks who have answered. Can we get a commitment in terms of this EA, when that -- and like this is for the frozen block, the most studied aspect of this DAR, can we get a commitment in terms of when those measures of -- quantitative measures of success will be established and be put in front of the Board and the parties to evaluate?

MS. LISA DYER: Lisa Dyer, Public Works. I -- I guess, Todd, there's two (2) things, because we've talked about the minus ten (10) for the frozen wall; we've talked about the minus five (5) for the block, and then we've talking about kind of long-term for adaptive management.

So I guess -- I'm -- I'm just trying to clarify whether you're looking at the short-term kind of criteria that establishes the frozen block; are you looking at long-term criteria for adaptive management?

MR. TODD SLACK: Todd Slack, YKDFN.

Lisa, you've -- you've captured it exactly right. The initial question is: Is this remediation going to be successful out -- even from INAC's proposal?

Like, what are the metrics will you use to -- to say yes or no, and not just the parties, INAC's own staff, and we'll get to this on Friday, are going to be the ones to say whether this has been successful or not, in addition with the -- the Boards.

There has to be transparency and clarity to success for the initial -- that barrier in between implementation and operations, is how I've been describing it, and that has to occur at this EA phase.

(BRIEF PAUSE)

MS. LISA DYER: So, Todd, we have mentioned the minus ten (10) criteria for the frozen wall. We have min -- mentioned the minus five (5) criteria for the frozen block.

Is that -- so does that provide clarity for you?

MR. TODD SLACK: Is -- is that the -- the INAC statement of success? Because it -- we're dithering around this, but in terms of the implementation, in terms of establishing a frozen block, is that what INAC is saying is going to be successful? Pardon me, AANDC.

(BRIEF PAUSE)

MR. TODD SLACK: And, so -- sorry, I'll add something here, too. Like, we have to have some initial point from which we judge success.

That can be refined at a later date based on the involvement of the different parties, and the different aspects of the proponent, and the -- the regulator, but at least tell us like what the -- what the go -- what the target is, eh.

(BRIEF PAUSE)

THE FACILITATOR MERCREDI: Giant Team, do you need a little more time to caucus? Yeah. Okay.

MR. TODD SLACK: If it would help the Review Board, if they wanted to take this away and we can come back -- well, may -- maybe not.

If -- I'd be happy to take this as an answer, you know, tomorrow, but this is a critical issue, and, you know, this is going to come up in terms of what the target of success is every day this week, so.

MS. LISA DYER: Yeah. No, thank you for that, Todd. We'll actually -- we'll chat with this, and -- and present on this tomorrow morning.

THE FACILITATOR MERCREDI: Yeah, we'll -- we'll put that on our agenda as something to address right off the bat for tomorrow morning.

Did you have a follow up to that, Adrian?

MR. ADRIAN PARADIS: No, I was just pointing to ...

THE FACILITATOR MERCREDI: Mr. O'Reilly?

MR. KEVIN O'REILLY: Thanks. Kevin O'Reilly, Alternatives North. I think I might be able to move this forward one (1) more bit, but -- and what -- I think I -- we would support everything that Todd said. We want to have a much higher comfort level in what's going to be in this EMF thingy.

If you don't know what those specific trigger end points, performance criteria are, you need to describe how you're going to get there in sufficient detail that -- that we have some comfort level with that.

And you also have to describe how you're going to involve and engage people in doing that because it hasn't happened to date. When you earlier talked about trust, I don't want to go back there, but it's going to keep coming back, and again and again and again, because people have not been involved or engaged in this.

So, you need to describe how you're going to get there in terms of developing this plan if you can't identify the specific triggers. It's like you need a -- you need a reclamation research plan as they call it when you prepare an ICRP, an Interim Closure Reclamation Plan. You need to describe how you're going to identify what those closure criteria are, what additional pieces of research you need to do, a time line for doing it, and how you're going to involve us in doing that.

Because if it's going to be -- if it's going to come out the way that you -- you chose, the frozen block, I don't want to have any part of it, quite frankly.

So you've got to find a better way to in -- involve and engage us, and not going back to that -- that process that you used for selecting the -- the frozen block, but that's where you need to go, is you -- you have to have this plan, framework, whatever you're going to call it, with a detail of how you're going to get there, with the specific research tasks, a timeline for it and how you're actually going to really, truly, meaningful (sic) engage people to get there.

THE FACILITATOR MERCREDI: Yeah, that was --

MS. LISA DYER: I -- I didn't hear a question in that.

THE FACILITATOR MERCREDI: But I'm sure he got a -- his point across. Okay. So on that, we'll leave that for tomorrow morning.

And, so for that, Todd, that -- yeah, I think we've addressed that and so we're going to Ed for the next line of questioning. So long as everybody else is okay with -- with every question around that.

THE FACILITATOR MERCREDI: Ed, go ahead.

MR. ED HOEVE: Ed, on behalf of Alternatives North. In the DAR, the wetting the dust is introduced basically as a concept and they're were some Information Requests around that, and I've kind of reviewed them.

And -- it's -- you've attempted to address it, but it -- it's left me with still some questions. And, so I guess there's probably two (2) questions here.

The first would be, could you state again, or help me understand to -- to what extent is saturation important in your frozen block concept or what degree of saturation are you requiring? So that's the one (1) question.

The second is, what's your current understanding of the process of wetting? What investigations are you doing in that way? Are you doing any kind of testing?

I don't believe that's part of your -- the freeze optimization study, it's -- I think it's outside of that. Is there any lab scale testing going on?

There was a comment this morning -- continue to investigate the geotechnical aspects of wetting the dust. I'm not sure if that involves any trials? So, I guess that's it. What's your current understanding of the process?

MS. LISA DYER: So there were a lot of questions there, Ed, so thank you for that. I guess -- it's Lisa Dyer here, again.

And I guess the first question -- I -- I guess the questions all surround wetting and what is the proposed plan for wetting and what testing has been done, or is proposed?

MR. ED HOEVE: It's Ed, here. There were -- that's one (1) of the questions. And the other one (1) was, what is required in terms of saturation for the frozen block to be successful, or what do you consider important for level of saturation?

MS. LISA DYER: Excellent. Thank you. I'm going to ask Daryl if he could answer the question on saturation and then maybe we can follow up by talking more about plans for wetting.

MR. ALAN EHRLICH: I -- I can't resist the low hanging fruit. But, Lisa, are you introducing the idea of wetting planning?

MS. LISA DYER: Lisa Dyer, here. I'm not going to answer that question.

(BRIEF PAUSE)

MR. DARYL HOCKLEY: Information -- Daryl Hockley. Information Request number 2 from the Review Board dealt with this subject, as well. And I think our answer to that is fairly thorough and the wording's fairly careful. The distinction is between wetting the dust and saturation of the dust, with saturation implying a complete thorough wetting and wetting allowing for something less than complete and thorough saturation.

Given that the objective of adding water to the system is to create a thermal inertia, it's not, in our opinion, necessary that that water be completely uniformly distributed throughout the system.

It would not be a good idea if that wetting was supposed to achieve 80 percent wetting and all 80 percent of it was in the bottom of the chamber and none on the top. That -- that would not provide the thermal inertia where if it's needed near the top.

So clearly there are extre -- there are some extremes in the -- in the -- under the term "wetting" that -- that would be unacceptable. The degree of wetting that's needed or the -- yeah, the degree of wetting that's needed is -- is -- we don't know that yet. It's, again, something that needs to be modelled when we -- when we have -- when we have results from the FOS.

Our modelling to date indicates that anything better than the extreme of having all 80 percent of the water on half of the chamber and none on the other is -- is adequate, but we would like to confirm that when we have the better data from the -- from the FOS.

That's the first question.

THE FACILITATOR MERCREDI: Okay. And Alan had a question for that, as well.

MR. ALAN EHRLICH: Thanks, Paul. I've actually got a few, and they -- they all relate to the -- the wetting of the dust and the saturating of the dust. The Review Board's number -- IR number 5, one (1) of the things it asked about was what were the opportunity costs of saturating the dust. At this point, we're still talking about saturation.

And when we say "opportunity costs," the question is specifically about futures foregone, alternatives that you can no longer explore because you've chosen to do one (1) thing and not another one (1).

But the answer that we got in the IR --

and the reason I'm bringing it up here is because I just want to avoid a slue of unnecessary IRs on a subject that could be put to bed perhaps tidily now.

So we asked about the opportunity cost of saturating the dust. And the response we got was, Wetting of the dust would not lead to additional costs in dust distract -- extraction. Yeah, but my point wasn't so much about the financial cost of this. I'm wondering about futures foregone and options that you lose by wetting the dust.

Can you please comment on -- on what are the opportunity -- I mean, there's tradeoffs in every decision, and what are the opportunity costs you lose by wetting the dust as opposed to not wetting it? That's the first of a few questions I've got in this area.

(BRIEF PAUSE)

MR. DARYL HOCKLEY: Daryl Hockley. We -- I think we didn't answer the second question that was presented earlier about the future of the wetting. Do you want us to do that first, and then come back to this question, or...?

THE FACILITATOR MERCREDI: Yeah, definitely, I'll keep him under control. So, yeah, we'll go to the second question first.

MR. DARYL HOCKLEY: Yeah, okay. So I think the -- the second question was: What -- what are the further plans for -- for work in this area? The, I guess, te -- testing of the -- of the dust to determine physical properties that -- that could be used to model the wetting process, modelling of the wetting process to the extent possible, and then laboratory tests at the -- as yet undetermined, but the picture I think in most of our minds is the aquarium scale, so not -- not a huge scale and not too tiny, but something that -- that might be wide enough to show flow fingering effects, ice segregation effects, those sorts of things, and seeing if any of those things do materialize in that system.

From there it -- it -- as you're probably aware, some of those phenomena would force us into a very different type of modelling, a much more complex type of modelling. And -- and we anticipate doing that again with the objective of constraining the range of possibilities rather than coming out with a precise prediction of where the water would go at -- at large scale.

That's the extent of our plans at the moment for -- for the work on the wetting.

THE FACILITATOR MERCREDI: Yeah. Ed, did

you have any followup to that?

MR. ED HOEVE: Well, maybe just a bit, and maybe it's -- I don't -- I'm not fully familiar with how this process goes, but that's stuff you'd be doing through detailed design then, I presume? Is that -- I -- just what -- what's the timing around that, or in -- in cont -- in context of your Implementation Plan?

