MANITOBA CLEAN ENVIRONMENT COMMISSION

PEMBINA VALLEY WATER COOPERATIVE

SUPPLEMENTAL GROUNDWATER SUPPLY PROPOSAL

HEARING

TRANSCRIPT OF PROCEEDINGS

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FRIEDENSFELD COMMUNITY HALL

FRIEDENSFELD, MANITOBA

NOVEMBER 7, 2006

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Volume 1

APPEARANCES:

CLEAN ENVIRONMENT COMMISSION

Mr. Terry Sargeant - Chairman

Ms. Gisele Funk - Member

Mr. Ian Halek - Member

Mr. Kenneth Gibbon - Member

Mr. Doug Smith - Report Writer

Ms Cathy Johnson - Commission Secretary

Ms. Joyce Mueller - Administrative Secretary

PEMBINA VALLEY WATER COOPERATIVE:

Mr. Sam Schellenberg - CEO

Mr. Steve Wiecek

Mr. Harm Maathuis

PRESENTATIONS:

WATER CAUCUS- MANITOBA ECO-NETWORK

Mr. Glen Koroluk

Ms. Kimberly Balance

Mr. David Brooks

Ms. Lindy Clubb

Mr. Charles Scharien - RM Grey, RM Dufferin, Town of Carman, Village of St. Claude

Mr. Herm Martens - RM Morris, RM Montcalm and Town of Morris

PRESENTATIONS: (continued)

Mr. Art Petkau - RM Stanley, RM Thompson, City of Winkler, Town of Morden

Mr. Bill Zacharias - Director of planning and engineering for the City of Winkler

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TUESDAY, NOVEMBER 7, 2006
UPON COMMENCING AT 9:05

MR. SARGEANT: Could I ask you all to take your seats, please. We will start the proceedings. I would like to say good morning, ladies and gentlemen and welcome.

My name's Terry Sargeant. I'm the Chair of the Clean Environment Commission, as well as Chair of this panel. With me on the panel this morning are on my left Ken Gibbons, to my right Ian Halket and Gisele Funk. In addition to the panel, I would like to introduce staff and advisors who are assisting us with this review. At the desk just to my left, the Commission Secretary, Cathy Johnson; our report writer, Doug Smith; and at the door, our Administrative Secretary, Joyce Meuller.

I would like to call these hearings officially to order. The hearings on the proposal brought forward by the Pembina Valley Water Co-operative. First of all, I would like to begin by thanking all of the participants for their involvement and the efforts they have put into the process leading up to this event.

The purpose of CEC Hearings is to

provide an open and accessible process to allow for public input into decision-making. This will assist the Clean Environment Commission in providing recommendations to the decision-makers as to the merits of this particular proposal. This, in turn, will assist decision-makers to come to the correct decisions by providing diverse, well-reasoned and well-informed perspective on the merit of this proposal. To achieve this we will strive, as much as is reasonably possible, to ensure a thorough and comprehensive review.

The Manitoba Clean Environment Commission is an arm's length agency of the Province of Manitoba. We derive our authority from the Manitoba Environment Act. We conduct these hearings, in general, in accordance with the process guidelines with respect to public hearings. These guidelines help to ensure that the hearings remain fair and open forums for the exchange of information and ideas, and that they provide full opportunity for public involvement in the environmental assessment process in Manitoba.

We strive to be as informal as possible. However, hearings in respect of complex projects do require some structure. Still,

flexibility and common sense will be given preference over rigid bureaucratic rules.

We are here today at the request of the Minister of Conservation to conduct a public hearing in respect of this particular proposal put forward by, as I've said a moment ago, the Pembina Valley Water Co-operative. This proposal is to construct a water pipeline from an area to the north of the community of Sandilands to a Water Treatment Plant owned by the Co-op in Morris, Manitoba.

The Commission was mandated to conduct the hearings to consider the potential environmental, socio-economic and cultural affects of this proposal. At this point, I would like to call on the Commission Secretary, Kathy Johnson, to read into the record the scope of the Commission's review as set out by the Minister.

MS. JOHNSON: This letter is dated May 26, 2006 from the Minister of Conservation to the Chair of the Clean Environment Commission.

"Dear Mr. Sargeant:

The Environmental Assessment and Licensing Branch of my department has received an Environmental Act Proposal

from the Pembina Valley Water Co-operative Inc. for the development of a supplemental groundwater supply system for municipal water supply, sourced in the Sandilands vicinities. Based on the many public concerns and requests for further environmental review of this project, I have decided that a public hearing should be conducted by the Clean Environment Commission. Terms of Reference for the public hearing are enclosed. The hearing should be conducted as soon as practicable and the report on the hearing should be submitted to me as soon as possible following the hearing.

Ms. Tracey Braun, Director of the Environmental Assessment and Licensing Branch, will coordinate department participation in the hearing."

And I now move on to the "Scope of the Review" in the "Terms of Reference":

"For the potential environmental effects of the Proposal, the

Commission shall consider the four reports associated with the Proposal, and public concerns, and provide a recommendation on whether an Environment Act Licence should be issued to the Pembina Valley Water Co-operative Inc. for the project.
Should the Commission recommend the issuance of an Environment Act Licence for the Proposal, then appropriate recommendations should be provided respecting:
the potential environmental effects of the proposed water withdrawals from the Agassiz Sandilands Upland area aquifer complex and its movements by pipeline to the proposed service area;
measures proposed to mitigate any adverse environmental effects resulting from the project and where appropriate, to manage any residual adverse effects; and
future monitoring and research that may be recommended in relation to the project.

The Commission is requested to make
non-licensing recommendations on other
matters as appropriate. In
particular, recommendations on matters
that are regulated by other Manitoba
statutes should be addressed as
non-licensing recommendations pursuant
to the Environment Act.

The Clean Environment Commission's
recommendations shall incorporate,
consider and directly reflect, where
appropriate, the Principles of
Sustainable Development and Guidelines
for Sustainable Development as
contained in the Sustainable
Development Act."

And that's dated May 2006.

MR. SARGEANT: Thank you. The Commission is convening the hearing here in Friedensfeld for two days, today and Thursday. We will sit this evening to allow for presentations by members of the public. There is a Schedule of Proceedings available at the registration desk.

A few words about housekeeping issues. First, members of the public wishing to make a

presentation must register at the desk. Also, if you wish to receive a copy of the final report, you should also register at the desk.

Second, a verbatim transcript of each day of the proceedings will be posted on the internet the morning following each session.

And, finally, at the conclusion of the hearings, the Commission will make a report containing advice and recommendations to the Minister. The Environment Act allows 90 days, following the closing of the hearings, for this report to be submitted. Following the submission of the report, the Minister will determine the date upon which the report will be released to the public.

Let me give you a quick overview of the hearings and how they will proceed over today and Thursday. Following my opening comments, we will have a brief presentation from the Province of Manitoba on their role in the Environmental Review of this project. Following that, the proponent, the Pembina Valley Water Co-operative, will give us a comprehensive overview of their proposal. This will be followed by a cross-examination or questioning of the proponent

by members of the panel, as well as by the one registered participant, the Water Caucus of the Manitoba Eco-Network.

There will be -- and I expect this will be a bit after lunch, there will be an opportunity for members of the public to ask questions of the proponent. Let me just note that we will be breaking at 12, from 12 to 1 for lunch, and at 5:00 until 7:00 for dinner. Neither lunch nor dinner will be provided here, so you are on your own for that one.

This afternoon, following questions, the Manitoba Eco-Network will make its presentation. Panel members and representatives of the proponent may ask questions of the participant. After supper, this evening, there will be presentations by representatives of some of the municipalities in this region and an opportunity for some members of the public to have their way.

Thursday will be much like this evening. We will hear from municipal officials and the general public. And there will also be an opportunity for members of the panel to place any further questions to the proponent.

And before we close off Thursday afternoon, the Manitoba Eco-Network and the Pembina Valley Water Co-operative will have an opportunity to make final comments.

I should also note that all presenters will be sworn in prior to giving any testimony here over the next couple of days.

Finally, two things that I don't tolerate. One is cell phones ringing. I heard one dingling a little while ago. If I hear a cell phone go off, I'm generally known to pick it up and jump on it. I also don't tolerate any side conversations while people and the Chair are making presentations and questioning. If you feel compelled to engage in conversations, please step outside. Aside from that, let's get on with business. Ms. Braun, please.

MR. KOROLUK: Sorry, Mr. Chair, I just have a point of clarification before we start on the terms of reference.

MR. SARGEANT: Sure.

MR. KOROLUK: It is said, under the Scope of Review, we shall consider four reports. I just want some clarification if the two additional reports, one being the Pembina Valley

Water Co-operative Additional Information Submission of September 2006 and the Pembina Valley Water Co-operative Regional Master Plan that was requested in September by the Commission, are they going to be considered within the Scope of Review?

MR. SARGEANT: They will. Thank you, Mr. Koroluk. I noted that as Kathy was reading the Terms of Reference, the comments about four. These Terms of Reference were written up at a time when there were four initial reports. Subsequent to the Commission's review and the panel members' review, we sought further information. So those two reports that you specifically identified, and any other information that we would have received from the Pembina Valley Water Co-operative in the ensuing weeks and months, they are all on the table today and will be considered by the panel.

MR. KOROLUK: Thanks.

MR. SARGEANT: Ms. Braun.

MS. BRAUN: Good morning. Can everybody hear me? My name is Tracey Braun. I'm the Director of the Environmental Assessment and Licensing Branch for Manitoba Conservation.

MR. SARGEANT: Technology is wonderful

when it works.

MS. BRAUN: Sorry for that delay there. I am Tracey Braun. As I mentioned, I am the Director of the Environmental Assessment and Licensing Branch for Manitoba Conservation. And I am here this morning to present to you a brief summary of the process which was followed under the Environment Act for the Pembina Valley Water Co-operative Supplemental Groundwater Supply System Project.

I basically organized my presentation as follows. I am going to give a brief overview of the chronology focusing on key milestone dates that happened. I am going to provide a summary of the public consultation process, a summary of the responses that our branch received as part of this process. And then I'm going to recap with some post-hearing steps for Manitoba Conservation, what we're going to be doing when this hearing closes on Thursday.

Okay, the chronology of the process. As is our normal process, and I have listed that here, we received an Environment Act Proposal from the proponent on December 14, 2005. And as we normally do, we assigned it to a Branch Technical

Coordinator Project Manager. And for this particular project, that person is Bruce Webb. And you will see him at the front desk. He will be here with me during the hearing for this project.

We distributed the proponent's submission to our Technical Advisory Committee on December 19th. And that Technical Advisory Committee consists of members of the Provincial Government. And have I listed them out here, agriculture, food and rural initiatives; conservation; culture and tourism; health; transportation and government services; industry and mines; intergovernmental affairs and trade; water stewardship; and Seine-Rat River Conservation District. We also sent the proposal out to our Federal agencies through the Canadian Environmental Assessment office.

MR. GIBBONS: Ms. Braun, if you could click on slide show there, we could get a bigger view of the slides. Just click it and it will advance.

MS. BRAUN: Anyway, the last goal I also wanted to say that circulating it through the Federal agency is part of our Manitoba-Canada

agreement on Environmental Assessment cooperation.

The project was advertised in the Emerson Southeast Journal on January 14, 2006; and, also the Steinbach Carillon on January 5, 2006.

It was placed in the following public registries: Main Street Library of Manitoba Conservation, Manitoba Eco-Network, the Winnipeg Public Library, and the Jake Epp Public Library in Steinbach. Copies were provided to the Rural Municipalities of Piney, La Broquerie, Hanover, De Salaberry and Morris.

The deadline for the public and TAC comments was January 30, 2006. We do normally give a 30-day period for that review. In this particular case, we extended it to February 6, 2006 because we missed the cut-off date for one of the local newspapers, so we wanted to make sure that we gave that extra time.

As a result of the Public Review, we received 27 submissions. One was from the Seine-Rat River Conservation District. We had the letter from the Buffalo Point First Nation, four rural municipalities filed submissions. The City of Steinbach. We had four other non-government

organizations. We had numerous private citizens. And we had a petition. And throughout that, there were numerous requests for a public hearing.

In terms of the TAC comments, we received comments from 7 provincial agencies and two federal. There was no additional information, technical information, that was required from the proponent in order to address those TAC comments. All public and TAC comments were placed in the public registries on February 16, 2006.

A summary of the public concerns that were raised: Aquifer sustainability, the withdrawal impacts, water demands and use, and that's for present and futures, and then the relationship of the project with other water management policies and projects.

After assessing all of this information, the Minister of Conservation requested that the Clean Environment Commission hold public hearings. And he made that request on May 26, 2006. The Terms of Reference were provided to the Commission. And we heard those earlier this morning. And the Environmental Assessment and Licensing Branch notified all of the public participants about the hearing on

June 2, 2006. And then subsequently, at that point, the CEC process commenced leading to the hearing here today.

So then what happens, well, from an Environmental Assessment and Licensing Branch perspective, we attend the hearing today and on Thursday. And we will await the presentation of the Commission's report on this hearing to the Minister. And based on the results of that report, a licensing decision would be made. If there are recommendations that are not followed, notification must be given to the Commission about that. Notification will also be given to the public participants. And then all of this information will be placed on the public registries.

And so, basically, that concludes my presentation this morning. And I would like to thank the Commission for the opportunity today to make this presentation. I look forward to the hearing, and receiving the CEC report. Thank you.

