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Chair

Mr. Leon Benoit

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● (1530)

[*English*]

The Chair (Mr. Leon Benoit (Vegreville—Wainwright, CPC)): Good afternoon, everyone. It's good to be back here again for our Wednesday meeting.

We're continuing with our study on resource development in northern Canada. We have witnesses back—I see it's not all the same witnesses—from the Department of Natural Resources today to take over from where we left off when the last meeting was interrupted.

We have with us Dr. Brian Gray, assistant deputy minister, earth sciences sector; Dr. John Percival, program manager, geomapping for energy; Dr. Donna Kirkwood, acting director general, Geological Survey of Canada, central and northern Canada; and Linda Richard, coordinator, geomapping for energy and minerals.

Welcome to you all. Thank you very much for coming today,

If we could start, Dr. Gray, with your presentation, then we'll get right down to questions and comments from members.

Dr. Brian Gray (Assistant Deputy Minister, Earth Sciences Sector, Department of Natural Resources): Thank you. It's a pleasure to be here again.

What I thought we would do, based on the questions we heard last time and some of the uncertainties, is focus this short presentation on two areas. One is to give a little more detail about the tool box that we have at our disposal in the geosciences. The second is to go into a little more depth on the outputs we have, how we disseminate information and, within that, how we engage communities.

[*Translation*]

Let's look at page 2.

Each layer in the image to the right represents a specific type of dataset: bedrock geology, surficial geology, geophysics, geochemistry, geochronology, mineral showings, topography, satellite images, etc.

Note that the layers depicted here do not correlate with the depth below the surface, rather they are best thought of as tools in the geoscience toolbox. Consequently, depending on the type of problem that we are tackling, we will choose the appropriate series of tools from the toolbox. Data can be acquired remotely, for instance through satellite imagery, geophysical airborne surveys, by surveys in the field, or in the lab.

Today, in this presentation, we provide three examples, wherein three different tools are used.

The first example is on page 3. In the north, most of the bedrock is covered by glacial debris left behind 8,000 years ago; these are known as surficial deposits. In order to understand the geology of the rocks hidden beneath the till, we use geophysical surveys. In this slide, we have removed the surficial deposits—left image—to show you what the geophysical survey sees. Geophysical surveys provide us with physical properties of the rock, for example the magnetic field of the bedrock. Hidden mineral deposits can be detected through the glacial overburden, which may be as much as 100 metres thick. This allows geologists to trace units and produce interpretative maps, even when they can't see the rocks.

In summary, we use geophysics to provide an image of the bedrock and to highlight mineralized environments.

● (1535)

[*English*]

Turning to page 4, the second example, we have to recall that glacial ice up to two kilometres thick once covered this part of Canada during the last ice age. The glaciers ground up rock and material and distributed it across the land, as I explained with the previous slide. Buried deposits have halos or trails of mineral concentrations, sometimes kilometres long, that lead back to the source of the mineral.

Geochemical maps, shown in the image on the left, provide an indication of the types of mineral deposits to expect, and clues as to where to find them. Geochemical anomalies help identify prospective areas and possible mineral deposit types.

The third example is on page 5. Another tool in our tool box is geochronology, which deals with the age of the rock. We may identify the need to determine the age of certain rock units to understand the geological history of an area. With this understanding, we can formulate new hypotheses, and develop a new geological framework or frameworks. This helps focus exploration on the most prospective units.

The image on the top is a geological bedrock map identifying different geological units found on the Melville Peninsula in Nunavut. A grain of zircon is extracted from a rock unit, which is the middle left image. It is then analyzed with the sophisticated laboratory equipment that you see in the bottom photo.

One grain can yield a complex history, as we've tried to illustrate here. This is one grain. You can see, in this case, there are two different ages from two different geological events. These ages are depicted in millions of years. The outer part of the grain is 1.8 billion years old, and the internal grain is 2.5 billion years old.

This approach helps to pinpoint age of mineralization versus the age of the formation of the rock. Later, during the question session, our experts can get into why that's important. Information acquired through the various tools, such as these three I've just highlighted, are integrated to produce a final interpretation of the geology, including an assessment of prospective mineral environments and exploration potential.

[*Translation*]

Let us move on to page 6.

You will recall that at the last meeting, we talked about our outputs in the annex. The following slides highlight additional facts on GEM outputs.