(BRIEF PAUSE)

MR. DARYL HOCKLEY: Yeah, the -- the honest statement is we're a bit behind in that. We -- we'd like to have -- have been further ahead than we are on it now. We -- we have been doing some -- some modelling and the -- the -- the driver, I think, is going to be that one (1) of the main factors we'd have to control, a combination of wetting and freezing, is the distance of the freeze pipes from the chambers, which is something that, as you saw this morning, David's team is already looking at configurations in terms of developing cost estimates and that sort of thing.

So -- so we -- yeah, we -- we want to get on with it in the next couple of months, make some headway on it. And -- and a bit more fulsome answer, I -- I guess some of us believe that there are easier ways to approach this problem, that the actual -- the complexity of the -- the combined wetting and freezing process, we recognize how complex that is, and it's probably several PhD theses to -- to -- to model that.

But on certain rates of wetting we believe we could overwhelm the freezing. Certain various slow rates of wetting are -- are going to be dominated by the -- by the freezing.

So we think that the bulk of the -- the -- the dust can be wet without necessarily a full understanding of what happens at that freezing/wetting interface. If we can control the location of that freezing/wetting interface, moving it outside the dust into the rock, or right to the edge of the dust, let's say, then we're in a -- then we're in -- then we solved the -- then we solve the -- the modelling problem by an engineering measure.

How we would do that is by moving the location of the -- of the freeze pipes, which is a decision coming up soon. So that -- that's how we see them being linked to the design process going forward.

THE FACILITATOR MERCREDI: Okay, Ed. And while we're on that, Lukas, you had a question?

MR. LUKAS ARENSON: Yeah, it's just kind of a followup. It was partially -- sorry, Lu -- Lukas

Arenson. It was partially answered already now, so that you're still investigating how much off the dust is actually still unfrozen when you start sat -- wetting it, 'cause I think that's probably -- when you -- when you look at your -- your test results it looks as if most of the dust is actually already at sub zero degrees, even within the frozen state and now you've tried to saturate something that's already at sub zero, so basically your nozzle will just freeze right away and you're not getting any water anywhere.

But that seems as if this is going to be of intense future study if I'm correct, or could you confirm that, please?

MR. DARYL HOCKLEY: Daryl Hockley. Yeah, that's exactly what we're -- we're interested in, in determining if we need to control that first, and -- and if we do need to control it, how do we -- how do we control that.

I'll just point out the Chamber 10 is a particularly narrow chamber. And again, our objective was to study the freezing in the -- in the rock, so we -- we didn't concern ourselves with the wetting process in the design of the FOS, right.

It -- it doesn't mean that we would have that problem necessarily on wider chambers, or with freeze pipes operated further -- further away, so.

THE FACILITATOR MERCREDI: Jack...?

MR. JACK SETO: Hi, this is Jack Seto on behalf of the Board. Regarding your FOS study, can you -- I wasn't clear on the dimensions of the -- the chamber that you were analysing, or that you had tested.

(BRIEF PAUSE)

MR. JACK SETO: I'm more -- sorry, this is Jack again. I'm more interested in the depth of how high that chamber is.

(BRIEF PAUSE)

MR. DARYL HOCKLEY: Daryl Hockley. We have it as a maximum height of 55 metres, and the distance from the ground surface to the top of the chamber as 30 metres.

MR. JACK SETO: It's Jack again. Now, what do you expect are your maximum thermosyphon lengths to be, or depths to be for -- for not this kind of chamber, but for all -- any of the chambers?

(BRIEF PAUSE)

MR. DARYL HOCKLEY: Again it's Daryl Hockley. It -- it needs to be confirmed with the modelling, et cetera, but to date we've been assuming that we go 10 metres past the bottom of the lowest extent of the -- of the drifts, not the chambers but the -- the drifts.

Darren showed you the -- the complex drifts, and some of them were -- were coloured bright red. Those are drifts that we believe are full of arsenic trioxide, and the -- the planning to date has been to get thermosyphons at least 10 metres past the bottom of those.

Again, it depends on -- on width and others, and it needs to be optimized. It might up being fifteen (15) in some cases, or who knows.

MR. JACK SETO: It's Jack again. Now, the reason I ask this is -- I -- I think you mentioned this earlier, normally the thermosyphons -- past thermosyphons are -- have been constructed, you know, to -- more for -- for shallow purposes. You know, 20/30 metres, typically the maximum.

Now, I understand in 2002 you -- you've installed a 100-metre deep passive thermosyphon and monitored it. I'm not sure if you had reported it, the results, and -- and sort of confirmed or -- or commented on -- on the performance. I know that in a DAR you -- you had mentioned that -- it was mentioned that it was performing as expected.

I guess the question is, because I -- I think, you know, to -- to install these passive thermosyphons to 100 plus metres, again that's sort of beyond the current realm of -- of what we've been doing for engineering purposes. It's just to provide some -- some comfort, that this system will work as -- as intended.

MR. DARYL HOCKLEY: Daryl Hockley. The -- the test thermosyphon was installed in 2002, was it, yeah, for precisely that purpose. We -- we had a concern that the carbon dioxide cycle would occur only over a section of that -- that distance. The -- the monitoring data that we've collected so far indicates that it's operating over the -- the full length.

We -- we did publish at least one (1) paper on that, and I believe we have reported it. There was an update, which -- which may or may not be in here, but -- but the data are looked at annually and -- and it -- we've never seen a problem with it short-circuiting.

Similarly, the -- the Chamber 10 thermosyphons, although they've been operating mostly in -- in active mode, they did operate in passive mode for some time, and there's - - there's no indication there of any problems. There are thermistors on the -- on the bottom of some of those, and -- and at lengths on them, and we're seeing uniform cooling throughout so far.

MR. JACK SETO: Okay. Thank you there.

THE FACILITATOR MERCREDI: Okay. Alan...?

MR. ALAN EHRLICH: Thanks. A couple more questions having to do with the -- the saturation. In Review Board IR number 13, the Review Board asked for:

> "A stability analysis to prove that cavities will remain stable during perimeter freezing saturation of dust and freezing of dust."

And it asked the Giant team to provide -- to:

> "Describe drainage scenarios, and other potential releases of arsenic in the event of a collapse or a bulkhead failure."

First question is -- at the time that -- that the team responded, said that the -- you hadn't yet had an opportunity to identify the potential impact of dust consolidation yet.

Is that still the case? Have you had any opportunity to figure out what effect dust consolidation could have on your -- on your plan?

MR. DARREN KENNARD: Darren Kennard, Golder Associates. It's somewhat related to the question of -- of wetting and -- and we talked about the potential for lab or bench scale testing to understand the potential amount of consolidation.

Of course, consolidation of dust would -- could have potential impacts on stability of the openings. And also, it -- it could impact our choice of backfill that we put in -- put in the -- the stope from a mitigation standpoint, as you point out in your question.

So, at this point our -- our design thinking, we are trying to incorporate, you know, a form of consolidation that we think could happen, but some of that is a subject that -- or needs to be the subject of an assessment of how the dust behaves in a -- in a lab-scale test.

MR. ALAN EHRLICH: Thank you. In response to Review Board IR number 15, we asked -- a detailed enough question so that I don't want to go into too much detail, but one (1) of the things we said is:

"With respect to holes and voids in the chambers during freezing, please define scenarios that en -- that include the

presence of a variable number or
section of undetected or unpluggable
holes."

And you talked a bit about undetected holes. You said, Well if the water balance -- the amount of water we're treating changes, we're going to know more water's coming out. You didn't talk much about unpluggable holes.

So, my question is: What if you do identify leaks in the way that you've mentioned, and they turn out to be unpluggable? I mean, can you get at them, do you have any management options there?

(BRIEF PAUSE)

MR. ALAN EHRLICH: I -- I -- I'd be happy -- I can read out to you just -- if it'll take less time than finding the IR there, but. What -- what your response was, originally was that:

"Unknown water pathways in the rock may
be encountered during the execution of
the freeze program. The plan is to
back -- backfill and plug exits -- plug
known exits for water. If leaks are
detected during drilling, and the water

flow is such that the frozen shell does
not stop it, then additional measures
will be considered, such as grouting.
A plan will be developed as part of a
future design..."

So, you said what'll happen if you've measured them, and you said, Additional measures will be considered during grouting. But the question said, What happens if you run into leaks in there that are unpluggable.

Do you have other ways of stopping the flow or making the freezing work?

MR. DARYL HOCKLEY: Daryl Hockley. The -- the -- the point of the -- the -- the first response is to just make it clear that, by far the biggest openings are -- are the actual drifts -- access drifts themselves. And that's what the plugging program is all about. And ensuring the stability of the ground below that is all -- all part of plugging what we know are the -- by far the largest openings.

The other form of openings that could be present are drill holes. Drill holes were grouted during -- during development of the arsenic trioxide chambers. And certainly, any -- any holes that -- that we have drilled or will drill will -- will be grouted.

The -- so, what remains as a possible pathway for water is fractures in the rock or an undetected drill hole.

Fractures in the rock are likely to have apertures of fractions of an inch. The -- the water -- in this case, we'd have a 10-metre wide frozen zone at minus 10. And as you saw from those contours earlier, that means probably a twenty (20) or even wider zone at minus 5, and et cetera, et cetera. So water would have to flow through this very narrow aperture for a very long distance before it could get out of the chambers.

It's -- the -- the source of water is going to be limited by the very low hydraulic conductivity of the dust on the other side. The water can't get through the dust very fast, so it's not going to get to the edge of the aperture very fast, so we believe it's going to travel very slowly a very long distance through these apertures and -- and we believe it will freeze before it gets to the other side.

MR. ALAN EHRLICH: Okay. Well, and that foreshadows my -- my next question pretty well, and I thank you for that. That's helpful. In another part of the response you point out that the rock within the freeze perimeter will be cooler than minus 10 and water in any fracture would eventually freeze.

And the part that I didn't understand is: Is the freezing just a function of temperature? I mean, it occurred to me that, you know, velocity and volume are going to be relevant when it comes to the freezing time. Now, you've -- you've partly addressed that with what you just said.

I was wondering if you want to add anything to that?

MR. DARYL HOCKLEY: Yeah, it's undoubtedly the case that if you had a large enough -- Daryl Hockley. If you had a large enough fracture and a large enough flowthrough that it would not freeze. That -- that is the -- where -- where ground freezing projects have had problems, they're usually related to -- to uncontrolled flow of water through them. So that's undoubtedly true.

But, again, we -- we think the -- the fractures are small enough and the rate of supply of water is slow enough here that that's not going to happen.