MR. SARGEANT: Thank you, Ms. Braun. Mr. Schellenberg, would you and your group take the stage?

MS. JOHNSON: Mr. Chairman, while

these gentlemen are playing with the technology again, I would like to read into the record the exhibits. Exhibit Number 1 will be the letter from the Minister. Exhibit Number 2 will be the Terms of Reference. And Exhibit 3 is Tracey's presentation.

(EXHIBIT 1: Letter dated May 6, 2006 from the Minister)

(EXHIBIT 2: Terms of Reference)

(EXHIBIT 3: Ms. Braun's Environmental Assessment Process Presentation)

MR. SARGEANT: You seem to have better technology out there in the private sector than we have. It works at first.

MR. SCHELLENBERG: Thank you, Mr. Chairman, and Commission and ladies and gentlemen.

MR. SARGEANT: Mr. Schellenberg, I would like each of to you state your names for the record and then I will ask Ms. Johnson to swear you in.

MR. SCHELLENBERG: Fine. I'm Sam

Schellenberg, the Chief Executive Officer from the Pembina Valley Water Co-operative.

MR. MAATHUIS: My name is Harm Maathuis. I'm a hydrogeologist.

MR. WIECEK: My name is Steve Wiecek.

MS. JOHNSON: Gentlemen, do you know that it is an offence in Manitoba to knowingly mislead this Commission?

MR. SCHELLENBERG: We do.

MR. MAATHUIS: We do.

MR. WIECEK: We do.

MS. JOHNSON: Do you promise to tell only the truth during this Commission?

MR. SCHELLENBERG: We do.

MR. MAATHUIS: We do.

MR. WIECEK: We do.

MR. SCHELLENBERG, MR. MAATHUIS, MR. WIECEK: SWORN

MR. SCHELLENBERG: Starting, Mr. Chairman, we had to change projectors for our display, so that was the delay.

Good morning, gentlemen. I will be presenting the first part of this presentation, and giving you the background to the request, and giving you background and information related to the Water Co-op. And then we will move into the

hydrogeology, which will be handled by my colleagues at the front table.

So we will move forward with the basic information first and take it from there. The Pembina Valley Water Co-operative was incorporated in 1991, and is owned and operated by 18 municipal governments. And those are the towns of Altona, Carman, Gretna, Morden, Morris, Plum Coulee and Emerson. It includes the City of Winkler, the Village of St. Claude. And the Rural Municipalities of Dufferin, Franklin, Grey, Montcalm, Morris, Rhineland, Roland, Stanley and Thompson.

The mandate for the Water Co-op is to provide treated/potable water to its members. And the Co-op is governed by a board of 18 members made up of each of those owners. It operates like a private sector company from a governance and accountability perspective. However, it is a municipal entity and, as such, is tax exempt and is also non-profit.

To give you some background as to the start of the Pembina Valley Water Co-operative, it grew out of the Pembina Valley Water Task Force, which was established in 1988. And this Task

Force, as many of you may recall, 1988 was a period of very low water levels, and in many areas drought. And the Task Force was asked to address water shortages in the region. Initially, there was about six or seven municipalities that came together, that grew to 12, to address this issue.

In this pursuit, they were assisted by federal, provincial and private sector consultants addressing water needs for initially the 50 year horizon. They then reduced that to 20 years, which was considered to be more realistic, especially after encountering some concern related to the length of the 50 year horizon.

The Federal and Provincial Government, by the way, provided a Technical Advisory Committee to this function. They then delivered a 400 plus page report in February of 1991 at the Morris Stampede Centre. And that was delivered to both Federal and Provincial cabinet people and department heads. And the proposal then underwent extensive CEC review in 1993 and '94, culminating in environmental and water rights licensing for the Pembina Valley Water Co-operative's existing system.

In our existing system, the Pembina

Valley Water Co-operative owns the water treatment plants and the pipelines and the ability to distribute to our members. Our three water treatment plants are located in Letellier, Morris and Stephenfield. The Letellier and Morris plants are on the Red River. Letellier produces 100 litres per second. Morris produces 35 lps. And Stephenfield, which is on Lake Stephenfield at the park, which is, of course, right by the Boyne River, produces 25 litres per second.

Our service area covers 3,500 square miles. We serve a population base of 45,000 plus. And in using our numbers, I should add that it would be nice to have the new consensus numbers available to us. Technically, they should be. But for all practical purposes, they are not.

This is, in fact, our distribution network. There we go. We serve an area up from St. Claude, which is our furthest extremity in terms of the north and west. Dominion City, a little east of Dominion City is the eastern border right now. And, of course, we serve Sperling and Rosenort, both in the RM of Morris. The Water Treatment Plant in Morris is located here on the Red River. This is Letellier. And Stephenfield

is up here.

The major centers that we provide water to are, of course: Altona, the City of Winkler, partially to the Town of Morden, Carman. That's where the distribution center is, here in Carman, and to the municipalities in this area. On the handouts, it will be clearer for you. The colours delineate the size of the lines which we use. And I should add, again, these are the major pipelines. This is what we need to distribute the water to our members.

We also own the Roland reservoir, by example, which helps us to balance supplies to Winkler and into Miami. We own the booster stations and the pressure reduction stations. We need pressure reduction coming down from Stephenfield to Carman and into Sperling. And, of course, we have to boost pressure up from the Red River, heading towards Winkler and other communities further west. The system works very well, and it provides water as required.

In our licensing, and as a matter of good natural resource management, all of the region's existing supplies are used to their sustainable yield. And this means that Morden

uses Lake Minnewasta for 90 percent of its supply. The City of Winkler is using, at the present time, the Winkler Aquifer for 60 percent. And Carman withdraws 65 percent of its supply from the Boyne River.

The Pembina Valley Water Co-operative is a user-pay wholesale supply system. There is no municipal development in our Co-operation. Water pricing includes principle and interest, operations, maintenance and delivery costs. In other words, it includes all of the costs.

And the wholesale cost is the same for all of our members. And at the present time, it is $5.40/1,000 gallons. And that is the 2006 price. And there are no volume discounts. There is no declining scale.

Our municipal members distribute water to their customers. And I know that from some of the questions we receive, municipal is not always clearly understood. Every one of our members is a municipal entity, if you would. We have rural municipalities. But the City of Winkler is also a municipal entity. And for that matter, so is the City of Winnipeg.

Our price, the end price, varies, by

the way, from $6.50 to $10/1,000 gallons, depending on which municipality is distributing and what their actual costs are. By comparison, the City of Winnipeg charges $4.46 with volume discounts. And the City of Portage La Prairie starts at $3.80/1,000 gallons and decreases to $1.02 for usage over one million gallons, which is a fairly dramatic price. And one wonders if that covers the cost of operations. They must be a lot more efficient than we are.

Water consumption rates the City of Winkler is at 268 litres per person per day, and that is the "all in" number. The Town of Altona, which is our highest number, is 373 litres per person per day. And there I make a note that Bunge, the canola crushing plant, which produces cooking oil, uses 40 percent of this supply. If you take Bunge out of the formula, their usage is 240 l/p/d. And rurally, including livestock, it changes from 199 l/p/d to 235 l/p/d for our nine rural municipal members. And by comparison, the City of Winnipeg is at 361 l/p/d and the City of Portage la Prairie is at 428 l/p/d.

Our water budget. This is the total water which was distributed by the Co-op in a

12-month period, from October '05 to October '06, and it is an exact number. I should perhaps give you some background in terms of litring. Every gallon that leaves the Water Treatment Plant is metered. Every gallon that enters one of our municipalities is metered. Every gallon that enters the community is metered. And so we have a very exact reading on what is consumed and by whom. And we, obviously, need that for billing purposes. It is also a good system to have in terms of making sure that you recognize leakage, in the event that it shows up.

So our total of water produced for that one-year period, that 12-month period is 700,470,372 gallons. Used by industry, basically 10 percent, 68 million plus. And the industrial use in our region is fairly minimal. And wet industry is something we, obviously, cannot consider. So one of the largest uses would be Bunge in Altona.

Used by the agricultural industry, it is 12 percent, 82 million gallons. And I know this number has been questioned. And based on other information, other projections that have been provided, particularly as it relates to the

Cochrane report, this is the actual number. And this includes the hog industries that are attached to our system, that got provided by our system. And the potato industry where washing is a big factor in terms of demand. It includes any other larger users for agricultural purposes. And we have pulled them out.

And used by our municipalities, it's eight percent. And, again, I should explain that this is, in fact, the water that they used in the municipality to fill the swimming pools, to make the ice in the rink, to clean the streets, if that's what they do with it. And it also includes fire protection, anything that's used in fire protection. And anything that is lost. And losses, given our system and the way it's set up, are readily and easily tabulated. That's eight percent.

And domestic use is the remainder, the 70 percent. And domestic use is what is used in the home and on the yard by the 45,000 plus people that we serve at home or in part.

Growth and future demand. The region grew 9.8 percent in population from 1990 to 2000. We are suggesting that this growth rate is going

to continue. In other material that we provided, we also added that in both Winkler, and in the Rural Municipality of Stanley, it is going to be faster and higher than that. And we will receive further information on that later on, but generally this is our projection.

The growth and water demand will reflect this growth factor of, say, 10 percent. And we suggest the per capita consumption, however, will decline over time. And I think everyone else, including the City of Winnipeg, is also suggesting this. And this is related to efficiencies, which we can now gain from front-load washers, from other water efficient devices which are coming into play in terms of our homes. And it is going to bring down the demand.

Water conservation, this is a critical component of our supply system. It was first addressed in the Task Force Report in 1991. And then it was prepared for the public record in 1996 and 1997, which was a condition of our licensing, by the way. It is reviewed on a regular basis.

It was most recently reviewed and reinforced in 2003, when we produced additional brochures bringing up-to-date the water saving

devices and water-saving measures that could be taken. And we also launched a radio advertising program at that time, which was fairly extensive. And we reviewed it again and talked to our public this year when, in May, June, especially, we had heavy demand on water and needed to have that cut back somewhat. And the public does respond. However, I would say that the user-pay pricing is probably the key element in any water conservation plan. And it is certainly a key element in our case.

The Water Conservation Plan that we put on the record back in '96, '97 recommended a Provincial Plan with priorities, Provincial priorities. And perhaps providing a template that the rest of us in the province could follow and, hopefully, would provide a challenge to all of us. Because in terms of water conservation, we can all do more. And this is something that needs to be encouraged.

In our own case, in terms of the agricultural usage, they are using considerably less than projected. They are using alternate supplies, wherever they can. And this is probably due to economics. It has, in no small measure, a

lot to do with our pricing. They are using technology, which is changing things both in the barns, and certainly on the field, in terms of high-tech sprayers which are able to do spot spraying much more efficiently on a computer model basis. And they are using common sense in terms of filling their tanks in their yards overnight in off-peak periods which provides some real savings for us.

The domestic users are in line with expectations. Water saving, water efficient fixtures, are used in new construction and renovations. And they are entering the Codes that are applicable in the municipalities that we serve. And building inspectors, of course, are now common and very active in all of our regions.

These measures are encouraged by the Municipal Governments, who also restrict lawn watering in much of our region, and use other common sense approaches to water conservation. And our municipal users, meanwhile, are controlling peak demands and doing so fairly effectively for us. And they are also on top of leakage, which is a critical factor, but one that can't be neglected when you pay for every gallon,

as they do.

And our industrial users, the demand has not grown on an industrial base, as there are no volume discounts. And we do not and cannot support wet industry. That's just a few comments on water conservation.

So why are we here? We have requested Environmental and Water Rights Licensing for a well and pipeline with the capacity of 50 litres per second. And that begs the question: What is the rationale for the Sandilands supply? We have a large and growing dependence on the Red River. We have no opportunity for increased supplies from the Boyne River, Stephenfield Lake Reservoir, or other local sources. And all of our present sources are extremely drought sensitive. And the dam on the Red River is, at the present time, our only resource in a drought emergency. And I might suggest that that is viewed rather dimly by many authorities, but it is the only solution that we have at the present time.

More specifically to Red River concerns, there is no minimum flow agreement between Canada and the U.S., nor is there likely to be one. And certainly if you are going to ask

Government: Are you talking or are you considering this? They are probably going to say: Yes. But the reality of the situation is it ain't going to happen. The Boundary Water Treaty Act provides no security. The U.S., North Dakota, Fargo and Grand Forks, in particular, are very dependent on the Red River for their water supply. And that's a growing dependence, as they have growing communities that require the supply. And they share our concern regarding drought and are taking measures.

And to demonstrate that, here is one which is taken out of their draft Environmental Impact Statement. It was also in their final Environmental Impact Statement. The highlighting is mine. This pipeline, which they are proposing, would capture Red River flows downstream of Grand Forks and re-circulate it back to Lake Ashtabula, which is on the Sheyenne River and feed it back for their usage. When this was presented at one of their public hearings, I asked the question: What would the flow be across the Red River when you put this into place? And I was told that it would be eight cubic feet per second. And that is barely a dribble.

The last time around, when we had dry periods, they were concerned about providing water to Pembina. That is alleviated because they can run a pipeline to Neche. And that is groundwater supply and that comes from quite a distance west.

This is what the river looked like in 1910. In 1936, that's the bottom of the river. This is 1970. And this is 1988. And in 1988, the Mayor of Morris, who is in the audience, walked across the river himself in regular boots. And he will be happy to tell about it if you corner him over coffee.