GEM has conducted 24 geophysical surveys across the north, covering an area roughly equivalent to the size of Newfoundland, Labrador and Nova Scotia combined. The primary purpose of these maps is to help guide field mapping, by imaging major features. However, exploration companies also use this information directly to identify new targets.

Let's move on to page 7.

GEM's 424 publications are available free of charge to the public for download on NRCan's fully searchable GEOSCAN database. These files include geophysical surveys, geological maps, raw data and scientific articles which have been subject to the peer-review process.

The GEOSCAN database also includes metadata and abstracts for several of GEM's scientific and technical presentations. GEM researchers have made more than 284 presentations at industry oriented events. Examples of such events include the annual provincial and territorial open houses, such as the Yukon Geoscience Forum and the Nunavut Mining Symposium. Scientists have also made 93 scientific presentations at societies and scientific associations conferences such as the joint meeting of the Geological Association of Canada and Mineralogical Association of Canada or the American Geophysical Union annual meeting. They also supervised the 16 thesis publications which have already been produced by the program.

Finally, note that delivery strategies vary on a project to project basis.

● (1540)

[*English*]

Turning to page 8, the GEM technical information is being made available to local communities as well. For example, a web service tool is being developed by Arctic College in Iqaluit to make local geoscience accessible to northerners.

The Arctic College is using GEM Cumberland Peninsula information, and this is being done via a GEM grant that we have given Arctic College. This web service tool is being updated with new GEM data and information as it becomes available.

Moving on to page 9, all of this information is released to the public free, and it's accessible online. NRCan is recognized as a leader in open data, which is to make data available all for free. GEM is making all data, information, and knowledge available online at no fee, and through an unrestricted licence. This ensures a level playing field within industry and between industry and communities. Open access to our information is helping promote Canada's north to investors.

GEM publications can be discovered from more than one dissemination portal. I've already mentioned GEOSCAN, but there's also GeoPub, GeoRef, CrossRef, Google and Google Books. As well, there is an RSS news release function that can be subscribed to.

GEM also provides geoscience information to multiple stakeholders. We provided many examples, in our earlier presentation, of how GEM information supported industry decisions, but the same information can also help northerners make sound, sustainable economic decisions. What we've tried to illustrate in this slide of the surficial geology map is that it is not only important for the exploration industry to understand the underlying glacial history for the source of precious metals or diamonds, but it also can be used by land use planners to identify sources of aggregate or areas of permafrost sensitivity. In developing geological mapping, the open data is useful to not only the development industry but also to the planners of towns and territories and provinces.

Moving on to page 10, there are essentially three phases, if we could simplify, to our community engagement. We start at the beginning with letters, community meetings, and we acquire permits that are necessary. We meet with the Inuit, first nations, and Métis to acquire traditional knowledge. During the project, we hire field assistants whenever we can who are local. We hire wildlife monitors, as I discussed at our last meeting. We present public presentations and we develop, where feasible, field courses. In part three, the closure and beyond, we develop workshops, school presentations, we work with local levels of government, post-secondary institutions, and we transfer various sorts of knowledge.

The GEM program has developed its community engagement practices under the guidance of the advisory group of northerners that I mentioned at our last appearance. I remind you, this advisory group of northerners provides advice to the GEM program from a northern perspective regarding community engagement during project development, planning, delivery and communication of results thereafter. This advisory group of northerners includes representatives from aboriginal communities and associations, territorial governments, educational institutions, and northern exploration industry.

Moving on on to the final slide, page 11, I'd like to make three points here. First of all, with reference to the goals of the program, GEM has made notable progress in our first three and a half years. We are already seeing significant use by industry of GEM information. We're seeing new investment in the north, and some encouraging discoveries to date. Although not yet complete, the program—we feel—is on track to achieving the projected investment leverage.

Our second point here is that there is also evidence that GEM is achieving its goal of having communities use public geoscience information. The best example comes from the Cumberland project on Baffin Island, where the community has requested a short course on diamond prospecting and mining. Another example is a recent invitation to present at the annual Kivalliq regional mayors annual meeting to present GEM results in the Melville Peninsula area.

● (1545)

Finally, GEM is contributing to the training of the next generation of highly qualified geoscientists. At least 38 students are on their way to graduate degrees with northern research experience, and another 50 undergraduate students have also been trained. Early indications are that industry is welcoming these new young scientists into the workforce.