There are rules of thumb that people use for these things. I don't want to quote them because I don't particularly like them, but we are well within those rules of thumb here and to -- to the sorts of flow rates that we're -- we're talking about.

MR. ALAN EHRLICH: Okay, thanks. And, Todd, do you want to do a followup on that? I've still got more questions on the subject, but is yours specific to what you just heard?

MR. TODD SLACK: Yes.

MR. ALAN EHRLICH: Okay. So I got to -- I'm going to hand the controvert over to Todd.

MR. TODD SLACK: Thanks, Alan. And my apologies for the interruption, but one (1) of the questions I had was directly related to this. In the research leading up to this one (1) of the analogies that we came across was the Scar (phonetic) Lake. They also used the frozen wall situation there, and it led to essentially a $1.7 billion oopsie.

Now, can you guys provide comfort that you have considered this, the failure of that operation, taken lessons from that, and assure the parties here that that's not going to happen?

MR. DARYL HOCKLEY: Yeah, we're very, very well aware of that -- Daryl Hockley -- very well aware of that project. The -- the most significant difference between that project and our project is that the -- the freeze wall in that case has, I believe it's, 750 pounds per square inch of water pressure on the other side of it. So it -- it's a freeze dam.

It's -- it's -- we -- we're not -- we're not -- how much is that? Can anybody quickly tell me how many metres of water head that is? Four hundred and fifty (450) metres of water on one (1) side of that wall. That's what's being held back, and that's a very significant potential for -- for problems.

We don't have that situation here. We -- we have initially no water on either sides when we're creating the freeze wall. Then when we apply water we apply it completely under control. We -- we have the ability to shut it -- shut it off or speed it up if -- if there are any -- any changes.

And so I think there are a lot of lessons to be learned from McArthur River, but I think the particular problem that -- that you're referring to is -- is not something that's -- that's in the cards for -- for our project.

MR. TODD SLACK: Thanks.

MR. DARREN KENNARD: Darren Kennard, Golder Associates. Todd, I'll just clarify that the failure at Cigar Lake that caused the -- the major in-rush was a wave from the frozen zone. And they happen to have a groundfall that connected into a major highly permeable aquifer that is under 450 metres of water head. So the hydrogeological situation at Giant is very different than Cigar Lake and it was in the failure of a freeze wall. It was connection physically into a major aquifer. There's a slight difference.

MR. ALAN EHRLICH: Thanks, Darren. It's Alan again. And I'll get back briefly to the McArthur mine thing in a second, but I still want to try and work my way through the response to Review Board IR number 15.

One (1) of the points you made in that was -- this had to do with potential leaks. And you mentioned that:

> "Current information indicates around the arsenic chambers and stopes, that the rock is generally competent with low permeability."

So the word "generally" kind of made me pause. Is -- are there exceptions? If so, what are they?

MR. DARYL HOCKLEY: Daryl Hockley. To my knowledge, there are no known exceptions. It's hard to get a geologist to -- to go anywhere beyond generally competent though. It's -- the -- the rock is -- is -- I think most people would say it's very competent. But I think the -- the -- when -- with water flow you talking about a -- if there is a 2-metre wide section that's wide open, that -- that could be a problem.

So I -- I don't know if any amount of geological investigation could ever rule out some -- some discontinuities.

MR. ALAN EHRLICH: That's fine. And I have no doubt you used a generally competent geologist for that too, so it's -- that's okay. Now this other one, you -- it sounds like you've kind of answered this before, but with re -- regarding Review Board IR number 5 -- actually, before I get to Review Board IR number 15, this is Cesar Oboni is an expert --

MR. CESAR OBONI: Cesar Oboni. I think I'm quoting Darren here when you mentioned this morning that it was homogeneity of the rocks.

Am I wrong?

MR. DARREN KENNARD: Darren Kennard, Golder Associates. I mean the point of non-homogeneity to the rock was -- was possible -- a general comment -- the fact that, you know, when we do rock mechanics, stability analysis, you know, there's no -- it's not a defined engineered material like steel or concrete, so there is some homogeneity in the rocks.

But that being said, Giant Mine has generally strong, competent material.

MR. CESAR OBONI: Thank you.

MR. ALAN EHRLICH: Thanks. In response

to IR number 16 -- Review Board IR number 16, you mentioned that the final methodology of wetting the chambers will take into account expansion effects.

And from some of what I heard earlier today, it -- it didn't strike me that the final methodology of wetting the chambers had been entirely established.

Is that fair to say?

MR. DARYL HOCKLEY: Daryl Hockley. Yes, that's fair to say. There's quite a bit of work to be done on -- on exactly how the wetting would take place.

MR. ALAN EHRLICH: Thank you. In response to Alternatives North IR number 8, and to some stuff that we asked too, it was not entirely clear if you were planning to use cemented or uncemented backfill. And then I saw in the presentation today, I think the phrase was "lightly cemented backfill" or something like that.

So the -- the -- the idea that came across to me was you have decided to use a -- a somewhat cemented backfill. That wasn't the case when you were filling out your IRs and it sounds like the design has come along a bit.

Is that fair to say?

MR. DARREN KENNARD: Darren Kennard from

Golder Associates. I think that's a fair comment. Those assessments are ongoing and we -- we foresee using variable cement content in the backfill, depending on the specific situation.

The term "lightly" is meant to mean that in most cases most of the backfill will require limited cement. Where we need strength for stability reasons we will include more cement.

MR. ALAN EHRLICH: Great. Thanks. In terms of the McArthur Mine, in response to Alternatives North Information Request number 9, you point out that there are differences that suggest that applying the McArthur River criteria to the Giant Mine ground freezing will be conservative. For example, the higher water pressure and some of the stuff that we just heard you respond to Todd with.

The thing that jumps to my mind immediately was the McMarth -- McArthur Mine is not proposed in perpetuity, and that freezing wall is not intended for perpetuity.

Bearing that in mind, would you still suggest that what you've seen there is a highly -- leads to a highly conservative position on this -- on -- on this project? Would you like me to reword that or you're clear on that? Okay.

MR. DARREN KENNARD: Darren Kennard, Golder Associates. I just wanted to clarify one (1) thing. Todd's question was in regard to Cigar Lake. Is that right?

MR. TODD SLACK: Yeah.

MR. DARREN KENNARD: Yeah, okay. They're two (2) different mines.

MR. ALAN EHRLICH: Yeah, the --

MR. DARREN KENNARD: So Cigar Lake -- Cigar Lake was a mine that had a -- a flooding event, and you're referring now to some discussions on McArthur River as an analogy for a freeze wall.

Is that correct?

MR. ALAN EHRLICH: That's -- that's roughly correct. I heard McArthur mentioned in -- in -- partly in response to the Cigar Lake stuff. Maybe I misheard. But -- but putting aside Todd's earlier question there, in -- in response to the Information Request by Alternatives North, the Giant team said, Well -- the -- the question was pretty much, you know, how -- how -- are there other examples of using this kind of thing for this.

And the McArthur Mine example came up and you pointed out that, you know, this is a -- a much shallower application than at McArthur Mine. There are no heat sources present in the ground at Giant Mine and the initial temperature is much cooler.

So these things make this a much easier application of a freeze wall than has been done successfully at McArthur Mine. At least that's what I got out of the IR.

The one (1) thing that's quite different between this and McArthur Mine is this one (1) is supposed to work forever and ever. Bearing that in mind, would you still say that the McArthur Mine situation, the fact that it works there, still bodes very well and can be used as a basis for comparison for what you're proposing?

MR. DARYL HOCKLEY: Daryl Hockley. Yeah, the -- again, the -- the minus 10 over 10 metres is a -- is a criteria to define the -- the completion of the frozen shell such that we would start putting water in -- inside it.

That's why it's a particularly -- that's why the McArthur River analogue is particularly good. The McArthur River freeze wall is intended to hold back water so that people can mine on the -- on the other side of it.

Over the -- over the very long term we are -- we will be talking again about the frozen blocks rather than the -- the minus 10 frozen walls. Yeah. The -- the minus 10 fro -- frozen criteria is not intended to apply to the -- to the long term.

MR. ALAN EHRLICH: Okay, thanks. That helps. I'm almost at the end of my -- my short list of questions here.

I -- I've got two (2) more. One (1) of them was in response to Review Board IR number 8. You talked about the possibility -- okay, our -- our question had to do with -- had to do with the freezing and -- and risks if the frozen wall doesn't seal off completely.

And at some point, you, in response 2, you mentioned that:

> "Slow moving water entering a crack would freeze quickly, and ice build-up would seal the fracture. If a more energetic blending of the dust was used during the saturation process, there would be a short-term potential for a larger quality -- quantity of seepage."

Could you talk a little bit more about an energetic blending of the dust during the saturation process? I didn't understand exactly what was meant by that.

Are we talking about -- about releasing

water under a higher pressure into the chamber or -- or what does that phrase mean?

MR. DARYL HOCKLEY: Daryl Hockley. Yeah, that's exactly what -- what's meant there. The -- at this point, as -- as mentioned earlier, the -- the method for wetting the -- the dust isn't -- isn't clear.

It ranges everywhere from simply allowing water to infiltrate from the top to adding some energy to mix the water into the dust, and the -- I think the -- one (1) of these things we talked about, a borehole mining device, which is a high-pressure jet that -- that could in theory be used to distribute water around the -- the chambers.

We're not proposing to do that. We're -- we're simply saying that if that was one (1) of the measures considered, it would have different implications for release of water.

You -- you could have a -- in that case, you can deliver water right to the rock face pretty quickly, and it would flow down these cracks pretty quickly. However, it would be a short-term thing. You would only be running that borehole -- that -- that jet for maybe a day or something like that. May -- may -- I don't know, maybe a couple of weeks, but -- but for a short period of time.

So the -- so in that case the -- the system would eventually settle down and further deliver of water into that fracture would be controlled by the hydraulic connectivity of the dust -- would be at that slow rate, and -- and would -- would freeze.

MR. ALAN EHRLICH: Thank you. The last little question I have in this line here is a response to Review Board IR number 7, which was looking at the effects of -- potential effects of instability on freezing, referring to the instability of crown pillars.

And our first question was for you to:

"Describe the potential effects on the stability of pro -- crown pillars in the stopes due to the saturation or freezing of the arsenic trioxide."

And that also kept in mind the possibility that the block might need to be thawed at some point in the future.

And the response that you gave was a little bit unclear in that you talked a bit about:

"The crown pillars at most risk are located in the B1 Pit."

And you said:

"There the voids beneath the pillars will be backfilled, and fill will be placed above the -- the pillars."