And in 1988 the Province had to go, hat in hand, specifically to the U.S., specifically North Dakota, and request additional releases from their impoundments. And those impoundments include Lake Traverse and Red Lake. At the time, they cooperated. And we were given what usually amounted to 32 cubic feet per second. And at that time, the only plant that we had on the Red River was at 32 litres per second, which is an awful lot less than we have right now.

I am suggesting that a similar request today would get a frosty response, given the relations between Manitoba and North Dakota, as

reflected in the number of water-related disputes between them, and demonstrated by the cases of litigation presently before the courts on both sides of the border.

So given that that's the scenario, and bear in mind that the area we serve is the second largest next to the City of Winnipeg, this growing diversified industrial base provides employment, not just in the region, but west, north and east of it. And by example, we have busloads of employees coming in from Winnipeg to Rosenort every morning and going back every evening. And we have, certainly, commuters coming in from considerably east of our area and also west.

With much of our economic activity being export oriented, the region brings new dollars to the province and provides a significant tax base. Given the important role that it plays provincially, and given its growing population base, to leave this area dependent on an uncertain U.S. supply of water is not prudent when this supply can be supplemented from Manitoba resources.

And this brings us to the specifics of the proposal. We are proposing a well north of

the Sandilands, and that is on the overhead right there. And we are then proposing to run the pipeline in disturbed right of ways, highway right of ways, down 404 to 12, across to St. Malo, down 59 to La Rochell, and down 23 to Morris. There will be more information on this in the next presentation.

Environmental mitigation and management practices. 98 percent of the pipeline route is disturbed right of way. All legislation and regulations will be adhered to as it relates to wildlife, wildlife habitat and fisheries concerns. Stream crossings and other sensitive areas will be completed using horizontal directional drilling to install the pipeline. And this is a technology that has matured. And it is certainly a technology of choice for us in many other areas as well. And the pipeline route was chosen to avoid environmentally sensitive areas. And if you look at that previous schematic, you will see that there was a more direct route, but we decided not to take that.

That concludes my initial comments related to background. I am now going to be turning it over to my colleagues at the table.

And they are going to be addressing the -- they are going to be the addressing the hydrogeology. They will talk to you in detail about the well and about the aquifer.

With me, and speaking first, will be Harm Maathuis. Harm Maathuis received his Master of Science Degree in hydrogeology from Vrije University in Amsterdam, the Netherlands. And since 1976, he has worked as a hydrogeologist for the Saskatchewan Research Council. His experience includes local and regional hydrogeological site characterizations, contaminant hydrogeology, groundwater monitoring, network design, reviews of monitoring data, groundwater observation, well networks and so on. He is going to provide an overall background for you.

And he will be followed by Steve Wiecek, who is going to be talking about the specifics in greater detail. Steve's background is a Bachelor of Science in geology and a Bachelor of Science in geological engineering from the University of Manitoba. And since 1982, he has been a practicing geoscientist and geological engineer. And his areas of practice include geological engineering, environmental geology and

hydrogeology.

So, Harm, I am going to pass this over to you and then to Steve to take it from here.

MR. MAATHUIS: If you don't mind, Mr. Chairman, and everybody can hear me, I probably prefer to stand and talk. It is a little bit easier.

MS. JOHNSON: Excuse me just one second. We need you to use the mike because the transcriber can't hear you without it.

MR. SARGEANT: No. We have a walk-around mike.

MR. MAATHUIS: I can do it like this, too.

MR. SARGEANT: We can give you a walk-around mike that you can just clip to your lapel, if you wish.

MR. MAATHUIS: Okay. Can everybody hear me? We will talk about the groundwater supply. So I will give a kind of general, very brief overview of what groundwater actually is. And what do we in terms of groundwater investigations, how do we go about it?

My outline will include a little description about what groundwater is, the

geological investigations related to groundwater investigations. We need to go through a number of definitions, and the number of data we collect as part of our investigations.

We, of course, have to talk about well yields. And when we talk about well yields, we need to talk about a few properties which are important for people doing the groundwater investigations.

So what is groundwater? Groundwater is something we stand on every day. We walk on it every day. It is the water below the surface of the ground where the sediments are being saturated. On ground level we have three zones there. The upper few metres below us are unsaturated, which means that between the particles -- that not all of the space between the particles is occupied by water. And then up to certain depths, everything is saturated and there is no air between the particles.

To give an example, here are some sands. The sand grains, if it is saturated, the groundwater and all of these pore spaces are being filled with water. You can also think about granite, or limestone, fractured then the water

will be in the fractures, but not necessarily in the rock itself. Some areas you can have limestone. You can have solution channels and there can be lots of water in those kinds of channels.

Now, how do we go about doing a groundwater investigation? Any information about the surface, the only way to get it, or the most common way to get it, is testhole drilling. You go out with a rig and you drill a hole. And you can did do it over a particular area. You look at the kind of holes which have been drilled in the past. As well, you drill some additional holes in the area of interest.

And then you want to have a 2 or 3D kind of idea of what the geology is. And you establish that with the cross-section. The cross-section is nothing else than a kind of vertical slice through the earth's surface. Anyway, this is a geological cross-section. What it shows are the different geological layers. In this case, we have an upper sands. We have a silt. We have a lower sand. We have a sandstone. And then deeper down we have rocks.

But aquifers are sand and gravels,

sandstone and fractured rock. Now, we are talking about something that has water in there. You can take that water out. So there is another word which is called aquitard. And an aquitard is also a saturated geological unit. And it allows for water to flow through, but not in quantities sufficient that you can put a well in and make it have a water supply. Aquitards are formed by tills. Tills are sediments deposited by glaciers, very tight. Silts, clays, shales and, of course, unfractured rock, you can't get too much out of those.

Now, in addition to those basic definitions of aquifer and aquitard, there are two other concepts you should know about. And we classify aquifers. And the basic clarification is we have unconfined aquifers and semi-confined aquifers. Now, essentially as to what the definition says, in an unconfined aquifer, you have the sand. This is the whole thickness of the sand. It is, in part, saturated. And here we have the water table. So at the bottom there is an aquitard. But at the top, the water level is formed by the water table.

In contrast, in a semi-confined

aquifer, we have essentially a water bearing zone, sandwiched between two layers which are relatively tight. The whole aquifer is saturated. But in this case, the water level in the aquifer is above the top of the aquifer. And we call it semi-confined because, as we saw before, there is still flow possible in aquitards.

So here we have the geological cross-section. Here the geological cross-section is translated into a hydrogeological cross-section. The setting is geological. And in this case, an unconfined aquifer. The sands here form an aquifer. And because they are sandwiched between silts and clays, which form -- and tills which form an aquitard, we have a semi-confined aquifer. The aquifers down here are also semi-confined. Now I have talked about aquifers and aquitards and what they are.

Geological settings are often quite complex and, therefore, hydrogeological settings are often quite complex. In the upper case, we have one geological unit. But then there are geological units in our areas that are pure aquifers and others are aquitards. The whole Sandilands complex kind of represents this. And

there areas that are aquifers and there are areas where there are no aquifers. Conversely, you can have complex formations, geological formations, which all consist of sands and they form one hydrogeological unit.

One of the more important things in hydrogeology is what do you learn from the very simple measurement of water levels. Now, to give you a basic understanding of what a water level is, you have a well in the ground. At a certain depth, you know the elevation of the top of your well. You can measure the depth of your water, so you can determine the water level elevation.

Why are water level elevations important to us? Now, here I have an aquifer. I have two wells. The water level in this well is higher than that well, so there is a water level difference. We also know the distance between those wells.

And then we can determine, it is a kind of A divided by B, an hydraulic gradient, which is the difference in water level between here and here divided by the distance. Why is the hydraulic radiant important to us? It tells us something about where the groundwater is flowing,

in which direction. It also, if we know the properties of the aquifer, tells us a little bit about the amount of flow.

It is very basic that an aquifer's flow tends to be horizontal. And in this slide, it either can go this way and that way. In aquitards, because they are so tight, the flow can either be upwards or downwards.

Now, we have a certain aquifer where we are doing our investigations. And you have got a number of points for which you have water level data. Now, then you can construct very simply lines, by the water level, a certain value. Now, why that is important? The direction of flow is perpendicular to those lines where the water level rises to the same elevation.

You can do that also in three-dimensional, three dimensionally, if you have wells at various depths. And, ultimately, you get to a kind of a picture that gives you a kind of global idea of the flow of groundwater. In this case, and this comes from a USGS publication. We have an unconfined aquifer. We have two semi-confined aquifers. You can see that the water drop in here can go either to this creek

here, or it can go down, or it can go even further down. And it really depends on the pathway the water droplet takes, you know, how long it will be in the underground. Essentially, any drop that gets to the water table, at some point in time will end up back to the ground's surface.

We have to talk a little bit about the yield of a well because that's what it is all about. The yield of a well is dependent on a few very basic properties. And maybe I will go through them relatively quickly. Transmissivity is indicated by the letter "T", and I will explain what it is. Storage coefficient, aquitard properties, you know, obviously, intuitively you know that if you have a relatively semi-confined aquifer, probably the yield of the well depends a little bit about -- it depends on the characteristics of the overlaying and the underlaying aquitards. It depends also on the available drawdown. The available drawdown essentially is the area at the top of the aquifer. In the aquifer, the water level rises to this level, so this difference is the available drawdown. So a little bit more abstract now on some very basic definitions, but a basic

understanding is required to follow what is coming next.

An unconfined aquifer. Now, an unconfined aquifer -- oh, I did something wrong here. I hope I don't have to go back totally. Sorry about that, my mistake. Okay. In an unconfined aquifer, if you put a well in there and you start pumping, then the pores between the sand gradients drain, and that's where you get your water from.

In a semi-confined aquifer it is a little bit different. It is rather quite complex. But it comes, in part, from expansion of water and because we have a load on the aquifer, compression of the aquifer.

The important thing here is for you to remember that if you have a well in an unconfined aquifer, you get for the same amount of water level drop. So, for example, if you drop, for example, one metre, you get a hell of a lot more water out of an unconfined aquifer compared to a semi-confined aquifer.

One of the most important properties in groundwater is referred to as hydraulic conductivity, a kind of difficult word, but a very

simple concept. Here we have a cross-section of an aquifer overlain by an aquitard. Now, we take a little block out of here. And that block is one metre high by one metre wide. And we apply an hydraulic gradient of one metre. So everything is 1, 1, 1, 1. And then gets you the hydraulic conductivity. The volume of water that will move through a porous medium, so we have the sand here, and a unit time, for example a day, under a unit hydraulic gradient -- hydraulic gradient was the difference in water level divided by distance of one -- through a unit area. We have here an area which is 1 X 1. So it is a very basic property of groundwater. It tells us something about the flow which can get through there.

Now, here we looked at this little piece. But, in fact, we are dealing with the whole aquifer. And there's where the word transmissivity comes in. And transmissivity is something that Steve will talk about later. Transmissivity is the rate of flow under a unit hydraulic gradient -- so we are still dealing with a unit hydraulic gradient -- through a cross-section of unit T over the thickness of the aquifer, so hydraulic conductivity applies to

here. If the thickness of the aquifer is "b", then the transmissivity is just the hydraulic conductivity times the thickness of the aquifer. Relatively quite simple concepts.

Now, what we're really after is knowing how much flow is going through a particular aquifer. And this was established in the 19th Century by a Frenchman called Mr. Darcy. It's a very simple A x B x C. What do I need to know? I need to know, kind of, the area. I need to know what your hydraulic conductivity is and what your head difference is. See, the water levels here are different than what the distance is. So the flow through an aquifer is nothing else than your hydraulic conductivity, times your area, times your hydraulic head difference.

Now, I talked about these properties. So the question is, how do you determine these kind of properties? Now, you do that by conducting a pump test. What is a pump test? A pump test is very simple. You have a production well over here from which you can pump water. And within your hydrogeological setting, you put in monitoring wells to measure the drawdown caused by the pumping. And you can analyze those data and

get your basic information on your hydraulic properties.

Now, what is happening when you start pumping? We start out here with a semi-confined aquifer. Here is an aquitard and an aquifer, and then you have a level here. The water level in the aquifer is similar over here. Now, in order to pump, you have to take out some water to start with, to get things going. So after a certain point in time, when they start pumping, the water level in the well drops. And away from the well and the aquifer it drops, as well, but not as much, obviously, as in the pumping well.

This here, this line, is referred to as the drawdown cone. It tells you how far your impact of pumping will be. So within the aquifer, there is flow towards the well, but there is also some additional downward flow through the overlaying aquitard.

Now, sustainability is something that you want to achieve. And in terms of groundwater, it is that the drawdown doesn't change any more with time. So if I go back one, I started out with an a drawdown cone, you know, that is relatively small and then, over time, the drawdown

drops a little bit. What you want to achieve is that the drawdown cone doesn't extend over time anymore. Then you are at the situation that all of the water you have pumped essentially comes from additional recharge to the aquifer. In other words, at that point, you have developed stable conditions again.

And, finally, in hydrogeology, of course, water quality is also always an issue. And taking groundwater samples for chemical analyses is always part and parcel of groundwater investigations. So I will leave it at this, and hopefully you have a little better understanding of what groundwater is and why we do things.

MR. SARGEANT: Can I interrupt now? We would like to take a short break. And we will come back perhaps in about -- it is just before quarter after. So let's come back about 25 after, about 12 minutes.

(Proceedings recessed at 10:15 and reconvened at 10:25 a.m.)

THE CHAIRMAN: Adjusted the lighting as much as we can, so hopefully it will help you to see the screen a little better. Mr. Wiecek.