[*Translation*]

Mr. Chairman, this concludes my presentation. Thank you.

[*English*]

The Chair: Thank you very much, Mr. Gray. That was another extremely interesting presentation, a great way to start off today's meeting.

We'll go now to the seven-minute round. I have Mr. Allen to start, then Mr. Stewart, then Mr. McGuinty.

Mr. Allen, you have up to seven minutes, please.

Mr. Mike Allen (Tobique—Mactaquac, CPC): Thank you very much, Mr. Chair.

Thank you to our witnesses for coming back.

I just want to follow up on a couple of things. Toward the end of the presentation you talked about community engagement and also the advisory group and that type of thing that you're actually using. Do these folks with whom you are actually engaging follow through the whole process, and would they be involved, for example, when it comes to permitting or anything like that? Would your community engagement people be involved in any of that process as well?

Dr. Brian Gray: I think it would be best if I turned this over to Linda or Donna.

Linda Richard.

Ms. Linda Richard (Coordinator, Geomapping for Energy and Minerals, Department of Natural Resources): The advisory group of northerners is a group of 12 representatives from the three territories, and there are members from industry and from education, first nations people, and government representatives.

We meet with this group every six months and we have discussions about some of the challenges we are facing on the delivery of the program. It also provides advice in advance to avoid certain issues. That is its role. It provides regular advice.

The permitting process is a different process. Yes, the group will provide advice. For example, it has advised us about traditional knowledge to ensure we incorporate traditional knowledge in our submissions on permitting. That is the type of assistance it gives us in the permitting process.

Mr. Mike Allen: Thank you.

Just going on a little bit from that process and going to the next phase of questioning, when you look at the proportion you have mapped as part of GEM now, what percentage have you mapped now versus the next phases you are going to do?

Specifically, in one of the early meetings we had on this, we had a map of the territories that showed some of the sensitive areas. Now we see other maps where some of the resources are actually located.

For example, on your slide 9 you have the permafrost and you have some other areas. Do you anticipate you've going to do an overlay of some of the minerals and some other things with the sensitive areas so that when someone goes in and actually looks at an area, you have all that information in one place so that the sensitive areas can be seen as well as the minerals, and ways can be considered to actually mitigate impacts?

● (1550)

Dr. Brian Gray: That's an excellent question. I'l let Donna answer that, as the director general for this program.

There are two programs we have going on. We have the GEM program, and we also have an ongoing program of environmental geoscience. That group is looking in the north specifically at vulnerabilities associated with melting permafrost.

Donna, perhaps you could go into a little more detail on how we get the GEM program information and our environmental geoscience together.

Ms. Donna Kirkwood (Acting Director General, Geological Survey of Canada, Central and Northern Canada, Department of Natural Resources): Thank you.

The GEM program objectives are clear. They are to map the north to modern standards, to produce the geoscience knowledge upgraded so that industry will have the right information to reduce its risks for exploration, and also, as we said, to provide updated knowledge for communities for their land use decisions. Those objectives are clear.

Things like permafrost sensitivity, for example, if that's what you mean by sensitive areas, are things we are not necessarily mapping for under the GEM program. But in our other programs, which Dr. Gray referred to—the climate change geoscience program or the environmental geoscience program—as we are gaining this new knowledge and this new information on the north, if the information acquired has some impact on our other program objectives, we'll integrate that into our new project planning but not in the GEM program per se.

It also does provide us internally with some additional information on the geoscience knowledge that we would look into more in depth under the other programs, but not necessarily under the GEM program. That was not in the objectives of the GEM program to start off with.

Mr. Mike Allen: The intent would be to have a strategy to try to knit these things together, is that true?

Ms. Donna Kirkwood: Eventually, at the end of this five-year program, we'll see where we are and what information we have garnered, and that will certainly potentially be integrated into our A-base programs, our other programs: climate geoscience program, climate change geoscience, or environmental geoscience program.

Mr. Mike Allen: Okay.

When you look at the technologies and techniques involved in collecting all this information, we had some people in here—I wasn't at the meeting—with some pretty neat technology from the planes; they could do some pretty neat things in terms of looking at this.

Who are the main providers of this? Is it the federal-provincial agencies? Is it mostly the private sector? And who's collecting all this information? Obviously you're trying to knit this together into one little quilt called the north. How does that all come together? Who's providing these technologies?