But you didn't get into much detail about -- you said the B1 Pit is the -- the one at most risk. Are there other ones at high risk, and are you planning to do the same thing for that? I think I've heard that the answer is, Yes, but I'm just not completely clear on that.

I mean, I understand why you chose the most extreme example to illustrate the point. I'm just trying to figure out how applicable that is backward to slightly less-high-risk pillars.

MR. DARREN KENNARD: Darren Kennard, Golder Associates. Some of our stabili -- our updates, or our review of stability assessments were ongoing at the time of this. We're now reaching some -- I -- I would say more stronger conclusions of which arsenic stopes require some mitigation prior to wetting and freezing.

And, you know, they -- they're very similar to the conclusions that -- that were reached previously, that some -- some of them do need some work done.

Others, from a stability assessment, at this point we don't think require backfill or a mitigation required before wetting and freezing. But we

-- we will take into account the potential impact.

We don't -- I think as we said in our response, we don't expect saturation to be -- to -- to be a big influence on stability, but you know, things like frost jacking of wedges off the sides of a stope could potentially impact. And any arsenic stope or chamber that we feel is -- we're uncomfortable with the stability now or even potential under future loading conditions like frost jacking, that we -- we would -- we would suggest that those should be mitigated prior to remediation.

MR. ALAN EHRLICH: So, which ones did the recent study determine were unstable enough to require backfilling with fill placed above the pillars?

MR. DARREN KENNARD: At this point, the specific arsenic stopes include arsenic Stope B2-12, 13 and 14, which we actually think are all -- it's actually one (1) combined stope. Arsenic stope B2-08. The stope underlying arsenic Stope B2-08, which is non-arsenic Stope B3-06. Also some of the non-arsenic stopes adjacent to arsenic Stope B2-12, 13 and 14, we -- we think that needs some work.

And also non-arsenic Stope C5-09, which sort of underlies arsenic Stope C2-12, and also Chamber B9. Those are -- those are targets for future mitig --

mitigation prior to remediation. That's our current summary of our assessment.

THE FACILITATOR EHRLICH: Great. Thank you very much. Now we have a question from the Review Board expert, Lukas Arenson.

MR. LUKAS ARENSON: Thanks. Lukas Arenson speaking. Just a follow-up question -- how do you assess stability?

MR. DARREN KENNARD: The primary stability assessment tool is an empirical ground pillar and open stope stability assessments, and we used investigation data that was collected previously, in, I believe, 2005. So, primarily core-logging data and rock-testing data and also some cavity monitoring scans, which are sonars of the shape of the opening. That formed the input to the database, but the -- the -- the primary stability assessment is a -- is an empirical stability approach.

MR. LUKAS ARENSON: So the, yes, the -- the frozen block -- didn't really go into and what -- what the frozen block could do to it -- didn't really go in -- into it.

MR. DARREN KENNARD: The current stability is -- or the assessment that we carried out was the current non-frozen, non-saturated. And any potential future impacts due to freezing or wetting are simply engineering judgment at this point on what further impact of the current stability condition that we could see due to that.

MR. LUKAS ARENSON: Kind of following up, do you expect any segregation in the future?

MR. DARREN KENNARD: Sorry, Darren Kennard, Golder. Segregation of...?

MR. LUKAS ARENSON: Lukas. Ice segregation, due to -- once you start potentially raising the groundwater table or even if the groundwater table is -- is at these low levels, we know that water can be sucked to frozen -- to any ice you form in the ground, water finds its way to it and can start to segregate, form ice lines as -- because again we're talking about hundreds of years, potentially.

MR. DARREN KENNARD: You mean ice lines as -- sorry, Darren Kennard, Golder Associates. Ice lines as in the rock or the -- the swale?

MR. LUKAS ARENSON: In -- in the rock. In rock fractures. We've -- we've seen massive ro -- massive ice within bedrock.

(BRIEF PAUSE)

MR. DARYL HOCKLEY: Daryl Hockley. Can you clarify if you're talking about the initial freezing and wetting process or something over the longer term?

MR. LUKAS ARENSON: Lukas Arenson. That would be over the longer term. Because you -- you're basically creating here your frozen block. It's cold and it's something at sub-zero within a unfrozen environment, so any -- so there's going to be a thermal gradient which will attract the water to it. And so I'm just wondering about the long-term stability in terms of ice lines formation or anything like that.

MR. DARREN KENNARD: Darren Kennard, Golder. I mean, from our point of view, the -- the existing voids in which rock could fail (sic) into will all be backfilled. So there -- there may be some ice lines segregation, et cetera. But I -- I don't see how that could impact stability, overall stability, if we filled up most of the voids.

MR. LUKAS ARENSON: Okay. Well, my su -- suggestion would be could we put that on record that you might want to discuss that point to -- to some degree? Because I really think it could be a potential impact to it that you -- you start to -- to generate more -- more ice than you probably were hoping for.

THE FACILITATOR EHRLICH: May I just for

the sake of clarification, Lukas, are you suggesting that this is something that should be a written undertaking or will be you be satisfied with the Giant team coming back tomorrow or later in the week with a more detailed analysis of this?

MR. LUKAS ARENSON: Yeah, it's Lukas. I -- I think if we come back this week and discuss that that -- that will be fine.

THE FACILITATOR EHRLICH: Okay. Is someone on the Giant team writing down what kind of homework you're committing to bringing back later in the week? If so, would you be willing to add this to that list?

MS. LISA DYER: Lisa Dyer. Yes, we would.

THE FACILITATOR EHRLICH: Lisa, when we do the wrap-up I'm going to ask if you would be so kind as to just briefly touch on those subjects because if you're able to deal with them during the week it prevents you from, you know, having undertakings. And, as I said during the opening comments, the more we can deal with on the spot and -- and just put to the bed, the better we are able to focus on the stuff that really matters, so thank you.

And Daryl has a -- is it a question or a response?

MR. DARYL HOCKLEY: It's a -- Daryl Hockley. It's a question that --

THE FACILITATOR EHRLICH: Please go ahead.

MR. DARYL HOCKLEY: -- Greg Newman, who -- who has been advising us on this thinks that there -- there might be a need for a bit more dialogue on this. I'm wondering if there's a mechanism.

Can -- can Greg and Lukas agree to meet sometime or is it better if we prepare a draft and then have that dialogue take place on the record tomorrow? What -- what's your preference?

THE FACILITATOR EHRLICH: If there's a need for more dialogue we've got rooms that are available partly because the developers set aside rooms that are available for meeting, and we also have another room available in this building for more discussion on this.

If you're open to it, we're supposed to start at nine o'clock tomorrow. But would you be able to meet at -- and, Lukas, I guess I'm asking both you and Greg this. Would you be willing to meet tomorrow morning before the session either for breakfast or come in here at, you know, 8:30 or something like that to discuss it?

MR. ADRIAN PARADIS: Darren, I'd like you to also -- Adrian Paradis, for the developer. Darren, can you take part in those and can we set those for 8:30 tomorrow morning here? Does that work?

MR. DARREN KENNARD: Darren Kennard, Golder Associates. Yes, I'm happy to take part.

MR. LUKAS ARENSON: I'm okay, yeah. Lukas.

THE FACILITATOR EHRLICH: Great. Well, if that can be settled during a little sidebar meeting tomorrow morning, we can hear back tomorrow how it went, and maybe there's an undertaking that can be avoided. Thanks.

Any other -- who has got the next question? Kevin O'Reilly's got his hand up.

MR. KEVIN O'REILLY: Thanks, Alan. Kevin O'Reilly, Alternatives North. I wanted to go back to your very first question that you asked that you didn't get an answer to about opportunity costs of basically the -- the frozen block method.

And I'm wondering, if you do go -- well, you already said you're going to go with the frozen block method. What affect would that have on if you -- if we found a way to do in situ treatment at some point in the future, you have this saturated -- water-saturated dust, what affect is that going to have on in situ treatment possibilities in the future?

It's a speculative question, but it gets to the notion of reversibility and taking away opportunities from future generations to do something that -- you know, I -- I guess where I'm coming from is I'm not convinced that -- that the frozen block is necessary, and I think that it -- it does create problems if we ever did want to do some sort of in situ treatment in the first -- in the future at some point. So I guess I'd like their comments on -- on my ramblings.

THE FACILITATOR EHRLICH: Kevin, you know, seeing as how it's proposes -- proposed in perpetuity and that we don't have a detailed adaptive management plan ahead, I mean, it is conceivable that there may be some scenario in which they, you know, need to look at other approaches. I mean, I think it's a fair question to ask.

Giant, do you want to take a minute to discuss that?

MR. ADRIAN PARADIS: Adrian Paradis for the developer. I think in the long-term we'd like to have -- or we did give some thought to this and I believe it was in our Review Board IR -- I'm sorry, it's escaping me right now, but we did talk about reversibility at some -- some extent.

I'll ask that Daryl try and respond to -- on this a little bit. As for your -- the question on the speculative of an in-situ method, I don't believe we actually did discuss that in the -- in the IR Response.

So you'll have to borrow -- we'll have to be somewhat creative in our response to you and it's not -- creativity is not the best solution at this point. So please bear with us while we put something together.

(BRIEF PAUSE)

MR. KEVIN O'REILLY: Alan, it's Kevin here, if -- O'Reilly. If I could just -- maybe just add another word or two (2), it might help clarify it. In looking at the issue of reversibility, the developer assumed that the purpose of thawing out the frozen block was extraction.

And I don't think he actually dealt with the -- the idea that there might be some sort of an option of in-situ treatment. So that's what you didn't deal with, I guess. And it comes out in your response to our IR number 8. You -- you make this assumption that it's -- the -- the thawing is for the purpose of extraction. I know there's another IR from the Review Board on this as well, but --

THE FACILITATOR EHRLICH: It's Review Board IR number 5.

MR. KEVIN O'REILLY: Thank you. Kevin O'Reilly here again. So that's what I want to know is you didn't really deal with the idea of in-situ treatment in responding to the issue of reversibility. Thanks.

(BRIEF PAUSE)

MR. ADRIAN PARADIS: Alan, we'll ask Mark Cronk to try and respond.

(BRIEF PAUSE)

THE FACILITATOR EHRLICH: Okay, please go ahead with a response.

MR. ADRIAN PARADIS: Mark, can you respond?

(BRIEF PAUSE)

MR. MARK CRONK: Mark Cronk. After that small pause, Kevin, I have a question for you. Clarification to your question.

Were you asking us about the reversibility of freezing to thawing? That's a simple question. Go ahead.