MR. WIECEK: Mr. Chairman, members of the Commission and ladies and gentlemen, I will be providing an overview of the groundwater aspects of the project. The outline of the presentation is I will start by reviewing the site selection process that this project went through, and then we will go through the field investigations, the results and the assessments, and then finally conclude with the proposed monitoring and contingency plan.

The first aspect that we need to deal with when we talk about site selection processes is to get a good understanding of the hydrology of southern Manitoba, the geology and the hydrogeology, to explain where potable water is and where it isn't and why it's there.

This first line is showing the average annual precipitation across the prairie provinces, but also across Manitoba. The one thing you will notice is across southern Manitoba, anyways, precipitation varies from 450 on the western boundary up to 600 millimeters per year by the time you get to the Ontario border.

The project area is located down in that southwest corner about where the

550-millimeter per year contour is. The other thing to notice is that this corner receives in excess of 550 millimetres of precipitation, and it is actually greater than the annual average precipitation anywhere in the prairies, except for the Rocky Mountains themselves. This increase in precipitation in that corner of the province is reflected in this official geology of southeast Manitoba. This is a simplified geological map produced by the province. The blues on here are clays of the Red River Valley. The greens are tills of the lake terrace plains. As the elevation rises, you get into more of the tills. The yellows and the oranges are various sand and gravel deposits that are distributed through the area. The pink is we are into the Precambrian Shield bedrock. There is very little soil in that area. And the grays are these extensive organic deposits that have formed because of the increased precipitation and generally poor drainage in there.

The project area is within one of these sand and gravel deposits within the organic area. This one is known as the Sandilands glaciofluvial complex. It is just one of a series

of these types of deposits through the area. The other thing is within these organic areas is also a series of swamps and bogs through the area of St. Lab, the Rat River and the Brokenhead Swamp.

When as we look at the regional geology, and this is a cross-section basically from Manitou, through the Manitoba escarpment, across through to Zhoda, which is just southwest of Sandilands. The Sandilands project is just off to the right here. We see this is the general geology across southern Manitoba is Precambrian bedrock overlain by sandstone and shales. These are the Winnipeg formation sandstones that form one of the aquifers. This is overlain by a sequence of carbonate rocks of which the upper part is known as the upper carbonate aquifer, and that is a secondary dissolution of the carbonates has formed permeability in there.

As we go up, we get into these reds, which are other shale layers. And then there is a whole sequence of shales, plus another aquifer called the Swan River formation up in that area.

The overburden is generally pretty typical across the province, it is clay over tills. And locally we get these surficial sand

deposits and sand deposits at depth.

The one thing that is very, very marked in the hydrogeology across the province is a dividing line basically in this area at the Rat River where groundwater on the eastern side is flowing from recharge all the way through this area, generally towards the east to the discharge points along the Rat, the Red and Lake Winnipeg. To the west, we have two groundwater components. We have groundwater moving upwards through these deep formations which is called the Western Canada sedimentary basin. And that's water, very old water, that's coming up from depth. We also have, again, recharge occurring through the clays, which is contributing some water to the overall water balance west of the Rat River.

The big thing that's different across here is the quality of the water. All of this water that's coming up from depth within that Western Canada sedimentary basin, it's saline, it's non-potable. So even though the upper carbonate aquifer exists in that area, it contains saline, non-potable water that can't be used. That discharge of that water into the overburden has also affected the groundwater supplies within

that overburden, and limits which ones can actually be used as a potable water supply.

To the east of the Rat River, groundwater flow, we are dealing with a smaller groundwater flow from recharge within this area. The age of that water is substantially less. And as such, as it moves through the various sequences, we get relatively fresh potable water through that whole area.

This is a map -- the Winnipeg formation sandstones is a groundwater flow. And just to further illustrate that concept, it is groundwater moving from depth, from west to east, towards Lake Winnipeg. And from the recharge areas in the Winnipeg formation primarily northwest to north to Lake Winnipeg.

This is -- within that particular formation, this is the dividing line between the fresh and the potable water. This is the deep water moving up through the sequence. This is the fresh water being recharged and moving through the sequence from the east.

A similar dividing line occurs within the carbonate aquifer above the Winnipeg formation. This is a just a contra plot of the

TDS concentrations, it is a measure of water quality. And the blue line here is, again, basically the dividing line between where you can find potable water within the carbonate aquifer and where the water is saline to non-potable due to that influence from the deep sedimentary basin.

So with that description in mind of how water is distributed and how the water quality is distributed across southern Manitoba, we will go into a site selection process that was undertaken.

The area that we looked at is east of the Red River. And one of the first areas that was eliminated from consideration very early in the project was anything within 12 miles of the U.S. border. It was desirable to avoid aquifers that might have the potential to get into the international boundary issues. So that area was eliminated. Very quickly, too, is also this area to the north, which includes Steinbach, Kleefeld and the areas around there, including Friedensfeld where we are at today, was excluded from consideration. It's been fairly extensively developed, and development is continuing in future, and it is reasonable to expect that the

demands for water in that area would be increase.

Finally, the other area that was early on eliminated from consideration was basically to the west of the Rat River to the Red River. And as we've discussed before, this is getting into the saline water zone, both within the bedrock aquifers and also the overburden aquifers, there is very little suitable water, potable groundwater available in the area. So the first pass, that left us with is this area in here.

The next thing we looked at was we compiled the areas of potential environmental concern. These are a series of designated areas of special interest, protected areas, wildlife management areas. It is just considered desirable to stay away from these environmentally sensitive areas. And the black line in here shows kind of the offset from those areas that were considered, if possible, to avoid those areas.

When we overlaid this on the previous areas taken under consideration, we were left with three basic areas, one in this eastern or western part Sarto Pansy, what has been called in here the Zhoda area, and then the Bedford Ridge area.

Sarto Pansy has ground water available

both in the overburden and the bedrock aquifers. There is some development in the area and development is continuing. And it is reasonable to expect that that demand for water in the area would continue in the future. So that was -- based on the potential interference with future groundwater users, that was taken out of consideration.

Moving on to Zhoda, we are into a more poorly drained area here. There is less development in the area. And it's not restricted from development, but certainly because of the drainage in the area, there is less development. Groundwater is available here in the limestone aquifer. It has been proven up by pump tests. So that was a possibility to consider, is to take water from the carbonate aquifer in this area.

Finally, there is the Bedford Ridge area which is located within the Sandilands Provincial Forest. This is an area that the province has set aside for the perpetual growth of timber for timber harvesting. As such, the development within that area is restricted. It is basically restricted to activities that did not

interfere with the regrowth of the forest, so it had limited potential for future development, and that could potentially interfere with other users. It also -- the previous research of the area, and we will talk more about that, it has shown that there is a series of overburden aquifers within the sand and gravel deposits within the area. And there is a very deep water table up to 38 metres deep, so interaction with the plant root zones and the water table is minimal.

So we are moving on. We will start talking about the details of the site geology and hydrogeology and the field investigations that were conducted.

The study area that we are considering here, the proposed wall site is located here on the Bedford Ridge, which is located within that Sandilands Provincial Forest. The towns of Marchand, Sandilands, and Kerry are the three major population centres in the area.

The first step in the investigation of this area is we compiled the existing domestic wells. Whenever a well is drilled, the drillers are required to file a log of that well with the province. And that information is available and

is used to develop a knowledge of the stratigraphy of the area.

We also compiled all the previous research work that has been done in this area, which included work by water stewardship, the Geological Survey of Canada, Universities of Manitoba, Ottawa and Carlton. With that information, we had a basic understanding of the stratigraphy in there, but we needed to do more drilling to better enhance the details of that. So a series of test holes were drilled along basically an east/west and a north/south line to develop more details of the geology in the area.

From that, and Harm has already talked about a bit about the stratigraphy in the area, we have developed this outline of the two overburden aquifers, the upper sands and the lower sand aquifer, separated by the two aquitards which, in this case, it is an upper silt and a lower till.

And then, finally, the thin Winnipeg formation at the base of the sequence overlying the precambrian bedrock. Within this area, based on the results of all of the monitoring work that was done in the area, general groundwater flow, recharge occurs throughout the area. And then

within the upper sands, recharge moves. It is restricted from moving downwards by the aquitard underneath. It doesn't prevent complete movement, but it restricts it. So the majority of the recharge water moves downwards within this upper sand to the low lying areas.

As far as the proposed pumping well location, we are primarily looking at recharge occurring in the uplands, moving down through the upper sands, through the aquitards, or areas where the aquitards are absent, and moving laterally through that lower sands where it disperses up into a series of different formations.

With that basic understanding of the geology of the hydrogeology and how groundwater worked in the area, we undertook an aquifer pumping test. The purpose of the test, there is two things we are doing with the test. One is to measure the transmissivity and the storativity of the aquifer. And the second thing is we are looking to measure the short-term dynamic response of the aquifer pumping. We are looking for evidence that there is boundaries or restrictions in the aquifer, either positive boundaries which are recharged areas, or negative boundaries which

are areas where flow is restricted. That test was conducted at 107 litres per second. The requested rate for this project is 50 litres per second. But, generally, we try to do the pump test at the highest rate possible for the test well to maximize the effects we have over the duration of the test. And that response to pumping was monitored at a network of 21 monitoring wells scattered through the three aquifers and over the area.

And this is a map showing -- these are the wells within the lower sand unit that was monitored during the test, and beside each we show the measured response. This circled area is the limit of the drawdown that was observed by the end of the test. We observed up to 6.3 metres right at the pumping well, and this goes out to zero at the margins there. Outside of this area, no response to pumping was measured.

Groundwater, the response to pumping in the upper sand unit was also measured throughout the test. There was a series of six wells, including one located in the upper sands directly above the pumping well location. There was no response reported in any of these wells

which indicates, especially in this location, it confirms the interpretation of the aquitard that that's limiting the influence, the hydraulic influence, between the upper and the lower, insofar as the effects could not get up to that upper aquifer. And we also, at the same time, monitored through the existing three wells the response to pumping in the sandstone unit. And, again, no response was detected in those wells.

So as a result of the pump test, and actually I will just back it up a bit, one of the other aspects of this response to the pumping in the lower sand unit is we have a definite boundary to the north. This aquifer is bounded to the north. There is a restriction to flow across to the north here. Basically, there was no -- even though the pump drawdown extended to the south that distance, there is no response detected to the north, which indicates that within that zone there is a restriction to flow. There is some sort of finer material preventing significant flow from occurring.

Also, from the geology of the area and the aquifer response, we also know that there is a boundary to the south of this. So these two

boundaries are the basic northern and southern limits to this aquifer, based on the pumping test results and what we know of the geology.

So as I indicated, the lower sand unit is definitely bounded to the north and south. The pump test results also showed us that there is a higher transmittivity zone that is present to the south of the pumping well. The transmittivity -- in any aquifer, the transmittivity varies. What this tells us is that test well was not in the most productive part of the aquifer. There are other parts of it that are more productive. And, of course, there was no response to the pumping that was measured in either the upper sand unit or the underlying sandstone unit.

The transmittivity and storativity values calculated from the results of the pump test are 0.01 metres squared per second and 8 times 10 to the minus 4. Now, those values of transmittivity, storativity, are used in conjunction with a continuous pumping rate of 50 litres per second. And the known limits to the aquifer to the north and south, and analytical methods to estimated the extent of drawdown that would occur at steady state after continuous

pumping of 50 litres per sec. The limits shown on here are the limited extent, or the interpreted extent of the drawdown that would occur if this project proceeds to continuous pumping.

Using that information, we then proceeded to look at the potential environmental effects of such a drawdown. This is a map showing the depth to water within that upper sand unit. Superimposed on this is that drawdown, the interpretive extent of that drawdown. And keep in mind that that drawdown cone is within the lower sand unit. There are no effects that are expected to extend upward into the upper sand unit through the aquitard. However, if they were to extend upwards, within the majority of the upland area, groundwater is at a depth of greater than five metres below the surface. The water table is at a depth of greater than five metres, and is actually up to 38 metres. So even if the drawdown could extend through the aquitard into the upper aquifer, and then do some drawdown in there, the water table is already below the level of the root zone of the plants and, therefore, would have minimal effect on the surface environment in the area.

The down gradient, once we get off the Bedford Ridge the water table becomes shallow, 2.5 metres to 3 metres depth below grade. The drawdown cone will extend out below that area within the lower sand unit. Certainly, the information we have from both of these monitoring well nests is that there is a strong hydraulic rating between the upper and the lower sand unit. And as I indicated, that restricts the amount of flow that can occur through that aquitard, and, therefore, it will restrict the effects of the drawdown from moving upwards into the upper sands.

As far as existing groundwater users go, we compiled the available information on the existing groundwater users. Major users, there is a number of wells in the Village of Sandilands to the south. As we indicated, the aquifer is bounded to the south, the geology indicates that, and the results of the pumping tests indicate that. So there is no -- the drawdown cone is not expected to extend to the south of Sandilands.

To the west to Kerry -- or to the east to Kerry, there is a number of wells in that area. As I indicated on the cross-section, there is a groundwater flow divide, where groundwater is

flowing on that side to the east and on this side to the west. And these drawdown cones will not extend beyond that groundwater flow divide. It's a fundamental change in the direction of groundwater flow, so there will be no effect to Kerry.

Marchand is an area -- there is a fair number of wells in Marchand, and a number of them are flowing wells. There is no effect of drawdown cone because of that restriction, the boundaries to the aquifer, no effects of drawdown are expected to propagate. And as we will talk, when we get to the monitoring plan, to confirm that we have specific wells in that area to confirm the lack of effect.