Dr. Brian Gray: I think we'll let Dr. Percival take that one.

Dr. John Percival (Program Manager, Geomapping for Energy, Department of Natural Resources): We collect geological and some geophysical information, but to plan our work we make use of whatever information is out there and available, information that can be obtained for free or purchased. For example, satellite imagery that's collected through commercial enterprise is available. That's a useful tool for planning where we're going to go on the ground and work. It makes our work much more efficient.

We're not involved in collecting all the different data sets that relate to the north. We do collect some that are relevant to our program, and then we use others that are relevant as well.

Mr. Mike Allen: Who actually owns the technologies?

Dr. John Percival: The technologies?

Mr. Mike Allen: Is it the private sector?

Dr. John Percival: Things like Radarsat, and....

Dr. Brian Gray: Right; if we're talking about Radarsat, then that would be Radarsat-2, and it's MacDonald, Dettwiler and Associates. That's their satellite. We have an agreement as the federal system to have access to all the data through a licence agreement, but I think in airborne geophysical work we would be using private sector.

Dr. Percival.

● (1555)

Dr. John Percival: We use the private sector to acquire the data, but we own the data.

Mr. Mike Allen: We may own the data, but we provide it open source, free?

Dr. John Percival: That's right.

The Chair: Thank you, Mr. Allen, your time is up.

Mr. Stewart, you have up to seven minutes. Go ahead, please.

Mr. Kennedy Stewart (Burnaby—Douglas, NDP): Thank you, Mr. Chair.

I think these two presentations have shown very impressive technology and use of this information. I'm beginning to understand how valuable this mapping information is for kick-starting exploration and later extraction, so thank you for your presentation.

I also like how you make efforts to share this information with industry and public institutions. Being from an academic institution, I'm glad you're helping to graduate so many master's and Ph.D. students.

I'm interested in just how far GEM can go in terms of identifying all types of energy sources. I'm especially interested in how geomapping might be employed to identify and map renewable resources such as geothermal, wind, waves, tidal, solar, anything that would be renewable. I envision maps that would look like these, but would have different kinds of resources other than oil or other minerals.

Just to follow up on Ms. Kirkwood's point that this again might reduce the risks for industries that are interested in investing in those kinds of resources in the north, does the department have any kind of capacity to use this geomapping to go beyond mapping mineral deposits and perhaps map other types of renewable energy resources?

Dr. Brian Gray: I can start that, and then my experts can correct me if I'm wrong.

On the geomapping program we would not be able to have any sort of mapping of renewable energy related to wind, tidal, or solar. On the geothermal side—this is where I can get a little help from my colleagues—the Geological Survey of Canada recently released a publication on a “geothermal potential” map of Canada.

Donna, I don't know how far north it went, if it was all of Canada or if it was south of 60.

Ms. Donna Kirkwood: It incorporated information that was available on all of Canada.

Dr. Brian Gray: Okay.

So it was the information available, not where it was necessarily economically feasible—just as our geological maps are not where it's economically feasible; it's just “Here's the geological information.”

Mr. Kennedy Stewart: We've heard a lot from the mining industry about how they're looking for alternative power sources. They use diesel at the moment and a bunch of other generators.

Would you say this would be in the early phases, and it's perhaps something that the industry could...? You know, do they ever take advantage of that? Do you have any enquiries from companies in terms of trying to harness those resources, the geothermal in particular?

Dr. Brian Gray: That really isn't in my domain, the science sector. My colleague Anil Arora, in the metals and minerals sector, deals directly with the mining companies, mining associations, in, for example, the green mining program.

Mr. Kennedy Stewart: So you don't currently do the other stuff—solar and wind and tidal—but what types of technologies would be needed to do that? Would that be something your department could expand into? Is that something we could consider investing in as a government?

Dr. Brian Gray: Well, taken bit by bit, the wind side, no; I would see the Meteorological Service of Canada as having the expertise on wind information in general. The solar side would probably be our energy sector, as well as the geothermal. The economic uptake side or feasibility would be the energy sector.

Mr. Kennedy Stewart: These sources of information seem a bit disparate. Would that be something that NRCan could do to aggregate that information and put it into one spot, to put it into a giant mapping program like you've got here, which could show not only minerals but also those other resources? Is that something you could feasibly see your department doing?