MR. KEVIN O'REILLY: Thanks. Kevin O'Reilly. Maybe I'll try it again. What I'm a bit worried about is if there was new technology that came along in the future that allowed for some form of in-situ treatment, and I -- look, I'm not an engineer. I don't know anything about this stuff but dripping something through the -- the arsenic dust or -- it's not even a dust, it's a paste, or injecting something into it that could transform it into something that's less toxic.

It seems to me it would be a lot easier to do that than -- if -- if it was drier than if it was a big frozen block that you're going to have to try to thaw out and then remove the water from somehow.

So I wonder -- so the -- when you looked at the issue of reversibility, you only considered it in the -- in the context of the real reason to reverse it is to take the stuff out, but what if the real reason is to leave it in there? So why would we freeze it in the first place if -- if some in-situ treatment option came along that would only get more complicated by having the stuff frozen and saturated with water?

I don't know if that -- that helps. Thanks.

MR. MARK CRONK: Mark Cronk. Several things in there, and I will try to simplify for my own reasons.

The dust is not dry now in almost all of the chambers, so we could not deliver a dry state if you asked for it. We're already past that. The best we can offer at this point in time is after the frozen block, we could thaw it and you would have a wet dust.

In terms of what technology you may be thinking of to remediate it in situ, I simply can't comment on at this point.

MR. KEVIN O'REILLY: Thanks. That -- that's -- I don't know what the technology would be because we're talking about perpetuity -- perpetual care.

But having a saturated frozen block seems to me might -- may even make it impossible to do in-situ treatment at some point in the future, so that's what im worried about.

And I'm not convinced that -- I guess I might be jumping ahead a couple of places to where I want to go ultimately, but it's -- I'm not convinced that the -- the frozen block is necessary and that it's any better than a frozen shield.

And I think a frozen block, it's going to cost you more money. It's going to -- might -- you might be able to freeze it in a shorter period of time, but I think the reversibility of it is more difficult.

I think that the -- I think that -- I -- I just don't understand why we need the -- I understand that one (1) of the reasons that you want to saturate the stuff is to provide an extra level of redundancy in terms of how long it's going to take to thaw out if all systems fail. And I understand that, but I -- if the sys -- if you say your systems are going to be as great as they are, we should never have to worry about that. We don't need that extra level of redundancy.

So I think that -- that having the -- the frozen shield just gives us a greater reversibility and leaves open more options for future generations to look after this stuff properly.

THE FACILITATOR EHRLICH: And your -- your question on the end of that was?

MR. KEVIN O'REILLY: Well, they've -- in -- in dealing with the issue of reversibility, they've only considered the -- the reason -- or they -- their assumption was, the developer, was that the thawing is going to be done to extract the stuff.

I'm talking about reversibility in the context of leaving it in place for some form of in-situ treatment, and I guess I want to know, frozen shield versus frozen block reversiblity for in-situ treatment at some point in the future.

THE FACILITATOR EHRLICH: I think that the -- the scope of the EA as we've dealt with it is -- you started off within the scope of the EA, and then in res -- and somehow in the back and forth it kind of got out of the scope of the EA.

You started off following up to my question about opportunity costs having to do with wetting the dust prior to freezing, which is definitely something that they're proposing and, you know, I -- I know I asked it and I know why you're wondering about it, I think.

But then, in the probing that happened in the discussion, it -- it -- it turned into more of a discussion on frozen shield versus frozen block, you know, all -- all together, which is starting to get into a direct review of alternatives from the beginning.

Now the -- there's a question that you asked that was well within the scope of the EA earlier, which was: What if in the frozen block method they want to do a controlled thaw for the purpose of in situ treatment? Which is a legitimate possibility. It hadn't occurred to me, but I could imagine it.

Do you have a question for the Giant team with -- with respect to that? Because it sounds like their answer didn't quite satisfy that part and that part of what you said was within the scope of the EA.

MR. KEVIN O'REILLY: Okay, then, thank you. I guess I'd like them to reassess their response to the two (2) IRs that deal with reversibility and that's IRs number 8 and IR number of the Review Board 15, or 5, whatever it is on reversibility, in the context of reversibility, the assumption not being excavation but the -- the assumption being in situ treatment.

I want them to -- to answer that. And if they need time to do it, that's fine.

THE FACILITATOR EHRLICH: Kevin, would you be okay with them coming back with that answer sometime this week, or would you prefer this as a written undertaking?

MR. KEVIN O'REILLY: Whatever -- thanks, Kevin O'Reilly here. Whatever they do, I want it in writing and I want it put on the record. And that's the proper way to do this stuff. Thanks.

THE FACILITATOR EHRLICH: So, don't forget, Kevin, that anything that's said here will get on the record because it's transcribed. So it will wind up on the record in writing, but it sounds like the request is for a written undertaking, which does give you a little bit more time to choose your answer carefully. I know you've got a busy week right now, as -- as we all do.

Is the Giant team prepared to do that as a written undertaking by November 14th?

MR. ADRIAN PARADIS: I would -- Adrian Paradis for INAC. No, and I -- and there's a very specific reason, Kevin.

We can continue to circle around the issue and talk around it in circles all you want, but ultimately it comes down to the same response you're going to get in both of those alternatives, 8 and Review Board 5.

We chose an example in -- of in situ extraction from the frozen block for the reversibility. We can go through the same process and rate, but ultimately it's going to come down to almost the same paragraph and response of: It is an example of a potential way of doing it.

There's not -- the logic going through it is not going to change. So the effort of going through and writing out an undertaking to respond to it, it's -- I don't think you're going to get a fundamentally different answer than what you have already on the record.

So the effort of going forward with it escapes me.

THE FACILITATOR EHRLICH: What I -- What I glean from that -- and it's Alan Ehrlich, here. What I glean from that then is, it sounds like the Giant team is of the view that the answer that it's put in for opportunity costs regarding ex -- ex situ treatment, it sounds like they say the answer is the same for in situ treatment.

And we have that answer on the record, and -- and the IR response. It doesn't sound like they've got anything to add to that. Is that sufficiently clear?

MR. KEVIN O'REILLY: Thanks. Kevin O'Reilly. I'll mull it over, but I always have the option of going back in round two (2) and asking another IR, if they don't want to answer it now. So, thank you.

THE FACILITATOR EHRLICH: And in the interest of keeping the next round of IRs as lean and mean as possible, I'd encourage the Giant team, if there's anything else you wish to add to this perhaps tomorrow or the day after, you're certainly welcome to revisit it.

MS. LISA DYER: Lisa Dyer. I'm going to pass it off to Daryl in a second, but one (1) of the things, Kevin, is that that was used as an example. The question asked in the IR was -- was about reversibility.

So an example was chosen to show how it could be reversible. And so it wasn't that in situ wasn't considered. It was coming up with a -- a kind of scenario that could be described. And there was a lot of effort put into that.

And I understand your question is: What would happen in situ? I guess there's two (2) things I see you're getting at, is, yes, we can thaw in situ. We can thaw the -- the frozen block. Now you're asking about whether that would prevent in-situ treatment in the future. It's hard to speculate on that without knowing what it is.

You're making the assumption -- what I'm hearing is that there's an assumption that water would interfere with it, but we don't necessarily know that. And just thinking about chemical reactions and what can be done, I -- I'm not sure that without knowing the technology we're ma -- that we can -- we can define that scenario, that necessarily is water going to prevent in situ treatment.

I don't think so, but do we know? Not for sure. Does it mean it will? No. It -- it's without having that technology in place that can do it, it's hard to make those judgment calls at this point. So that's more my concern is, you know, without having that treatment that you're sa -- we can assess of how it would impact, it's hard to do that scenario.

Yes, we can thaw it. There will be moisture regardless of whether we wet or not. And that moisture, will it have an affect on in situ treatment? Not necessarily.

THE FACILITATOR EHRLICH: I'm going to just leave it at that. If either of you wants to sleep on it and take one (1) more swing at it tomorrow or the day after, that would be just fine. But I don't want to take more time today on this because I think that everyone has heard exactly what everyone else has to say about it. And I don't know if more questions on it right now are going to be productive.

So we'll put it in the parking lot for a later day. If there's anything to add then, or, Kevin, if you decide that you're satisfied with that answer that it's clear as you're going to get here, could leave it that too.

Does anyone else have any questions about other aspects of the underground or freezing part of this?

Ed Hoeve, for Alternatives North...?

MR. ED HOEVE: All right. It'll -- it'll

come back a little bit to something that was discussed earlier but from a different angle a little bit. And it was discussed this morning in the presentation that one (1) of the reasons this option was selected was Occupational Health and Safety. It was one (1) -- one (1) of the lower risk options in terms of implementation.

One (1) of the, I guess, risky elements of it would be, I think, probably drilling those horizontal holes. Given -- you know, as you say, the model that you have is evolving, you're learning more, but you still probably have some uncertainties around what's going on at -- below these chambers and stopes, so -- and we have also heard that there's no dry chambers or there are wet chambers. There may be some pressure, not the types of pressure we were talking about earlier, but there could be some pressure.

So has -- how's that been addressed? Or the thinking around the drilling and if you were to encounter a pressurized zone that you weren't expecting, is there a contingency around dealing with that at construction?

MS. LISA DYER: Lisa Dyer here. So, Ed, I just want to clarify because there's -- there's a few questions there. And so what I heard was one (1) kind of about the stability. Wa -- was that -- and about -- you

-- you were kind of questioning about people drilling kind of the horizontal. And is that a concern of stability of the chambers or...?

MR. ED HOEVE: Well, I guess stability could be one (1) aspect of it, but probably more specifically just if in the course of drilling they did encounter pressurized water bearing zone and how would they deal with that from a drilling point of view and in terms of safety of the -- the crew.

MS. LISA DYER: Mark Cronk, do you want to answer this question?

MR. MARK CRONK: Mark Cronk. Good question, Ed. It was one (1) of the primary challenges we put to the contractors working in the freeze optimization study. And they took the notion of a hot tap, which out of the water and sewer guys, and developed a system to be able to drill behind a sealed, grouted and fastened to the bedrock blowback preventer.

And so if they ran into a pressure seam it would all be behind a valve, and they could simply shut the valve and abandon the hole. It worked fine, so does that answer your question?

MR. ED HOEVE: Yes. Just -- but just to be clear, so they've already implemented something like that during the drilling for the freeze optimi -- okay, good. All right. Thanks.

MR. MARK CRONK: Mark Cronk. Just for the record, yeah, we would not let the driller start until he had that procedure and equipment in place.