And, then, finally, to the west is this area where there is a number of domestic farm wells in the area. The drawdowns are not expected to extend to the west to that area, but we will also be monitoring that to confirm that result.

One other final thing when we look at the environmental effects, we also have to look sustainability of the resource. And before I get into that, I have to caution that estimates of sustainable yield are just that, they are

estimates. You cannot just take a recharge estimate and consider that to be a safe withdrawal from the yield. The state of the art is what was referred to as the water budget myth in the industry. And if you just calculate the static, non-pumping recharge rate, you are not taking into consideration the dynamic response of the aquifer, and, therefore, you are not getting a true picture of what the yield is. Nevertheless, a sustainable yield estimate has value as a general concept because it does provide us with information on generally what's there.

So if we look at the overall estimated recharge rate based on published information for the entire region, and this estimate was done using the Thornthwaite method, which takes into consideration precipitation and evapotranspiration and general drainage, it doesn't really take into consideration the specifics of the aquifers themselves. It is more from a regional perspective.

The estimated recharge rate is 71 millimetres per year. If we extend that over the entire area of the Sandilands glaciofluvial complex, which is 1.9 billion square metres, it is

a square calculation to come up with 137 cubic decometers per year of average annual recharge to the area which, if you break that down to a flow rate is about 4300 litres per second, that would be the equivalent flow rate.

If we just look at the estimated area of recharge to the pumping well, in this case we are looking at an area 10 kilometres, which is basically from the pumping well to the east to where the groundwater flow divides, and the northern and southern limits to the aquifer. And based on specific investigations done within that area and to look into the recharge to those sandy soils, because that particular area is underlain by sands, the estimated recharge rate within that area, 174 millimetres per year. It is much higher than the regional rate because sands are more permeable. It is a deep water table. This is an area that has the potential to absorb a lot of the precipitation. And anyone that has been up there also knows there is very little drainage up there. Most of the water or the precipitation that falls on that seeps into the ground and becomes part of the groundwater budget. So just within that area of recharge to the pumping well, using those

values, the estimated recharge rate is 14,000 cubic decometers per year or the equivalent of 400 litres per second.

So, finally, we will be moving on to the proposed monitoring and contingency plan for this project. As part of the monitoring plan, the province currently has a network of monitoring wells that they have been monitoring since the early '60s in the area. They will continue monitoring that, as well as that monitoring network will be supplemented by monitoring wells that will be installed and monitored by the proponent. All three aquifer units will be monitored. And that includes the upper sands, the lower sand and the sandstone unit, and it will be monitored on a continuous basis. There will be digital equipment used to continuously record water levels. The plan also includes a program of groundwater quality monitoring, and there will be quarterly and annual reports to the regulators for review.

Within the lower sand unit, the specific monitoring wells that will be monitored will include the three wells that are currently monitored by the province, basically along an

east/west line. That will be supplemented by eight additional wells to be monitored by the proponent, including a well, the existing wells installed as part of this test within the area of the pumping well, two new wells installed to the east and west, and an additional well to be installed near Marchand to confirm the lack of impact in that area.

Within the upper sand unit monitoring wells, the province is currently monitoring five wells scattered through this area, including this one which has been monitored since approximately 1962. That will be enhanced with additional monitoring at the pumping well location, and also in the shallow sands adjacent to Pocock Lake. And within the sandstone unit, the province is currently monitoring these three wells on a basically triangulation basis. And a fourth well will be installed to monitor, again, by Marchand to confirm the lack of impact to that area.

So with regards to the contingency plan for the protection of existing groundwater user in the area, a standard requirement of any water rights licence is to provide mitigation should any existing users be affected by the

groundwater withdrawal. This mitigation typically can include repairing the existing well, which can mean a redevelopment of the well to improve its efficiency and capacity, lowering of the pump, or other measures to ensure that the well is still capable of providing the required supply. It may necessitate providing a new well or a new water source. Or if no mitigative solution can be found, the other option is to reduce or cease the pumping and find an alternate source. The determination of the appropriate mitigation plan is done in consultation with the owner of that particular well and water stewardship.

As far as the protection of the environment goes, as we have shown, there is a comprehensive monitoring program that's in place that will be assessed regularly. And if it is shown that the withdrawal is having an adverse effect on the environment or the groundwater resource, i.e. that the water is not sustainable, then the pumping rate will be reduced or ceased and alternate sources of supply will be developed. That concludes my talk.

THE CHAIRMAN: Thank you, Mr. Wiecek. I just have a question perhaps on clarification.

You showed us on some of the slides some of the limits, the boundaries of this aquifer to the north and south. Do you have a general idea how large this aquifer is?

MR. WIECEK: As far as the lower sand unit itself?

THE CHAIRMAN: The one that you're interested in.

MR. WIECEK: The eastern and western limits has not been fully defined. The difficulty there is until we know the long-term dynamic response, the hydraulic response to pumping, it's very difficult to say in advance which ones of these zones in the distance are providing water, like how does water specifically flow through the area?

THE CHAIRMAN: So you know that there is a northern boundary not too far north of your well?

MR. WIECEK: That's right.

THE CHAIRMAN: And then a southern boundary just north of the Village of Sandilands?

MR. WIECEK: That's right.

THE CHAIRMAN: But you don't know the east and west boundaries?

MR. WIECEK: Yes.

THE CHAIRMAN: And how deep is it from top to bottom?

MR. WIECEK: Top to bottom, approximately 200 to 300 feet from top to bottom.

THE CHAIRMAN: Through most of that area?

MR. WIECEK: Through this area, yes.

THE CHAIRMAN: Yes.

MR. HALKET: Good morning. I have a few questions, you might say, about the presentation. Very informative, thank you. I would like to talk about alternatives that you've considered, first of all. This isn't part, really, of that or it is part of it. I know that you considered, and you eliminated groundwater alternatives to a water supply for the Pembina Valley Water Co-operative. But what surface water supplies did you look at or alternatives?

MR. SCHELLENBERG: The surface water in this region has been studied repeatedly. It was studied in considerable detail back in 1988, '89 leading up to the 1991 report, and has been reviewed since then as well. Basically, you've got several options.

The best option, and our MLA for the RM, Mr. Jack Penner, is in the audience, and one that he would certainly strongly support, and is very much in favour of is the Pembina River and that is, of course, on the U.S. and the Canadian side of the border. And on the Canadian side of the border in Manitoba that would involve of an impoundment with a dam at Calida and an impoundment in the Pembina gorge.

This has a couple of serious problems attached to it, the first being environmental. You have, and I'm not sure how active they are, but certainly back a decade ago you had the Pembina Valley Protection Association, which had 225 paid up farm family members who were determined to make sure that this didn't happen because, from their perspective, and I would suggest from a provincial perspective, this is an important ecological area that would be inundated with water.

The other problem is because the Pembina is drought-sensitive and because, by agreement, we have to pass on 50 percent of the flow to North Dakota, it means that the impoundment if it was supposed to provide any

stability in terms of water supply would have to be large, which is the concern that -- and this is what raises the concern related to this.

So those were the issues related to the Pembina. And I am moving very quickly. And I will be happy to answer more specifically if you have more questions. We also looked at all of our creeks and streams, including the Tobacco and the others, and I have provided some information specifically to the commission on that. Again, with the same intent, what would happen if we took and put impoundments on all of these coming off of the Pembina escarpment, how much water can we collect? What kind of security would there be to that supply? And that's, again, where the problem came in because the security is not there. And PFRA will tell that you two years out of ten are drought years, two years out of ten you are not going to find recharge or water that is going to fill those impoundments. And this is why the irrigators, for example, in the area are allowed and are licensed to use impoundments from these streams, recognizing that two years out of ten on average they won't have water, so that's why we walked away from those.

In terms of other areas, obviously, the river aquifer has been studied in great detail, as I am sure you are aware, and the sustainable yield has been determined and doesn't allow us for any further withdrawals from that particular source. So groundwater in the rest of the area is not a factor. Surface water, basically you are looking at the streams, you are looking at the rivers. You are looking at the Boyne, for example, which is fully allocated. And, again, we are drawing from Lake Stephenfield, which is impoundment of the Boyne, but there is no further allocation that can be made from that source or other impoundments made along that river. So very quickly, those are some of the others that we have certainly looked at. We would far and away prefer an in-region solution to our particular problem because it would take care of a lot of other problems for us.

MR. HALKET: Have you also considered tying into the City of Winnipeg's water supply system?

MR. SCHELLENBERG: That issue was raised back in '89 and '90 with them very specifically. And the response that we got is

very similar to the response that neighbouring communities have been receiving in the vicinity of Winnipeg for quite sometime. And I am sure you are aware of what the response, and it isn't positive.

MR. GIBBONS: Sorry, if I may follow up on that line of questioning. The point has been raised elsewhere that it may be possible to provide some conservation of local water, surface water, through retention ponds and the like for spring runoff and so forth. Has that been examined as well? In other words, not using the streams and rivers of the area, but to use the spring runoff as a potential source, not necessarily exclusively for, but perhaps in the context of water supplies for livestock operations and things of that sort that might reduce some demand?

MR. SCHELLENBERG: Certainly when we did the in-depth study, and the Province and the Federal Government at that time, and PFRA have been involved on an ongoing basis, I might add, that's been looked at very closely. And one of the reasons why our agricultural usage numbers are lower than what most people anticipated is, in

fact, that they are using impoundments. The only area in -- the only area of the AG industry where they prefer to use treated water would be in the dairy operation whenever they can access treated water and also in the hog industry, especially for weanlings.

In terms of our own look at it, yes, we did look at it. And, as a matter of fact, a lot of our communities were using those kinds of impoundments for their water supply prior to the water co-op's formation and our ability to provide water to them. And these small systems come with some serious problems attached to them, largely related to water quality. And so in our case, for example, we took out a number of these smaller operations, including St. Joseph, by example. I think in total, Rosenort, Lowe Farm and a number of others, I think it totalled about a dozen. Simply because of the water quality, in terms of being able to meet the Canadian drinking water standards, it wasn't there. It is prohibitively expensive and extremely difficult, and it's just not an efficient approach.

MR. GIBBONS: Thank you.

MR. HALKET: Okay. I wondered if you

had considered horizontal wells in the hyperergic zone of the Red River as a source for water supply?

MR. SCHELLENBERG: Could you repeat that? I didn't catch the first part.

MR. HALKET: I wondered if you had considered horizontal wells in the hyperergic zone or the saturated zone of the Red River as a possible source of water supply to your water intakes?

MR. SCHELLENBERG: That, to the best of my knowledge, has not been explored in great detail. I think the concern would be the drought sensitivity of that supply based on river flows. Do you have any further opinion on that?

MR. WIECEK: If I understand it correctly, you're talking about horizontal drilling along the bed of the river?

MR. HALKET: On the periphery of it.

MR. WIECEK: On the banks. But it is eluvial sediments, which are clays and silts. It would take a substantial network of those wells to develop any significant supply to get the water to move through those clays and silts. And there would be certainly significant -- DFO would have

significant concerns about that amount of work being done in the river bank.

MR. HALKET: My question was had you considered it?

MR. WIECEK: No.

MR. SCHELLENBERG: It has not been given a detailed study. But certainly I suspect that if DFO was present, they would be the first to advise us that they would not tolerate it. They have tremendous strengths and capabilities. They are the only inspectors, to the best of my knowledge, that are armed. Eventually, apparently, customs will be, too.

MR. HALKET: As for other alternatives, did you look at desalinization of some of the groundwater supplies in the bedrock aquifers throughout the Pembina Valley area?

MR. SCHELLENBERG: Desalinization? We have certainly looked at the economics and the costs of it. And at the present time, given the state of the technology, and in terms of cost, the economies simply aren't there. I mean, it would saddle our region with a cost for water that would be prohibitive. And I mean, like, layers of prohibitions above where, you know, what we could

tolerate. It would remove our economic viability and would certainly make us extremely undesirable as a place for people to reside.

MR. WIECEK: Certainly the other aspect of desalinization is that process generates a high concentration backwash. And then the question becomes, well, what do you do with it?

MR. HALKET: I was just wondering if you had considered it?

MR. SCHELLENBERG: Yes, we did. As a matter of fact, it was considered in the context of the Winkler Aquifer Management Plan when that was developed. Because, as you know, the Winkler Aquifer is underlain by very saline water. And they looked at it, and the issue was, cost was actually the big one. And I know that Bruce Webb was in attendance for some of those discussions.

The other big problem that you had is precisely this, what do you do with the residue? It was proposed we look at, and I think there was some work done, on putting us into deep wells. But if you look at the charts that came up, those deep wells, and when you closer to the Red River, we already have problems with salinity coming to the surface, and this would only enhance that.

Even if you could argue, from a scientific perspective, that maybe it wouldn't -- the perception would certainly be there, as far as the general public was concerned, that this would be the case, then you would have a huge fight on your hands in terms of trying to get that done.

MR. HALKET: Okay. My next few questions come to just understanding the amount of water you are talking about here. You are talking 50 litres per second extracting from the Sandilands area to the Pembina Valley Water Co-op. And that's -- although in some of the reports, in the first report that I read, I came across the number of 300 litres per second as an output, an ultimate amount of extraction. Is it 50 litres per second or is it 300 litres per second? Could you clarify that for me, please?