Dr. Brian Gray: I think those questions would be best posed to my colleagues in the energy sector or to my deputy.

Mr. Kennedy Stewart: Okay. Right: so if we're going to take one area to move into, perhaps, not all of them—you mentioned geothermal—are there any other possible energy sources that you could see this technology identifying and, again, reducing the risk for companies interested in investing?

● (1600)

Dr. Brian Gray: I can speak on the tidal, for example. We are engaged in what's called geohazard research. We are, on the east coast, for example, and the west coast, where companies or provinces are interested in developing tidal energy. Essentially you have generators underwater, sitting either on the bottom of the ocean or suspended in a manner where you're reliant on the substrate. We do research in the risks associated with where you place these things. We're developing geohazard maps on the bottom of the oceans.

The main things you have to worry about there are underwater landslides that may or may not be related to an earthquake. You have to worry about sediment loading in water moving underneath.

So from an industry support standpoint, we do that, and that helps in traditional energy development but also in potential new energy development.

Mr. Kennedy Stewart: Okay.

That information could actually be used in combination with, say, information from the Department of Fisheries and Oceans to give companies a sense of where perhaps they could locate these generators, not only geologically but tidally.

Would that be something on which you might advise the company that was interested in investing in...?

Dr. Brian Gray: Our energy sector might be involved in where best to situate it from a tidal-power standpoint. I frankly don't know. But where we would be engaged as a sector would be that if you decide that this is the best possible place to put it because of the current and the maximal use of available natural energy, we'd be the ones, the Geological Survey, who would look at whether it would be a safe place to put it—i.e., would it be something that would exist for 10 or 20 years, or whether there'd be a likelihood of some sort of geological failure that would create a loss of this huge investment.

Mr. Kennedy Stewart: That information is available for free?

Dr. Brian Gray: The geohazard? Yes, we create geohazard maps, so as soon as we are ready, that information is published.

The Chair: Thank you, Mr. Stewart.

Mr. McGuinty, you have up to seven minutes.

Mr. David McGuinty (Ottawa South, Lib.): Thanks, Mr. Chair.

Welcome back, folks.

Dr. Gray, the last time you were here, on October 19, I asked you whether you had seen or had a plan, or were working from a climate change plan in terms of your good work on climate change and the climate change impacts and adaptation directorate.

You talked a little bit about the research that was going on, but you were very open in your answer in saying that you don't have a plan, you've never seen the plan, and you're not working from a plan. I want to pick up on that answer.

You did say, however, that your climate change impacts and adaptation directorate is working on things like permafrost, ocean activity, shorelines, and future development.

Dr. Brian Gray: In conjunction with the Geological Survey of Canada, yes.

Mr. David McGuinty: Absolutely.

First, can I get sense of how much money the earth sciences sector of NRCan manages? How much do you manage as the ADM for this sector every year, roughly?

Dr. Brian Gray: It's a bit of a moving target, but in general terms, this fiscal year, Mr. McGuinty, it's about $180 million.

Mr. David McGuinty: Of the $180 million, how much is being spent on the climate change impacts and adaptation directorate?

Dr. Brian Gray: Off the top of my head, I can't tell you, but it would be in the neighbourhood of $5 million.

Mr. David McGuinty: About $5 million.

To your knowledge, is there another climate change impacts and adaptation initiative government-wide that's investing at the same time as you are in trying to figure out what's happening in that context for Canada? And this is for Canada, right? It's not only for northern Canada but Canada-wide.

So it's a $5-million budget to prepare Canadians for the impacts and how to adapt to climate change nationwide, is that right?

Dr. Brian Gray: Yes, $5 million to $7 million.

Again, I'd be happy, Mr. Chair, to circle back with the actual facts on that. I didn't bring them, so it's top-of-head.

Mr. David McGuinty: No problem.

If it's $5 million to $7 million out of $180 million, it's maybe 2% or 3%. I'll come back to you on that in a second, if I have to, but I want to go back to your comments about how this is affecting permafrost, ocean activity, shorelines, and future development.

A couple of times I've been asked to stop asking questions about climate change and its relationship to this northern Canadian development study, which I won't do, because I'm not sure how one would do that.

I'm really pleased today to see my Conservative colleague Mr. Allen ask questions that talk about the overlay that I'm trying to get at here—namely, how do we deal with this wonderful opportunity in northern Canada's development potential while we're struggling with what I only can conclude is an invisible climate change plan for the country?