THE FACILITATOR EHRLICH: Okay, a question from Bill Horne. And, Bill, you're here on behalf of Alternatives North too, right?

MR. BILL HORNE: Yes.

THE FACILITATOR EHRLICH: Yeah.

MR. BILL HORNE: Yeah. Another question about the pressure but a different kind of pressure. Earlier we talked about some of the pressures that are going to be created as the -- the water in the -- in the dust freezes and it expands and it's going to cause -- result in some pressures on the wall of the chambers. And it was -- you've addressed the -- the answer in some of the Information Requests.

The response was during final design you'll assess the optimum approach to freeze -- to -- to introduce the water into the dust to -- to prevent an increase in pressure.

My question is: What -- how are you going to assess this? What future work are you going to do to -- to ensure that the stability of the chambers isn't affected and we don't break up the rock so that if we do have a -- we do have to reverse the process it's -- it's still a stable mass?

MR. DARREN KENNARD: Darren Kennard from Golder Associates. I think it's a question related to Lukas', if I'm right.

MR. BILL HORNE: No, Lukas' question was talking about the frost heave in the -- in the rock. I'm talking about actually breaking the rock, you know.

MR. DARREN KENNARD: Okay. Back to -- I mean, again, any arsenic stope or chamber that we believe poses a current stability issue or a -- a potential future instability due to -- due to these factors, we -- we propose it -- it should be tight backfilled now.

Tight -- just to clarify, tight backfilling will not stop failure of rock due to even frost pressure, or -- or what you mentioned.

The -- the tight backfilling will -- will reduce the propagation of any rock failure. I mean, the -- the -- if any rock failure tries to occur, the backfill will -- will keep it from -- keep that failure from propagating. So we can't actually stop rock from failing either through natural stress processes, or anything we induce on it.

The goal is to try and keep the failure from -- from progressing. So again, it's a -- it's a current stability assessment to decide which -- which of these areas need to be backfilled, and also we're -- we're using, frankly, engineering judgment to say, if any of these is a little closer to the edge than we are comfortable with and there may be some changes due to some of the -- the freezing and the wetting, that we will backfill these voids.

I'm not sure if that answers your question.

THE FACILITATOR EHRLICH: Bill, does it?

MR. BILL HORNE: Not really. I guess I'm more concerned about just breaking up the rock in the chamber itself due to the high pressures, like we -- you know, all -- all of your mass is going to expand by 9 percent times the -- the frost heave of your -- your dust.

But, I mean, you're going to have huge pressures inside that chamber. I'm not so sure that we're talking about the same thing.

(BRIEF PAUSE)

THE FACILITATOR EHRLICH: Lisa, do you have a comment?

MS. LISA DYER: Not on the rock

mechanics, that's not my area of expertise. But I would like to have ten (10) minutes to come back to the EMS and whether we -- how we're going to determine whether the frozen block is a success or not. I'd like to respond to that.

But I -- we'll let this line of questioning continue, but I'd like to have a few minutes at the end. We've given some thought and just wanted to clear a few thing -- clarify a few things on that topic.

THE FACILITATOR EHRLICH: I'd like other parties in the room to understand that if the Giant Team has ten (10) minutes on that, then you're left with about twenty (20) more minutes for other questions.

And any other pressing questions you have on the underground or freezing, if you want them done today, you'll have to do them within the next fairly short period of time.

So please start thinking about that. Remember, there is a possibility to carry some over till tomorrow if necessary, but I just want parties to try and prioritize what they still need to know.

MR. DARREN KENNARD: Okay. I just thought about your restating of the question, Bill. I -- I mean -- I mean, in general there will be expansion of the water in the pour space.

Whether or not that 9 percent expansion gets transferred directly to the walls of the -- of the opening, I think is the question. We're going to have a void on top of some of these. We're talking about backfilling some of the one's we're -- we're worried about being unstable.

I mean the -- the stiffness of that backfill is such that it will take up some slack, I think, when there's some expansion. Whether or not the -- the expansion of the pour water dir -- transferred directly to the walls of the -- the openings would have any impact, I mean, I think it's a question of -- of the -- the thickness of the pillars, and the -- the stiffness of the rock. I mean, it's very -- in the end it's strong rock. It's got a high stiffness.

We haven't done any studies to look at the impact of -- of a -- of a volume increase on the stability. Generally, again back to the same point, again we're not trying to stop any -- we're not trying to stop failure with backfill.

We're just trying to reduce the impact of any failure in the -- you know, reaching surface or opening up a pathway where dust can escape.

THE FACILITATOR EHRLICH: And Lukas Arenson has a question?

MR. LUKAS ARENSON: Yeah, Luk -- Lukas here. Just a follow-up question.

Have you put any thought into the direction of your freezing? Is it going to be mostly upward freezing, say if you have the -- the bottom pretty cold, and try to cool it up, or do you do the -- the experiment where you just put a bottle of water into the freezer, and let it freeze from all direction and in the end, it's going to explode?

Just have you thought of how -- how -- which direction you -- you -- you try to -- to freeze it? It's kind of what Bill's probably go -- going at, too.

MR. DARYL HOCKLEY: Daryl Hockley. Yeah, exactly. During the -- during the freezing of the walls for -- the frozen shell, pardon me, the freezing will be occurring from a line essentially of -- of cold pipes.

And -- and it would be towards the opening of the -- of the dust, and some of the expansion would simply be pushing water ahead of that, and -- and discharging it into the unsaturated fill.

So that would relieve some of the -- some of the 9 percent that -- that you're worried about, not all, but certainly a lot.

So the idea, and -- and this is where we might get into three (3) dimension modelling, it was mentioned earlier. We -- we want to avoid setting up a freezing system that traps water somewhere in the middle. And -- yeah.

THE FACILITATOR EHRLICH: Lukas, you good?

MR. LUKAS ARENSON: Yes. Yeah, thank you.

THE FACILITATOR EHRLICH: Okay. Todd, do you have a question?

MR. TODD SLACK: Yeah, thanks. I have four (4) questions left, but in the interest of time I'll go two (2) at a time, and we'll go with the two (2) easy ones here.

So the -- the first question I have is: In the -- in the presentation you talked about that resource -- or that there will be a ten (10) year update to reevaluate technologies. What commitment can INAC make to ensure that resources will be available for this process?

And the reason I ask this is given the -- the sum costs, and the sort of approach to future technologies that the proponent has taken here, you know, we -- we want to ensure that there's -- there's going to be the opportunity for a good faith evaluation.

So that's question number one (1).

(BRIEF PAUSE)

MS. JOANNA ANKERSMIT: The Government of Canada is going to invest a significant amount of money in this project, and its our own due diligence, and in the best interest of everyone that we continue to stay abreast of the technology that's -- that -- and the information and research that's going on around this significant investment. Joanna Ankersmit, I'm sorry, with a candy.

MR. TODD SLACK: Thanks for that. Todd Slack, YKDFN, also with a candy.

And number two (2), in the -- on page 49, slide 97, it says that, "The FOS construction went well."

Now I have a little issue with this considering that INAC chose not to get a land use permit for this, so there was no inspections of this site, and there was two (2) spills.

I'm just wondering how you arrived at the conclusion -- or if there's any evidence other than the -- this that suggests that the construction did go well?

I'd suggest that were an exploration company to have two (2) -- two (2) spills of this sort of situation, the inspector might come down somewhat hard on them.

MR. ADRIAN PARADIS: I think I'll -- I'll ask to go to -- we'll eventually to go to Daryl here to talk about what the actual freeze study has shown us to date.

The discussions about the land use permit and other options, that has been resolved now by the Board's making a Section 98 decision. So before the questions come out, I'll just be preemptive and say we actually are in discussions and we will be getting a land use permit.

As for the other discussions, I think it's just easiest to let the actual data speak for itself about what we've learned.

MR. TODD SLACK: Sorry, if I can preempt that. It's not about what we learned, but rather from a health and safety perspective, both in terms of worker health and environmental.

Is this typical of future operations? Like, should we expect this as the -- the threshold of construction that went well?

MR. ADRIAN PARADIS: Maybe I can actually ask Mark to talk about some of the lessons that we learned instead -- I apologize, Daryl -- of what we've learned during the drilling versus sending that to Daryl.

MR. TODD SLACK: And I'd just like to

say, Daryl owes me one for getting him out of that.

(BRIEF PAUSE)

MR. DARYL HOCKLEY: Daryl Hockley. I just think it's a bit dangerous to take statements on PowerPoint slides out of context so the -- the false statement was that the FOS construction went well. Below that were two (2) sub-bullets.

The first was that there was a good learning curve. The second was that it test -- tested several readily available technologies and collected data to support future procurement. That was the intent of -- of -- of the -- of the statement, and only that.

THE FACILITATOR EHRLICH: I'd like to ask a question regarding the -- the freeze optimization study, as well.

In light of what we've heard earlier about deep thermosyphons and experience with deep thermosyphons, how many deep thermosyphons are expected in the total amount of the project here?

I -- I don't remember off the top of my head the ratio of shallow to deep ones, but I figured one (1) of you might know the number of deep thermosyphons you're going to require.

MR. DARYL HOCKLEY: Daryl Hockley. I think by that -- by the -- by the standards that -- that Jack was discussing, they were -- all of the surface thermosyphons would be deep thermosyphons.

I think, Jack, you would -- you would call a shallow thermosyphon 20 metres and anything beyond that a deep thermosyphon, so essentially all of them, six (6), seven hundred (700). The -- the numbers are -- are still -- still changing but...

THE FACILITATOR EHRLICH: During the freeze optimization study -- now in the DAR on page 639, I -- am I correct in understanding that only one (1) deep thermosyphon was actually tested as part of the freeze optimization study?

MR. DARYL HOCKLEY: Daryl Hockley. No, there was a prior test that started in 2002 of a deep thermosyphon. That -- that's what's being referred to there. The -- the DAR -- I don't quite remember the number of thermosyphons in the DAR, at least twelve (12). Does anybody know the precise number?

MR. DAVID KNAPIK: Twelve (12).

MR. DARYL HOCKLEY: Twelve (12). Good guess. Thanks.

THE FACILITATOR EHRLICH: Yeah, that helps. Todd, did you have another -- Todd Slack, of the

Yellowknives, do you have another question? You -- you mentioned you -- you had four (4) and I kind of heard two (2), I think.

MR. TODD SLACK: You did. Good guess.

THE FACILITATOR: Do you -- could you truck on with the remaining questions, please?