MR. SCHELLENBERG: It is 50 litres per second, that is our request, that's the application. And that's the only number that was used. The number of 300, and where that surfaced, and I can explain that as well, is we were asked: What would it take, in a drought of the kind that we haven't seen as yet in Western Canada, if you lost all of your existing supplies, including Lake

Minnewasta, the total use of the Winkler Aquifer, the Boyne River system, et cetera, et cetera, we are talking complete devastation, what would it take to then provide that region with water? And the response to that would be somewhere in the area of 300 litres per second. What we are looking at is 50.

There are economies here which determine this. There is also common sense which determines this. We are proposing a 12-inch pipe from the Sandilands down to Morris. This is the most efficient way in which we can do it. It is also a line which will carry 50 litres per second. It won't do any more. And when you are looking at the type of capital investment that we are putting into the ground, that is probably your best guarantee that there won't be any further withdrawals from the Sandilands, unless and until there is a very, very stringent reason for doing so. And in that case, obviously, the review agencies, such as yourself and the province, would become involved very directly and very quickly.

MR. HALKET: So this proposal, then, is 50 litres per second, no more?

MR. SCHELLENBERG: Correct.

MR. HALKET: I was intrigued by your comments on the water budget myth.

MR. SCHELLENBERG: Okay.

MR. HALKET: I think the experience of some hydrogeologists would be that in order to get a snapshot of a resource, a water budget would be a valuable tool to use. Can you explain again why you see a water budget for an aquifer to be a myth?

MR. MAATHUIS: Yes. And I will answer that question --

THE CHAIRMAN: Can you speak into a microphone?

MR. MAATHUIS: I will answer that question using a power point presentation. It all boils down to the whole issue surrounding sustainable yield. And what is sustainable yields? Sustainable yields is the development and use of groundwater that can be maintained for an indefinite time, without causing unacceptable environmental, economic or social consequences.

Let's have a look at hypothetical groundwater system. It can be either an unconfined aquifer or a semi-confined aquifer. We are in a natural state, and that means that there

is some recharge going into the system. There is some discharge going out of the system. Everything is in balance. And the water level in the system essentially remains at the same level.

Now, in 1940 Mr. Theis wrote what is a very important concept, stating that:

"Under natural conditions, previous to the development by wells, aquifers are in a state of approximate dynamic equilibrium."

So what happens, then, if you put in a well and start pumping? The next sentence is:

"Discharge by the wells is thus a new discharge superimposed upon a stable system, and it must be balanced..."

and this is really the critical issue,

"...it must be balanced by an increase in recharge of the aquifer, or by a decrease in the old discharge, or by a loss of storage in the aquifer, or by a combination of these things."

Now, let's have a look at what this means. Here we have the same system, but now we have that additional pumpage in here. That pumpage results in an increase of recharge. Of course, when you

start developing a water supply, for definition, you have to take some out of storage initially, and you get a decrease in discharge. So the first line says pumpage equals the increase in recharge, plus decrease in recharge plus a change in storage. It's a very simple equation.

What we are aiming at is at getting to that stable condition in the end. And when that is achieved, then pumpage is equal to the increase in recharge and a decrease in discharge. What does that say? That says that, yes, it is very useful to have some idea. The emphasis is "some". We don't need any really defined quantitative number, some idea about the virgin recharge. But it has no role in determining what your sustainable yield or yields of an aquifer is. Because what we are interested in, and what is the dominating factor, is the long-term response of the aquifer to the imposed change, that is the overriding issue here that that has to be determined. You want to get to the stable situation again after you have imposed a disturbance in the term of pumping. So that's what is really emphasized here is the importance of monitoring, very carefully, in all of the

various aquifers, what the impact of pumping is.

So, yes, quite often if you are dealing with a surficial aquifer, so an unconfined aquifer, starting somewhere at the top, it would be nice to know what your recharge is. And it gives you a kind of bulk idea what you could pump out of that aquifer. For semi-confined aquifers, whatever is happening at the top, the recharge implies recharge to the water table. The semi-confined aquifer's recharge to -- semi-confined aquifer is not influenced, is not dictated, is not controlled by recharge to the water table per se. What determines the recharge to a semi-confined aquifer is how much additional water can be pulled through the aquitard. And that additional amount of chemicals through the aquitard is dictated by the vertical hydraulic conductivity of that aquitard. So what I'm trying to say is that for surficial aquifers, unconfined aquifers, it is kind of helpful to know what your recharge is. For semi-confined aquifers it becomes less relevant to know. But what is important at all points in time is your dynamic response, and monitoring your dynamic response to the end use pumping. And that has been taken care

of by the extensive monitoring networks which are being proposed.

MR. HALKET: So what I hear you saying is that an aquifer changes in its response to pumping, its dynamics change to its response. But how would you assess how much water is in an aquifer and how much is available for usage? Wouldn't you do that through a water budget? Wouldn't you want to know how much is coming in and how much is going out and how much is in storage before you start to develop an aquifer?

MR. WIECEK: On the basis of a pre-development estimate, yes, but that is not going to be the ultimate value.

MR. HALKET: Oh, I agree it would change under -- but you would want to start somewhere.

MR. WIECEK: So a typical --

MR. HALKET: So my question, then, is can you provide a water budget for the aquifer system that we're talking about developing here?

MR. WIECEK: For that lower sand unit, based on the information we have, the estimate is 14,000 cubic decometers per annum, based on what we know at this stage. That would be refined over

the long term, as we know the long-term response to pumping and the dynamic response.

MR. HALKET: That number you are throwing at me, 13, where does that come from?

MR. WIECEK: That comes from the estimate of the recharge through the --

MR. HALKET: That's what's coming into the aquifer, the way I understand it?

MR. WIECEK: That's right.

MR. HALKET: But what's in storage and what's moving out, do we have any handle on that?

MR. WIECEK: Well, the storage doesn't change substantially. Under static conditions storage is -- I mean, there is a fluctuation on water levels based on seasonal trends, but that is minor compared to the total volume in storage. So, basically, storage under static conditions doesn't change. So ultimately recharge has to equal discharge. It's a straight mass balance at that point.

MR. HALKET: Yes. So my next piece on this is do we know where the recharge is going? If this is the discharge, if you are saying this is a recharge that's coming in, the storage is

static, okay, so this discharge is then coming out somewhere?

MR. WIECEK: That's correct.

MR. HALKET: Where is that going?

MR. WIECEK: In this case in the lower sand unit? The available information is part of it infiltrates up through the aquitard to the upper sand unit. Once we get down to the lowlands, at that location there is an actual upper gradient from the lower. That flow rate is restricted by that aquitard. It doesn't prevent it, but some part of it goes to there. Part of it goes down into the Winnipeg formation and is part of the recharge to that Winnipeg formation. The other part of it goes laterally. As you get beyond the lower sand unit, as typical with these types of deposits, it disperses into a series of smaller lenses of sand and gravel, and so the water is moving through that.

MR. HALKET: Now, have you measured this, like, where the water is going from the aquifer?

MR. WIECEK: We've measured it within that part of the lower sand unit that we've monitored, down to those test holes installed in

the lower unit.

MR. HALKET: So what you're saying, then, is that the water that is coming through from that lower sand unit is going in to replenish wetlands on the surface, replenish other aquifers that are around it, is that what --

MR. WIECEK: That's right. That's part of the overall component.

MR. HALKET: Okay.

MR. WIECEK: So, again, within that whole Sandilands glaciofluvial complex, the estimate from there is 130,000 cubic decometers, but that is looking at the whole complex, which also is replenishing wetlands, which is also replenishing the bedrock aquifers. This lower sand unit that we are looking at here is just one small component of that.

MR. HALKET: Okay. So, you see, I see a value in having a water budget for an aquifer because then I know what's coming in and going out, as you've said. And if the storage isn't changing, then the mass balance equation tells me what's going in and what's going out are about the same; is that correct?

MR. WIECEK: That's correct.

MR. HALKET: Okay. My question, then, is basically understanding where that water is going? Like, if we are going to be taking water out of an aquifer, obviously it was on its way somewhere else, okay? And so that's what I'm -- my question, then, is where was that somewhere else? Like, have we looked at that? Do we know how this aquifer is sustaining or feeding the downstream?

MR. WIECEK: Down to specific details of specific flow paths, no, that's not practical to do that.

MR. HALKET: Okay. I was just wondering --

MR. WIECEK: Okay.

MR. HALKET: -- if we know that side of the equation at all?

MR. GIBBONS: I would like to pursue this line of discussion for a moment more, if I could. The previous slide, it's off the screen now, not the last slide, but the slide before, made reference to the establishing of a new dynamic equilibrium, what might be called a steady state once the discharge -- sorry, once the drawdown has started. And that would be the

drawdown on top of whatever the natural discharge might be and so forth.

Perhaps you could explain to me how it is possible for that to reach a steady state if, for example, we are taking out 50 litres per second? And let's assume a time frame of the following sort, so we can put it in concrete terms, 50 litres per second during the first year is taken out. That's not 50 litres that's going out now. It is an additional 50 litres compared to what goes in now. At the end of that year, presumably there will be some effect on the water table, et cetera. It doesn't necessarily -- and what I guess I am unclear about is, is there an assumption after year one, or whatever, that there will be a new study stating the water table will stabilize? Because the word "stability" was used, at a certain level, after a period of X months, years, whatever? And if so, how would that be the case, or would there, in fact, be a continuing decline? Based on the fact that we used to get 4300, I think the figure was used, 4300 litres per second recharge, some of that is going out now. Naturally some is being used for wells, et cetera. We are going to take another 50 litres out. How

can there be a steady state at any point in the future, when you are taking additional water out, if the recharge hasn't increased by 50? In other words, wouldn't the graph, in effect, be continuing slowly, but surely, not very quickly, we are talking about a fairly slow rate here, but nonetheless it would be in the vicinity of 1/10th of 1 percent a year? I guess 50 over 4300 would be 1/10th of 1 percent, or something in that range, or a little over that. I haven't calculated it. But there would be a slight decline each year, unless the recharge rate increased, is that correct, or am I misunderstanding the term of "stability" in this context?

MR. MAATHUIS: Yes. What I'm talking about are two changes, all right? When you have a system that is equilibrium, you superimpose something on it. The two changes are an increase in recharge and a decrease in discharge. When you have a system -- how can I -- I am trying to look at the technology. If you have a system with perfect equilibrium and you start pumping, you get a new equilibrium. The only difference with the old equilibrium is that your water level at the

beginning, whether it is an official aquifer or in a semi-confined aquifer, obviously, it is somewhat lower. But you need a lower water level to create, if you wish, that additional recharge where there is that decrease in discharge. So, yes, you can, at all points in time, get to a new equilibrium.

Now, what happens if my pumping is way too high? Yes, then you are correct, then whatever you are pumping, if that becomes more than your increase in recharge and the decrease in discharge, then the water has to come from storage, and it will go down, down, down, down, right?

If, for example, your pumping only has a very little effect, you get, very simply, a little drawdown cone and at somewhere else in the aquifer you might not even notice it, and there is where, you know, where that cone of influence comes from. The aquifer will -- the pumping will react to the system by extending its drawdown cone until it gets stable. It's only if you start pumping way too much that you never will get to the stable condition and then, of course, things will sink out of sight, if you wish. But in this

case it will not happen.

THE CHAIRMAN: Why do you get an increase in recharge? I can understand the decrease in discharge when you start to pump. Why do you get an increase in recharge?

MR. MAATHUIS: Certainly in semi-confined aquifers -- if I may, Mr. Commissioner, go back to the slide?

THE CHAIRMAN: Certainly.

MR. MAATHUIS: Here we have a schematic illustration of a semi-confined aquifer. We have the aquitard at the top, an aquifer and another aquitard at the bottom. This is the initial condition. During the initial condition, we have somewhere a water table over here, so the water table is in the aquitard. In the well in the aquifer, you have a water level indicated by the red line which is lower than the water table. As I said in my introduction, we are interested in differences in water level. So there is a downward flow the way I sketched it here.

Now we start pumping. When we start pumping, we lower the water level in the aquifer. As a result, this airway here, there is a little bit more recharge. And now we start pumping again

a little bit more. You see, in this case, that the drawdown has expanded. It has become a little bit larger, but you also see that these arrows become larger. So the amount of flow through the aquitard, so there is additional recharge in the cone of drawdown. The amount of additional recharge, of course, is the highest near the well, if you wish, and decreases away from the well. So the water -- this additional water is coming through the aquitard from the water table, and that is the water which is being pumped out.

Here I have sketched or superimposed the initial pumping just to show what is happening. If we start out here -- let me say in the initial year we create a drawdown cone. We induce some additional recharge. After a time, we have reached stable conditions. In other words, this drawdown cone will not change in time anymore. There will be no additional drawdowns as I keep on pumping. And why is that? Because I have created additional recharge by vertical flows through the aquitard, so it starts to balance. In that case, there is no more water taken out of storage from the aquifer. And all of the water that I'm pumping from the aquifer comes from

additional flow through the overlying aquitard, that is the increase in recharge.

MS. FUNK: Just a small question here. What I read inside the reports is that this aquifer is going to be used in drought conditions, right? You will be pumping out the 50 litres a second, and it's for drought conditions. Has anybody looked at what the drought conditions -- what would happen with this aquifer during drought conditions?