Can you tell us, and Canadians who are listening or reading or watching at some point in the future, what is happening right now? In brief, from your research, your $5 million to $7 million research, what's going on with our ocean activity right now in terms of climate change? What's going on with our shorelines? What's going on with permafrost?

You can freelance on this, Dr. Gray. You've a long background, I understand, in biodiversity and biological subjects.

What's going on, for example, with belugas and polar bears and habitat? What are we seeing?

● (1605)

Dr. Brian Gray: Mr. Chair, I thought I was here today to talk about the earth science sector's programs.

I'm no longer an official responsible for those areas, Mr. McGuinty—the biodiversity, for example.

I'll take the direction of the chair on this.

The Chair: Mr. McGuinty, you were referring to me—

Mr. David McGuinty: Stop the clock, Mr. Chair, while you're talking to me, right?

The Chair: —suggesting before that maybe you'd want to keep your questions on the topic we're actually dealing with today. That's all I was suggesting. I wasn't saying to stop asking questions on anything, for that matter, but this is what happens when you start asking questions that aren't in the area that the witnesses are expert in. They don't have the information, and that's to be expected.

Mr. David McGuinty: Mr. Chair, I'm very confused, then, because our analyst today produced a paper for the guidance of our committee members to ask questions, in which it says the earth sciences sector of Natural Resources Canada deals with a series of things, including the climate change impacts and adaptation directorate.

So I'm asking questions about the responsibility that Mr. Gray has for this directorate, and I'm trying to get a sense, for the $5 million to $7 million that he is managing in terms of climate change impacts and adaptation research, of what are the overall signs that we're seeing—

The Chair: Then I would suggest you get to it, Mr. McGuinty. We're starting the clock again, so go ahead.

Mr. David McGuinty: Well, sir, you interrupted me. I didn't interrupt you. If you're sure, Mr. Chair, that my remarks are not in order, you should intervene. If you're not sure, perhaps we should have another discussion offline.

Mr. Gray, perhaps I could ask you to pick up from where I left off. I'm trying to get a sense here of what are you seeing, from your $5 million to $7 million? What are we seeing in terms of climate change?

Dr. Brian Gray: To be clear, the impacts and adaptation group does two things. One is that periodically it leads the direction of the creation of the climate change impacts report. The last one was released in 2007-08. We take the lead for management purposes, but then you have the areas of expertise: from Environment Canada there'd be a piece on biodiversity, a piece on the climate system. Agriculture would be involved, the Canadian forest service of NRCan would be involved. In those periodic publications they are looking at the impacts of a changing climate on Canada, and they include the infrastructure side of things.

When dealing with the geophysical side of things, then it is our domain, either the Geological Survey of Canada through their environmental program, or through the impacts and adaptation group.

Mr. David McGuinty: Are we seeing any climate change impacts on the geophysical side? I don't need to know the process. What are we seeing?

Dr. Brian Gray: We're seeing glacial melt in our large northern glaciers. They are contracting, especially the land-based glaciers, as you know, in Greenland. With that melt would come sea-level rise. That's one parameter.

The other parameter we're seeing—this is not our domain, per se, but it has an effect—is that we're seeing, generally speaking, less polar ice. With that comes wave activity.

We're seeing increasing temperatures, ocean water and surface temperatures. Those coupled will cause permafrost to melt.

When you have permafrost at the edge of something that's normally ice, you don't have much erosion. But when you have permafrost melting, coupled with more wave activity...so instead of one week a year, or one month a year, depending how far north you are, you might be seeing two weeks, or a month-and-a-half, with something that's already melting. So you have two things happening at once that are causing coastal erosion.

That's the area where we're expanding our look to see how fast it is happening, where it is happening, and what mitigation measures, from an engineering standpoint, could happen.

● (1610)

Mr. David McGuinty: Is that my time, Mr. Chair?

The Chair: Yes, your time is up, Mr. McGuinty.

Mr. David McGuinty: Thanks very much.

The Chair: We go now to the second round, the five-minute round, starting with Mr. Lizon.

Go ahead, please.

Mr. Wladyslaw Lizon (Mississauga East—Cooksville, CPC): Good afternoon. It's good to see you again.

I would like to go back to your slide presentation. I would like to ask a few maybe more detailed questions.