MR. TODD SLACK: Well, I was going to give it to Kevin just in -- because we're getting close to the time and I'm sure he'll give it back once he gets his out.

THE FACILITATOR EHRLICH: Before we go to Kevin, I'd like to say, Lisa, because the developer's presentation went pretty long this morning, I -- I don't think it's fair to penalize the -- the parties for that.

I -- I'd rather give them the rest of the time we have available and then turn your response now into something that comes out with the presentation, perhaps just before the presentation tomorrow morning, as part of the introduction. And I'll keep my opening remarks extra short tomorrow to make sure that there's time for that.

Kevin, over to you.

MR. KEVIN O'REILLY: Thanks, Alan. Kevin O'Reilly, Alternatives North. I wanted to follow up on one (1) of Todd's questions. And it's slide 18 in the presentation about assessing future technology with regard to arsenic treatment.

And it's not on the slide. I think it's in response to the IR that was asked by the Board, not the one (1) that we asked, because they wouldn't put a time frame in -- in the answer to us, but in the response to the Review Board, they said that they would do this every ten (10) years.

Guess what? Ten (10) years is up now, or will be next year, because I -- the assessment or review of the alternatives was done in 2002/2003, by SRK.

So we're at the ten (10) year point, actually next year. So is the -- the developer prepared to do another assessment next year, starting next year?

THE FACILITATOR EHRLICH: And just for clarity, when that was described in response to the IR, did you mean every ten (10) years from project approval or from the completion of the alternative study nine (9) years ago?

MS. JOANNA ANKERSMIT: Thanks for the clarification. It's project approval that we're -- everyone around this table is pretty up-to-date on what's going on with the management of arsenic trioxide. No one in the world is looking at it more than us right now.

So once we get a project and we can

implement a project that can protect the human health and safety and the environment, then we'll start to look at future research.

THE FACILITATOR EHRLICH: Kevin...?

MR. KEVIN O'REILLY: Thanks. While I appreciate the passion of the response, I guess I'm a bit more -- I -- I want a reassessment every ten (10) years. And that -- if they want to provide that clarification now as to when the ten (10) year clock starts ticking after they get approved, well, that's okay, but I think it's time probably to do another assessment now.

And may I suggest though that when you do this -- I guess it's not really clear who's going to do it. I understand the report -- the results are going to be reported in the SOA report, state of environment report. But I guess I'd like to suggest that it be a much more collaborative approach than what was done last time around.

I would suggest or propose that -- that you put together a multi-stakeholder group that develops an RFP that actually is involved in reviewing the information and so on, that it's not just left to the developer. And so I guess I'm suggesting a process for how that -- that should happen, and I think it's probably time that we did it again now.

If they want to comment on that, that's fine. I did have one (1) other sort of follow-up as well.

THE FACILITATOR EHRLICH: Okay, I note that you've got a follow-up. Just -- and I welcome the Giant Team's comment on that, but I will also point out that we are going to be dealing with certain perpetuity issues and risk assessment issues that this might fit fairly well under on day 4 and day 5.

And I would hope that if the Giant Team -- that the Giant Team recognizes that they will have an opportunity then to think through carefully what you've just heard, but it will fit pretty well later into our agenda as well, and you can respond more fulsomely then if you wish.

MS. JOANNA ANKERSMIT: Yeah, I definitely look forward -- that's the point, I think, of the meetings on -- this week, is to hear your ideas, to give us an opportunity to talk about how we're going to work together. And like I said in my opening remarks this morning, we genuinely welcome people's constructive ideas for how -- how we can work together and how we can have the best project possible. That's what we all ultimately want.

THE FACILITATOR EHRLICH: And I'd like to apologize for using the word "fulsomely" in my question. I'm pretty sure it's not a word, and there's really no excuse for that kind of thing. Back to you, Kevin.

MR. KEVIN O'REILLY: Thanks. Kevin O'Reilly, Alternatives North.

And I think my last set of comments was exactly what I hoped you were looking for and that you're open to, so. But come Friday I want to transition this into a discussion of the need for ongoing research and dev -- development into new technologies because without a plan it won't get done, so.

But I'll leave that until Friday, Alan. Thanks.

THE FACILITATOR EHRLICH: I suspect there might be some of that on Thursday and Friday because long-term risk and long-term management are hard to entirely separate. But, yes, there will definitely be time devoted to the subjects that are spelled out in the agenda like that.

THE FACILITATOR EHRLICH: Do the Review Board's experts have any other questions that they'd like to put forward to the developer, particularly Jack Seto because he's only here for the rest of the afternoon?

But if any of the other Board's experts have a question, I do notice that the agenda says this time is particularly for Review Board experts.

Are you satisfied at this point in terms of new questions?

MR. JACK SETO: Yeah, I had one (1) question regarding one (1) of the slides on -- I think it was the lessons learned on the monitoring. I think it said something along the lines of -- I think you had some problems, and they were in terms of the measuring of the operating parameters.

Are those problems solvable, or I guess what was the extent of the problem?

(BRIEF PAUSE)

MR. MARK CRONK: Mark Cronk. To your question, yeah, they are solvable. They are simply technical issues arriving from commissioning a complex facility and we're working through them. They're -- oh, incompatibilities between some of the instrumentation and the data collection systems, it's nothing that we're not working through right now, so.

MR. JACK SETO: Okay. Thank you.

THE FACILITATOR EHRLICH: Mr. Slack from the Yellowknives Dene First Nation.

MR. TODD SLACK: Thank you, Mr. Ehrlich.

I have a two (2) part question which I think you may answer it in one (1) part, but I'll ask it in two (2) parts, just because that's the way I've written it down.

And this goes back to the original scoping session and at that the -- the proponent said -- and I'm just going to quote a little here:

"And we feel that doing this freeze optimization -- freeze optimization system would further elaborate and inform the whole EA process. In addition, one (1) of the two (2) --"

And, sorry, there's -- this is a separate quote:

"In addition, one (1) of the worst points of arsenic leas -- leakage, both water and arsenic solo is in the form of sludge is from Chamber 14 at Bulkhead 68."

Now given that this FO -- the FOS Study is not performing -- performing one (1) of those objectives, focussing on how this FOS is going to in -- inform the EA process, at this point we have -- like, you know, we both have -- our parties have experts here that I'm sure would be very interested in seeing this data.

And given the original timeline that existed with the -- this EA, I'm just not sure how that was originally designed to inform the EA process, and what it is that we can expect to see as part of the EA process, given the sort of timelines that I've heard now, which is more than six (6) months away.

That risks putting the delivery of results, like -- sorry, published results, or results in front of the Board until, you know, essentially after the EA is completed, or towards the completion of EA at least.

And I can try to rephrase that as one (1) part if it's not clear enough.

THE FACILITATOR EHRLICH: You know what, Todd, go for the -- the short rephrasal (phonetic).

MR. TODD SLACK: I wish I could just say it was because it was getting late in the day, but I'm -- I'm just not very good at crystalizing.

So there -- there was a -- a number of original objectives suggested in the scoping, some of which haven't, and I would suggest weren't possible to achieve at that point.

But here we are, we have this FOS Study. At what point are there going to be results on the table for, you know, our experts that we received this participant funding for to review?

THE FACILITATOR EHRLICH: There's a better --

MR. TODD SLACK: Was that a better crystallization?

THE FACILITATOR EHRLICH: That's a -- a -- a very clear question and let's put it to the Giant Team.

(BRIEF PAUSE)

MR. MARK CRONK: Mark Cronk. That report is currently in draft with the government for review and we could make it available by your November 14th time frame, if that's acceptable.

THE FACILITATOR EHRLICH: From the Review Board's perspective that would be great. Todd, that would put it to you before you are expected to produce the next round of Information Requests. I trust that's helpful?

MR. TODD SLACK: I -- yeah, that's totally helpful.

THE FACILITATOR EHRLICH: Question from, is it Lukas? From Lukas -- or sorry, Mr. -- Mr. Cronk.

MR. MARK CRONK: No problem. Just to

clarify, that is an interim report. The FOS is still a study that's in active mode. It's not done yet, so. But we can release what we know to date.

THE FACILITATOR EHRLICH: Sounds good. Thank you. And the question now is from Lukas Arenson, who is one (1) of the Review Board's experts. It is getting late in the day.

MR. LUKAS ARENSON: Even for me. Yeah -- no, it -- that would be very much appreciated if we could get those data, because in -- in lots of DIRs you refer to the FOS and it's very difficult to judge on it.

And I'm -- it's probably a comment more rather than a question, I'm not really sure if the data you're going to present will be enough to -- to judge the system. Because as you know, the passive ones will only start to kick in later this year, so you probably won't have this data.

But, at the same time, what you expect to present -- are you expecting to present kind of raw data, or are you starting to use -- or are you planning to do thermal analysis, for example, to back calculate what you've done so far and to give us forward prediction on that too? Or what -- what's the state of the report, keeping in mind that we only have a summer. That doesn't give us any data on -- on the passive cooling.

(BRIEF PAUSE)

MR. DARYL HOCKLEY: Daryl Hockley. We have a lot of very useful information. Our -- the current report is -- deals with data that has been analyzed and reduced, and -- and there are nine (9) or ten (10) questions that we are attempting to answer there.

What is the thermal properties of the rock; what -- what -- but you're -- you're right, we won't be able to answer all the questions.

We won't be able to say, for example, whether thermosyphons are more cost effective than active freezing because we won't have winter data.

I think a lot of what's needed in terms of assessing the -- the risk of environmental impacts is -- is already in the existing data.

MR. LUKAS ARENSON: So we can expect a fair amount of interpretation and analysis from -- from your side, which will help with -- with the current IR answers.

MR. DARYL HOCKLEY: Yes, I think so. I guess one (1) cautionary note is there are millions of data points, so I think it's probably better that we share our report with you. You may well at some point want to follow up to get the -- the background data, but I don't think it would be a good idea for us to overwhelm you with the complete data set, so...

MR. LUKAS ARENSON: Thank you.

THE FACILITATOR EHRLICH: Are there any other questions for the day from the Review Board's consultants?

(BRIEF PAUSE)

THE FACILITATOR EHRLICH: Going, going, gone.

Are there other questions from other parties, besides the developer, that they want to address to the freezing underground, remembering that there will be a small opportunity tomorrow to pick up, just if -- if there's something that's percolated in overnight.

Ed Hoeve...?

MR. ED HOEVE: Yeah, you can decide if this is within the scope, or what -- outside of the scope. And that is really maybe just a preliminary comment based on what they know about the freeze optimization study so far.