MR. WIECEK: As I indicated, these groundwater -- this area has been monitored for as far back as the 1960s, including through the droughts of the 1980s. And there are monitoring records available from these wells that show how the aquifers normally respond to decreases in precipitation. I could find it. It would take me a little while. I could find the actual hydrographs for the area. But within that upper sand unit, it's on the order of two litre decline in water levels is the normal drought response. So any incremental, and it is just a straight incremental increase in drawdown, would be associated with the pumping. But, like we said, it is coming from the lower sands. The drawdown

is primarily focused in the lower sands. And the water is coming from decreases in discharge and slight increases in recharge, so the effects dissipate by the time you get to the water table.

THE CHAIRMAN: Perhaps you could find those charts during the lunch break and we could come back to it this afternoon?

MR. WIECEK: Okay.

THE CHAIRMAN: Because I think that will be an area of some more questioning. Ken, did you have more?

MR. GIBBONS: I just want, if I can, a further clarification. I am not sure if you are referring to the same charts that I have in front of me. I have the charts from the report that was issued, the supplemental report from September 2006. And it shows, in the case of one monitoring station, a variation of about five metres over the time period from 1965 to a low point, that's at four to five metres, at various times, from 1965 down to 1990. And it's gone back up again, so it is at a historically high period now. But it does show variation over time, certainly, that is fairly significant, I suppose. And if we could find out which ones you are

referring to, and it might be helpful to know whether you are referring to this chart or to some others. This is for the monitoring station OE-001.

MR. WIECEK: 001 is the one that's in the center of the Sandilands Glaciofluvial Complex.

MR. GIBBONS: But I guess what I am trying to get some clarification on is, it seems to me, that there is an assumption that the aquifer is being replenished by the aquitard, that's my understanding. Because the reference to the idea that the drawdown area around the well will be replenished, will be recharged, if you will, that there will be an increased recharge, is not an increased recharge that comes from other sources, other than what's already in the ground, is that what I'm hearing?

MR. WIECEK: No, that's not correct.

MR. GIBBONS: Where does it come from, then?

MR. WIECEK: The limiting factor to recharge to a semi-confined aquifer is the flow -- is the flow-through that aquitard. The volume of water that's above it in the unconfined aquifer,

whether that's going up and down, doesn't have a significant bearing on it, because the limiting factor is how much water can get through that aquitard. So that's what we are saying there, is that becomes --

MR. GIBBONS: Well, I'm not sure that is answering the question that comes from your earlier statement. Your earlier statement said there would be a drawdown, and then with the increased recharge. So the question is, where does the increased recharge come from? In other words, what is the assumption behind where an increase recharge will come to create a steady state after you take 50 litres per second out of the system? And I guess that is what is throwing me off here because I'm not sure where that's coming from. There has been several references now to an increased recharge.

MR. WIECEK: It is coming from an increase in the hydraulic gradient through the aquitard. Groundwater flow, it is controlled. There are three factors that control groundwater, or the calculation of the volume of groundwater flow. One is the hydraulic conductivity, that is a fixed property of the aquifers or aquitards.

The other one is the cross-sectional area, the area through which flow can occur, so that's basically the size. And the third is the hydraulic gradient. And that's the one factor that changes when you are pumping, is that by increasing the hydraulic head difference, you are increasing the gradient.

MR. GIBBONS: Sorry, but in that context, then, the water that flows through that gradient, where is it coming from? What I'm getting at, I guess, is a sense that we are talking about groundwater recharging groundwater, because you are talking about the gradient affecting the groundwater. There is an assumption, and let me go back to the original point that was made in one of the other -- the earlier references; we are going to pull 50 litres per second out, and there is going to be a recharge that will allow that to enter into a steady state. Where does the 50 litres come from? What I'm hearing is that it's coming from other aspects of groundwater from the aquitard or wherever. But presumably we need to find some recharge coming from outside the aquifer, that is rainwater, et cetera.

MR. WIECEK: Precipitation infiltrates to the upper aquifer --

MR. GIBBONS: Right.

MR. WIECEK: -- which then, part of that, infiltrates through the aquitard to the lower aquifer. And so the increased recharge is the induced infiltration from the upper aquifer to the lower aquifer.

MR. GIBBONS: And that will increase because either, A, there is room for it to infiltrate as a result of the water being drawn down, or is it being -- is the increase coming because there is more rain?

MR. WIECEK: No.

MR. GIBBONS: This is what I am having trouble getting people to pin down, where the water is coming from? And it would help me understand the recharge issue because this goes back to the budget question. And we would like to have a sense of what's going into the system in order to assess whether or not what is going out of the system is, in fact, somehow sustainable.

MR. WIECEK: Yes. No, it's coming from ultimately precipitation infiltrating through the upper aquifer, through the aquitard to the

lower aquifer. There is that 50 litres per second that is being diverted out of the upper aquifer over a very broad area. Within that particular area, as we talked about, it's a very deep water table. So a minor, a small decrease, like over a large area, 50 litres is not a lot of water. It is not going to have an effect on the surface environment. It will have some small decrease in the water table in that area.

MR. GIBBONS: This is what I'm getting at. Because before what we were getting is a sense of steady state, which implies no change. But there must naturally be a change. Unless we have an increase in rain.

MR. WIECEK: Yes.

MR. GIBBONS: There would have to be some slight decrease in the available water in the water table of the aquifer, et cetera?

MR. WIECEK: That's correct.

MR. GIBBONS: Okay, that's what I needed, thank you.

MR. HALKET: I would like to ask a question. What it seems to me that you are saying, and you can correct me if I'm wrong here again if I'm wrong or right, that there is no real

increase in recharge, we are making an estimate on recharge in terms of a water budget here. But when you start pumping the lower aquifer, when you referred to an increase in recharge, what you really mean is that the system's dynamic response is going to change. And that the water -- you are going to decrease hydraulic gradient around the confluence of the well. And it is going to be pulling the water, more easily, shall we say, from the surface aquifer, the unconfined surface through the aquitard, is that basically what it is?

MR. WIECEK: That's correct.

MR. HALKET: Pardon me?

MR. WIECEK: That's basically correct, yes.

MR. HALKET: So now we're talking about diverting water within the system or, you know, the system is reacting to the pumping. Do you perceive this reaction to the pumping, if it is going to affect the unconfined aquifer above, what kind of affect would that have up there to the unconfined aquifer, and maybe to the beto zone above that? Would you look at an increased hydraulic gradient there as causing any affect to,

say, the root structure of plants?

MR. WIECEK: No. I mean, as we discussed, there is, first of all, a deep unconfined water table in there, in excess for most of the area, it is in excess of five metres up to 38 metres. The beto zone above there -- any lowering of that water table does not increase the gradient through the beto zone of the unsaturated flow, that will continue at its current pace. So as far as diverting water that would be available for the surface plants and the wetlands in the area, no.

MR. HALKET: So then those changes would then probably take place in the unconfined aquifer above; is that correct?

MR. WIECEK: That's correct.

MR. HALKET: To the hydraulic -- to the pumping in the unconfined well?

MR. WIECEK: Yes.

MR. HALKET: And the changes, you're saying, would be localized to the aquifer above, then?

MR. WIECEK: To the broad area.

MR. HALKET: To the broad area above it.

MR. WIECEK: Of the drawdown area site.

MR. HALKET: To the drawdown area. Okay. And there would be, then, some downstream changes to that unconfined aquifer, would there be?

MR. WIECEK: To the unconfined aquifer?

MR. HALKET: Yes.

MR. WIECEK: Which currently flows west of the Bedford Ridge to the lowlands area below there, that's correct.

MR. HALKET: And so, basically, you are taking the water, then, that would come from that unconfined aquifer that you are pumping out of the -- in terms of your increased recharge piece?

MR. WIECEK: Yes.

MR. HALKET: Okay, got that.

MR. WIECEK: It's a net mass balance, yes.

MR. HALKET: Okay. I liked that slide, if we can put it back up again, where you were calculating the recharge. And I would still like to continue down this avenue of what the

recharge is to this aquifer, just to see -- I guess my questions all come to the idea of interpretation here and interpretation of the numbers. So you make two recharge estimates, one for the area around the well and one for the whole --

MR. WIECEK: Sandilands Glaciofluvial Complex.

MR. HALKET: The whole Sandilands Glaciofluvial Complex. And I notice in the whole Sandilands Glaciofluvial Complex you use a recharge estimate or a rate of 71 millimetres per year. But around the well system itself, around the well system, or the cone of influence that you have portrayed, you use something like 174 millimetres a year?

MR. WIECEK: That's correct. That's based on studies within that area.

MR. HALKET: Okay. Can you explain the difference, why such a difference, to me, please?

MR. WIECEK: Okay. Part of this study that looks specifically at the recharge rates for the area, that study looked beyond this specific area here, also to other areas where it determined

in a clay soil area the recharge rate is estimated based on that study on 43 millimeters per year. For the sandy areas, the recharge estimate was 134 millimeters per year.

If we look at the overall sort of official geology, we can see that the area, in a broad sense, portions of it underlaying the surface is sandy, which is particularly in the area of this study. Other portions of that complex, the surface is underlain by clays or tills, which will have the lower recharge associated with them. And when you get into the net balance of lower 43 millimeters in the areas with just clays, because the water has a better tendency to runoff rather than recharge, versus the sandy areas with a high recharge rate, you get a net balance that is coming to something on the order of that 71 millimeters per year over the broad area. But within specific portions of that area, you have suitable soil conditions for a very high recharge rate to occur. Others, the conditions such as clay, clayey areas, the recharge is very slow because it cannot get to the clays with any significant fashion and you end up with a significant amount of water runoff in those

cases.

MR. HALKET: Yes. And in your report you characterized these estimates as being fairly conservative?

MR. WIECEK: Yes.

MR. HALKET: And the Thornthwaite method that was used to calculate the -- gave you 71 millimeters a year. Okay. And then if you look at your cone of depression, or where the cone of depression is, and you are using 174 millimeters a year, was that also from the Thornthwaite?

MR. WIECEK: No. That was calculated using actual tracer tests on nested piezometers within that area.

MR. HALKET: Okay. This 71 millimeters that you are using here from the Thornthwaite method, if I understand the Thornthwaite method right or correctly, that is a method that takes the total precipitation within an area?

MR. WIECEK: Yes.

MR. HALKET: And then it subtracts the evapotranspiration from that, the losses due to evapotranspiration?

MR. WIECEK: That's correct.

MR. HALKET: And then it defines the rest of the water that is left over as recharge?

MR. WIECEK: Yes.

MR. HALKET: Now, that recharge then includes water that may not make its way to the aquifer. It may be water that runs off into streams or other surface water, let's say, or surface depressions. It may be water that runs through the beto zone horizontally and never reaches the water table or the groundwater table. In this calculation of the Thornthwaite method, the Thornthwaite method, I think, is presuming that all water is recharged to the aquifer once you take evapotranspiration losses out of the equation; is that correct?

MR. WIECEK: That's basically correct, yes.

MR. HALKET: So then this 71 millimetres per year is not a total recharge to that aquifer, would not be a total recharge. Some of that is going to surface runoff. Some of that is going to flow in the beto zone. So that if I was to interpret those numbers, I might want to use a number that may be a little bit less than

71?

MR. WIECEK: That's correct.

MR. HALKET: Got you.

MR. WIECEK: In an area, such as in the Red River Valley, where these clay soils can get a lot of runoff, your net recharge is going to be less because you see a lot of runoff in the area. As we discussed, this area here is fairly poorly drained. And while there may be some localized runoff, the water is moving primarily through the ground in that area. When you look at the topography of the area, certainly the drainage channels are very poorly defined.

MR. HALKET: But there is topography in the area?

MR. WIECEK: Yes. Oh, there is a fair bit of release from here.

MR. HALKET: So there could be a lot of water running horizontally through the beto zone through the flow, that sort of thing?

MR. WIECEK: Through the unconfined aquifers, yes.

MR. HALKET: And even above the unconfined aquifers if it's sandy. Because one of the pictures that I'm getting about this aquifer,

and the Bedford Ridge area, is that there is a great variety of soils in that area. They are predominantly sandy, but there is a lot of lenses. And it is quite a complex system, is it not?

MR. WIECEK: That's correct, it's a very complex system.

MR. HALKET: Yes. And, therefore, there may be quite a few avenues below the soil that transmit water horizontally in this area. My point, I guess, that I'm getting to here, is that assuming that from Thornthwaite's equation that everything you lose after evapotranspiration goes into recharge, to me that's not a conservative estimate. Conservative estimate would be saying that there are other losses within the system, and maybe the number should be a little bit lower than that. I'm just asking you what you think about that?

MR. WIECEK: Well, when you look at the glaciofluvial complex itself, the majority of it is overlain by sandy soils. And, therefore, going by Cherry's estimate of 174 millimeters, is actually, if you did an average -- likely, and it hasn't been done -- but if you did an average of the areas of the complex that were underlain by

the lower permeability clays and tills versus how much of the area is overlain by sands, the average would probably be on the higher end because the bulk of the soils over the -- under the complex are sands.

MR. HALKET: I was looking at Cherry's paper on this. And in the Bedford Ridge system, she actually -- she had three sites that she looked at within this area. And she calculated -- not using Thornthwaite's method, but actually calculated --

MR. WIECEK: Yes.

MR. HALKET: -- what she thought the recharge was in those areas. And at one of the sites, one of the three sites, she reports that the recharge was 43 millimeters, plus or minus 26 millimeters a year.

MR. WIECEK: That's correct.

MR. HALKET: And this is because she said it was a clay, or sand site, or a clay till site. And she also goes on to say "that if this" -- and this I quote from her report:

"That if this value is not used, then the calculation of the average recharge rate, the value would be

closer to 30 millimeters per year plus
or minus eight millimeters a year."