With the GEM program you run, how much area is already covered by your geomapping north of 60? Is it half? Is it a quarter?

Dr. Brian Gray: I have a copy here from the last presentation we did, but it's very small. We showed you that about 40% of the north had already been mapped to modern standards. That left 60% of the north that had not. We used the best available knowledge at the time to target what I would call the best of the best areas—the areas that were most likely to have a high probability of having energy, oil and gas, minerals, or metals.

Those were areas we targeted. We talked with the provinces and the territories. We talked with the industry. We talked with locals. From available information and from meeting with northerners and industry, we targeted the 24 areas depicted on that map.

I can't say that there are boots on the ground covering half of the remaining 60%. There are not. But we're covering a significant portion of those areas that we thought had the highest probability of having energy and minerals.

Mr. Wladyslaw Lizon: I'll go back to your geomapping tool box. Would the method used on the 40% be geophysics?

Dr. Brian Gray: My experts can respond, but it would generally be a series of tool boxes. I don't think the entire 40% was geophysics.

Ms. Donna Kirkwood: In the 40% area that is sufficiently covered, a whole slew of criteria and different tools or methods were used to produce the geoscience knowledge of that area. It could be geophysical surveys. It could be geological maps drawn from field surveying. It could be geochemical information. Dr. Gray discussed the different types of geochemical information. It could be surveying and analyzing the rocks. It could be looking at specific minerals to date the rocks.

There is a whole bunch of information of that type that brings the geological context of that area to a level we would conclude is sufficient for industry to come in on their own to do more detailed work in a specific area. They will not literally dig deeper, but they will acquire more detailed information.

Mr. Wladyslaw Lizon: We heard a very interesting presentation here by the Canadian Space Agency, which does research in that same regard. Do you use the results of their work, and if you do, how do you marry the two together?

Dr. Brian Gray: Yes. First of all, I want to point out that it's not all their work. We have a Canadian Centre for Remote Sensing, and I'm very proud to say that yesterday we received the William T. Pecora Award in the United States, which is the highest level of recognition for an earth observation unit. That group has been around for 40 years.

So that group works with the Canadian Space Agency to, in my terminology, “make sense” of remotely sensed information from RADARSAT-1 and RADARSAT-2.

We have scientists within the Canadian Centre for Remote Sensing, and I'd be happy to come back and bring those experts with me, who develop applications that were not even thought of when these satellites were launched.

One of the applications is to look at the movement of earth. Is the earth moving one way or the other, or moving up or down? But there are other applications, not necessarily in RADARSAT. While RADARSAT can determine depth in shallow water areas and it can look at soil moisture, there are other types of satellites that we also use, such as the United States Landsat, for example. Geologists will use Landsat imagery where surface rock is available to get a gross idea of the terrain.

As I mentioned earlier, that leads you to do a little bit of inference, but you still need to get boots on the ground or to get geophysical information on the site.

● (1615)

The Chair: Thank you, Mr. Lizon.

We go now to Mr. Anderson for five minutes.

Mr. David Anderson (Cypress Hills—Grasslands, CPC): Thank you, Mr. Chair.

I want to pursue that a little bit then. I don't know how to put this, but what percentage of work is done with what technology?

We had a gentleman in here with a gravity detection system. It sounded like a really interesting new development on the technology. He seemed to think that it would eliminate some of the need to put people on the ground. It gives a little bit more precise measurements or whatever.

I'm just wondering, then, what percentage of your data comes from which technology.

Dr. Brian Gray: I'll ask Dr. Percival to respond.

Dr. John Percival: We generally use a combination of methods appropriate for the geological problem that we're dealing with. Traditionally we use some kind of airborne geophysics—like the gravity system that was described—to identify the major geological features that we can then plan our work around. If there are major features, we'll go in and identify what those are geologically. Then we can use the remote information to track them for some distance, for example, so that we know where that feature is going on the ground.

Mr. David Anderson: And then you put people on the ground?

Dr. John Percival: We put people on the ground once we've planned what we want to look at, and that makes our work much more efficient.

The Chair: Thank you, Mr. Anderson.

Unfortunately, the bells are ringing again. You are being interrupted again.

It means that we wouldn't get back here until probably a quarter after five, so we might as well at least not keep you waiting. I apologize for this. That's the way this place is sometimes.

Thank you again very much for your information and for the answers to the questions.

The meeting is adjourned.

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