There -- it goes back to the comment that construction went well in the presentation this morning. Well firstly, I'd say I appreciate in the presentation having some of that information from the freeze optimization study because it -- we had nothing previous, so I appreciate that, but -- and the lesson's learned. Construction went well; some challenges with the instrumentation, the monitoring. But from that exercise so far, has that caused you to re -- get any better information on your costing that you're looking at, or is it premature to come up with any revisions to the costing?

I know like for example you say on one (1) hand, as you probably would have expected, it's performing better than you ex -- you anticipated, but me as an outside observer it seemed to me to take longer -- it took longer to implement than it was expected.

So are there any thoughts on how this is impacting your cost estimates?

MR. MARK CRONK: Mark Cronk. We have learned a great deal. We're not done learning, though. As you can appreciate, a lot of the construction cost information needs to be factored into a detailed design optimization, and we haven't done that optimized design yet.

But in terms of raw data, by example we

did test three (3) different drilling technologies, and we found that the most expensive drilling technology was not at all the one (1) we want to use. It didn't produce the results. It didn't have the productivity. So that's one (1) example of what we've learned.

We've learned that some of the freeze hole assemblies need to be optimized, trying to reduce the number of damage to some of the thermistor strings as they go in the hole.

A lot of those small details, we're still trying to feed into a detailed design process, which is currently ongoing. Yeah, and cable trays need to be in the right direction, or right position so they don't encumber the future change to passive. Details like that.

THE FACILITATOR EHRLICH: Kevin, go ahead please.

MR. KEVIN O'REILLY: Sir, I think this maybe a quick one, but in response to the Review Board IR Number 15, there's some discussion of how to control leaks out of the arsenic chambers during the -- the freezing process.

And one (1) of the things that's mentioned here is grouting the -- that might be done. So I'm just trying to figure out where do you do the grouting, on the inside of the chamber?

And how do you -- how do you get in there to do it, or who -- do you do it remotely, or what's the grouting that -- that's being discussed here?

MR. DARREN KENNARD: I mean, I think grouting was -- sorry, Darren Kennard, Golder Associates.

I mean grouting was a -- was a potential option, if -- I mean, first of all, I don't think it was mentioned -- I think if you're adding water and it was leaking we would stop adding water for starters. I don't think that was mentioned.

We'd freeze longer and harder. You could even put in some targeted freeze holes to try and get the -- get the area frozen, but as Alan pointed out, at -- at a certain -- at a certain velocity water won't freeze.

We have quite a bit of access underground. There's currently -- there's underground openings that are traversed daily. There's inspections that go on weekly.

I think we would attempt to target grouting if it was a potential solution, from underground or even from surface, so it wouldn't be done from inside the chamber, it would be done from outside, and you would be trying to intercept, for example, the fracture that was carrying water. You'd try and intercept that with a drill hole from another location and -- and grout from there.

MR. KEVIN O'REILLY: Okay. Just -- sorry, Kevin O'Reilly. I'm reading the IR, so I'm not making this up.

"If unexpected leakage is detected and the frozen shell does not stop the flow, additional measures such as grouting may be reviewed and evaluated as part of the response plan."

So that's IR number 15, page 2, response 1, paragraph 2. Thanks.

THE FACILITATOR: Giant Team, care to? Nope? Okay. The team is nodding they -- they -- it looks like they stand by their response to that.

And do the Yellowknives Dene First Nation representatives have any other questions they'd like to get in today? I see they're indicating that they do not have.

And it is exactly one (1) minute before I'm supposed to start the wrap up. Let's forego the one (1) minute break and I'm going to dive right in.

Before I -- I get into the -- the sort of general statements, Lisa's indicated earlier that she's willing to just remind everybody what information INAC has said it will bring back a little bit later this week at different dates, remembering that these things can be written undertakings if the parties are not -- information needs aren't satisfied during the technical session.

So, Lisa, are you able to go over those one (1) at a time, please? Or do you need a minute before? Because I can talk about other stuff for a minute or two (2) if you like.

MS. LISA DYER: No. It's Lisa Dyer, here. I will ask people to add on. I only have three (3). So, unless I missed something, I guess the first one (1), is we made a commitment to bring in MSDS sheets for tomorrow for the three (3) products associated with the freezing.

The second one I have -- where did it go -- oh, yeah, the second one I have is that we're going to have Darren, Greg and Lukas meet tomorrow at 8:30 here to talk about the ice lensing in the rocks.

And, oh, there's other ones. Okay.

THE FACILITATOR EHRLICH: Oh, you know what? Can I just take a -- a short thing there. I'm not sure if this room will be open at 8:30 in the morning tomorrow, but we definitely have control over the Review Board. I wonder if it's worth meeting at the Review

Board location because I've got keys for that.

Jessica Simpson, do you know if this place is going to be unlocked at 8:30?

Okay. Let's -- let's stick with -- with this location and if you guys come here and you can't get into the room, go to the Review Board, which is above the Sco -- in the Scotia Centre on the second floor and we'll give you a venue there if you can't use the venue here.

Sorry. Please continue, Lisa.

MS. LISA DYER: The next one (1) -- well, there's kind of two (2) aspects to the groundwater level in relation -- or the current mine water level in relation to Great Slave Lake. We said we would provide some clarification on that.

We were going to talk about -- we made a commitment to talk further about mine water management in general tomorrow. Bob Boon will be here to talk to that.

And then the last one (1) I have is, that we agreed to submit an interim report on the freeze optimization study on November 14th.

THE FACILITATOR EHRLICH: So I'd like the transcription of this to make it clear that the interim report on the freeze optimization study is Undertaking Number 1 from the technical sessions because that's one

(1) that we don't expect to have resolved here and the -- that'll be clear in the transcripts.

--- UNDERTAKING NO. 1: To provide the interim report on the freeze optimization study

THE FACILITATOR EHRLICH: There is one (1) other thing that I didn't hear but I thought that I heard agreed to, which had to do with metrics for success, in other words, criteria for when you've decided that the project is successful.

And I know, Lisa, you were prepared to do it today, which makes me think you'll be at least as prepared to do it tomorrow.

Is that right?

MS. LISA DYER: I will be more than ready tomorrow morning.

THE FACILITATOR EHRLICH: David Knapik...?

MR. DAVID KNAPIK: David Knapik. I have a question on the deliverable of the MSDS sheets. How many copies are requested? Are they electronic or paper?

THE FACILITATOR EHRLICH: Is there anyone besides the Yellowknives Dene First Nation that really wants the MSDS sheets? As I recall, it was on coolants to be used onsite.

Okay, I don't see anyone jumping for it. So if you can bring a paper copy and give to Todd and then email an electronic copy to the Review Board, we'll add them to our registry as well.

MR. DAVID KNAPIK: Thank you.

THE FACILITATOR EHRLICH: Do any parties -- sorry, I've got a -- Doug Ramsey has got an additional note.

MR. DOUG RAMSEY: Yeah, Doug Ramsey. I didn't hear any mention about the climate change scenario and bringing that information tomorrow, as you'd agreed earlier today.

MS. LISA DYER: That was specific to water management?

MR. DOUG RAMSEY: No, it's -- it's the re -- in relation to the IPCC climate change --

MS. LISA DYER: Okay.

MR. DOUG RAMSEY: -- scenario --

MS. LISA DYER: Yes.

MR. DOUG RAMSEY: -- and the specifics surrounding the worst case --

MS. LISA DYER: Right. And I think --

MR. DOUG RAMSEY: -- that was

represented.

MS. LISA DYER: Yeah. And I think the commitment was to try and bring that information tomorrow.

MR. DOUG RAMSEY: That's my recollection as well.

THE FACILITATOR EHRLICH: Doug, for clarity, can you recap ex -- in a little bit more detail what you're expecting from the Giant Team tomorrow on that?

MR. DOUG RAMSEY: Sure. Doug Ramsey.

As far as the IPCC worst case scenario that was represented in the -- in the DAR, looking for the specifics surrounding beginning with the period over which the worst case was considered. For example, whether it was a fifty (50), a hundred, two hundred (200), five hundred (500) year period for the worst case scenario.

Secondly, with respect to whether it considered only temperature or if it also considered other climate parameters and what those parameters were. And, thirdly, whether climate change was carried into other aspects of your analysis. For example, in return frequencies of various kinds of climate events, whether those were based on historical data or on historical data modified for the climate change scenario.

THE FACILITATOR EHRLICH: Thanks, Doug. That sounds like it's a clear understanding. And I get the sense that the Giant Team has got a firm grip on what you're expecting.

And if you can't do this for tomorrow, this is the kind of thing that works okay as a written undertaking as well. But if you're still willing to give it a try for tomorrow, we're game.

I think that's it for the -- I don't want to call them undertakings because that sounds like they're all due on November 14th, but for the homework and the tasks that the Giant Team has said it's willing to try and do.

Just a general note that the management here has asked if you could leave your books on your seats instead of on the tables. It makes it easier for them to clean the tables.

We're a tiny bit ahead, and I'm just curious, in the interest of -- you know, we've got four (4) more days of this, are there things that you would change over the next four (4) days to make them more productive or more efficient? Any suggestions into how we're organized or run? I can't guarantee we'll do it, but I can guarantee we'll hear it if you say it now.

Are there things you would like to see improved in certain ways for the next four (4) days? Because ma --

MR. TODD SLACK: I would like it to be hotter in here.

THE FACILITATOR EHRLICH: In the microphone that was the -- that was Todd Slack requesting that it become hotter in here. I assure you that at least there'll be some hot air at some point in the next four (4) days and maybe that'll help raise the temperature.

I'm happy to see what -- by your silence at this point seems to be such a satisfied bunch. Thank you very much for bearing with us for a long period of -- of pretty intense discussion on a very technical and complicated subject.

I appreciate that the developer has made real efforts to be forthcoming and to prepare thoroughly for this, it's obvious. And, you know, the developer's good intentions, and goodwill are indicated in part by the presence, of, you know, higher management and by the fact that you're fielding questions about a very complex project and clearly have got the team you need to do it well. So that's very helpful.

I'd like to thank everyone who flew into town for this as well. I know that many of the consultants are not from here. This is one (1) of the most specialized rooms we've ever had in any of our EA processes.

Save your energies for the remainder of the week, four (4) more days. We're only 20 percent in but we're through, what I suspect, one (1) of the more complicated technical subjects as well.

So with that I'll -- I'll put a break in it. We're going to start at 9:00 sharp tomorrow morning. Thank you.

--- Upon adjourning at 4:55 p.m.

Certified Correct,

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Ms. Wendy Warnock