She goes on to say that:

"The local recharge rates estimated at
each site indicate that there is
significant spatial variation in
groundwater recharge throughout the
study area."

And all three sites of hers that she chose were on the Bedford Ridge. And she goes on to say that:

"These findings would indicate that 71
millimeters a year is at the high end
of the estimates from her tracer
findings."

Could you comment on that?

MR. WIECEK: Based on my experience with those soils, and the work that I've done in that area, I would say it's probably on the lower end.

MR. HALKET: Okay. Well, here is a report that has three sites. And I agree one of them is up at 170 or so millimeters per year in terms of recharge, but there is one that is down at 43. So I guess I come back to my estimate, or to my original equation, or original

interpretation here and say -- or original question about interpretation, and would say that you are saying that your numbers, in terms of recharge, are conservative estimates. But Cherry has got three numbers here, one which is very low, and in the Bedford Ridge area. And that would lead me to believe that that 71 or 70, I forget what the number was, is not so conservative.

And if we could go back to that calculation, please. And then a different interpretation of those numbers might lead to a lower estimate of the total recharge in that area. And if we could go to the next slide. You are using a recharge here, an estimated recharge, of 174 millimeters a year, which would seem to be at the high end of Cherry's numbers, considering the three test sites that she did on the Bedford Ridge, one of them being as low as 40 millimetres. And, as a matter of fact, in the one that you had 40 millimetres, she said that is an average of that site. Her average of that site would be somewhere below that, 20 to 30 millimetres per year. This seems to me that if we use the lower number here, it would take that annual recharge calculation of 400 litres per second, if you

wanted to take that down to, say, I would imagine a more conservative number, say 50 millimetres a year or 70 millimetres a year, under half of that, it would take you down to 200 litres per second in terms of recharge within that site. Would that be another interpretation?

MR. WIECEK: That would be another interpretation, yes.

MR. HALKET: Yes, okay. Another point here is if we do take that down to 200 litres per second, and if you follow along with my reasoning, all of that recharge now is not going to -- to the groundwater supply or to the aquifer. Some of it may be moving, and preferentially in the beto zone out of the area, too, and not get to the aquifer, would you agree with that?

MR. WIECEK: Clarify that, please?

MR. HALKET: I said all of this recharge here that we're talking about, it may not be making its way vertically through the soil. It may be making its way horizontally through the soil and may not even become part of the recharge of the aquifer system itself?

MR. WIECEK: It will become the recharge for the upper unconfined aquifer and then

will move lateral through there. And a portion of it will also move downwards from the aquitard to the lower semi-confined aquifer.

MR. HALKET: Yes. Now, if we take this number as, for example, if we take 174 millimetres and use a number that's about half of that, let's say 70 millimetres a year, which is a little less than half, or 73, and use that, we are looking at about 200 litres per second.

But my understanding is that this is a recharge zone for four aquifer systems. Like, we have an upper -- we have an upper system, an unconfined aquifer, sand aquifer. We have the aquifer of interest here, which is the lower sand aquifer. But below that we also have two bedrock aquifers, don't we, we have the Red River formation and the Winnipeg formation that are being recharged out of this area, too?

MR. WIECEK: Out of the broad regional area.

MR. HALKET: Out of the broad regional area, but also this area, too. This is -- this is the main recharge area for the sandstone aquifer that lies below, that's my understanding from the geological reports, anyway. And it's also one of

the main recharge areas for the carbonate aquifer that runs through this area, too.

MR. WIECEK: If I could speak to that, please?

MR. HALKET: Pardon me?

MR. WIECEK: I've just got a short presentation here that speaks to that.

MR. HALKET: Oh, okay.

THE CHAIRMAN: Do you want to do that now or after lunch? Do you want to finish it off now?

MR. HALKET: How long will it take?

THE CHAIRMAN: How long will the presentation take, Mr. Wiecek?

MR. WIECEK: Five minutes.

THE CHAIRMAN: Let's do that now, and then we will break for lunch.

MR. WIECEK: Certainly, as you are saying, it's basically common knowledge that groundwater is recharging in that area to the east of the Sandilands area, the broad Sandilands areas to, in this case, it's the Winnipeg formation, but it's also to the carbonate aquifer. If we look at a geologic cross-section coming straight out of Winnipeg, going straight west, this is what we

see. This is Winnipeg. And going along Highway 15, passed Dugald, the Brokenhead River, the Hazel Creek area above there, and all of these wetlands below there.

Certainly in this area, we see the typical soil profile, clay over till, the carbonate aquifer, underlain by the sandstone aquifer, the granites. And one thing you see in this area is we have got extensive sand deposits. One of those extensive sand deposits that, in this case, is actually extending down and is in contact with the carbonates and the sandstones. So you can see a very clear path way for the majority of the water to get through from these rivers, these water surfaces and sources, down through the sands, off to the sandstones and the carbonates. So certainly there is an obvious pathway for the water to get from its source, from that surface source, which is the rivers, the precipitation in the rivers through to the aquifer.

In the case of the Winnipeg formation, the water is moving basically from the north to that area towards Lake Winnipeg. If we go further south and take a look at another geologic cross-section down in this area, which is the

project areas just to the north area here, but there is another cross-section to consider here, and I have highlighted that this is the limit, the eastern limit of the Winnipeg formation. And, in particular, the Winnipeg formation and the carbonates have been eroded here and replaced with shales. That's what you see on this cross-section going along the Rat River, through Zhoda, the Village of Sandilands and Woodridge. What we see in this area is actually sandstones. And the carbonates do not exist because they have been eroded off and replaced with these shales. You do see -- in the Sandilands area, you do see that whole -- I am just showing it as a single unit for simplicity here -- this whole Sandilands complex. Groundwater recharges up through the uplands and it moves laterally. In this case, it is restricted from getting down by these underlying clays and tills, and the fact that this aquifer is the formation of sandstones, and carbonate aquifers don't exist at depths there. A portion of it is moving off through these silts. Which, in this case, these silts are a series of -- it is a silty unit with a series of sand and gravel lense layers in it.

Just going back to that broad regional cross-section again, we are talking about this area through Zhoda here, where the carbonates have been eroded off and then overlain by these shales. One thing to note, when we go back to the such, is that recharge is occurring not only through the upper sands but also through the tills. I mean, recharge occurs, of course, throughout the area.

So, finally, if we just look at the particular project area, and that's that same schematic that we were showing to you before, the upper sands, this unsaturated zone -- or not unsaturated zone, unconfined zone in here, is restricted from moving into the Winnipeg formations by this underlying aquitard in the lower tills. There are places where the tills become very thin and there is an increased avenue for water to get through there, but it is still restricted because cross-sectional area, the amount of exposure has a major factor on the volume of water.

So basically what we're saying here is that, yes, this area does provide some recharge. Certainly when you get to the south of this, to the Zhoda-Sandilands area, the carbonates don't

actually even exist in this area. This whole area, as we saw up here, is a definite known avenue for high flow of recharge to the aquifers. This whole area becomes the zone of recharge to that bedrock aquifer, not just this one particular zone. It is the cumulative effect not only of this deposit, but all of these deposits, and the water that's within the organics here, infiltrating through the ground to the bedrock.

MR. HALKET: Thanks. Can you go back to that, to the slide, the local slide of the local geology and stratigraphy? No, the last one you showed of the area around the Bedford Ridge, that one there.

MR. WIECEK: Oh, right.

MR. HALKET: That's the slide that's in the geological or the hydrogeological reports that you have here, correct?

MR. WIECEK: That's correct. Those are the sections. We've just cleaned them up in here with colour to clarify them.

MR. HALKET: And the arrows that you've got, in terms of the preferential flow of groundwater in that slide, that's the interpretation of where you think the water will

go?

MR. WIECEK: Based on the monitored water levels, yes.

MR. HALKET: Okay. Now, I look at that and I see sort of a tiered keg sort of structure. There is three aquifers there. There is the Winnipeg formation aquifer, sand aquifer on the bedrock, and then there is the lower sand unit aquifer, and what you have depicted as an upper sand unit aquifer there. Now, if I go back to your calculations on recharge, if you could flash those up for a second, please.

MR. WIECEK: That's in another slide here. Okay.

MR. HALKET: Now we're looking at this annual recharge rate, if we were to use another estimate of recharge within the area of, say, around 70, we are looking at around 200 litres per second. And now what I see here is three aquifer systems below. So I would suggest, then, that not all of that recharge that we're seeing is going to one aquifer system, or that you would -- that it would be prudent to divide that number by three, because there are three aquifers that this recharge is being used for. So another

interpretation of that equation, or this calculation, would take us to 200 litres per second and then divided by three. And now, all of a sudden, we're down to around 60 or 70 litres per second to that aquifer as a recharge number to use. And the proposal is to use 50 litres per second, which is 750 over 70, somewhere around 80 percent, let's say, of the total recharge of the aquifer for that particular aquifer, the lower sand aquifer. That's another interpretation that you could run on the same numbers that are being -- on the numbers and the research that has been presented so far. And I was wondering what do you -- what would be your interpretation of that?

MR. WIECEK: Going back to this cross-section here, another way to try and estimate the flow through that lower sand aquifer is to look at this hydraulic gradient. We have done the pump test. We have measured the transmittivity of the aquifer, and from that we get the conductivity. We know the hydraulic gradient. We measure that off of the monitoring wells in the area. And compared to a normal regional gradient, it is very steep. We have,

from the pump test, we have got some idea of the boundaries of the aquifer, so we have a cross-sectional area of where the water is flowing to.

If you take the measured conductivity, the known area of the aquifer, and that gradient, you end up with a flow, an initial estimate of flow through that lower sand unit on the order of 400 litres per second. Which, if you work that backwards, that, therefore, what that calculation says is that all of this recharge is going through the lower sand unit and none of it is going through, you've got a net deficit. It suggests that there is more recharge out there that we are not accounting for yet.

THE CHAIRMAN: Okay. I think I am going to interrupt this debate for a little while so we can take a break for lunch. It is now just about quarter after 12. I had indicated that we would break for an hour, but I note that most of you will have to drive into town and back to get some lunch. So we will give you an hour and a quarter. I am going to start at 1:30 sharp.

(Proceedings recessed at 12:15 and reconvened at 1:30 p.m.)

THE CHAIRMAN: Can we come to order, please. We're a little later than I had indicated but once again, we had technological glitches which we have only partially corrected.

You'll note some different people at the front of the room. We're going to have a slight change in the program. The Manitoba Eco-Network has a presentation that I wanted to complete today, so I have put them on now to make their presentation. Following that, the proponent, that's the Water Co-op, and the panelists may have questions of the Eco-Network. And once their presentation is concluded, we will return to asking questions of the Water Co-op.

First of all, could I ask each of the four of you to state your names for the record and then I will have the Commission Secretary swear you in. Mr. Koroluk first, please.

MR. KOROLUK: Thank you, Mr. Chair. Glen Koroluk, I'm the water caucus coordinator for the Manitoba Eco-Network.

DR. BROOKS: I'm David Brooks, Director of Research for Friends of the Earth Canada.

MS. BALLANCE: Kimberly Ballance and

I'm a masters student at the University of Manitoba.

MS. CLUBB: Lindy Clubb, I'm representing three environmental groups and I'm a member of the Manitoba Water Caucus.

(MR. KOROLUK: SWORN)
(DR. BROOKS: SWORN)
(MS. BALLANCE: SWORN)
(MS. CLUBB: SWORN)

THE CHAIRMAN: You may proceed, Mr. Koroluk.

MR. KOROLUK: Thank you, Mr. Chair. I'm a bit awkward for my presentation today because my screen isn't working so I'll be doing a lot of twisting around. I'm not ignoring the crowd or the panel. I appreciate a lot of the intense questioning this morning. I'm happy to see that a lot of thought has been put into this proposal. We feel this is a very large issue that we have to deal with.

And just to give a bit of a background for my personal side. I'm from near this region, kind of. My mother's homestead is in around the Sarto area and I spent my summer holidays there as a kid up to the age of 16. It's very dear to me.

We used to go to Sandilands and pick blueberries. And the other side the Red River too is also important to my life as I lived in the small town of St. Jean Baptiste for about seven, eight years and my dad worked in Morris at the bus plant there, Flyer Industries, and the Plum Coulee was where I learned to skate and play hockey. I recall many a time losing the hockey puck at springtime into the flowing water.

So both these regions are really important to me and we've got a big issue here to talk about.

I want to begin by getting this slide show to work first. First off, I want to talk about the project rationale or the justification of the project. Why is this project in front of us right now? We've got four different scenarios or rationales placed in front of us. In the December 2005 filing, the actual application, all it said is that the Pembina Valley region is susceptible to drought and that they needed this water for emergency supply.

And then, you know, recently in September 2006, with the supplementary filing, we discover that maybe that this pipeline will supply

water to new customers outside of the traditional area that Pembina Valley currently supplies. And by new customers, we mean those municipalities from where the pump well is to where it reaches Morris. So it would be the east side of the Red River.

And then we also find out in the September 2006 document that there's going to be population growth in the Pembina Valley area, mostly attributable to immigration from Germany.

And then there is another document that isn't in the public registry but it was requested by us and subsequently by the Clean Environment Commission and it's called The Master Plan. It's prepared late in December 2003. And it sort of does some projections of people and livestock. So now we find out that this water may be required for the population growth and the growth in the livestock industry. And in particular, the livestock we're talking about is the hog sector.

So, you know, we question what the true rationale of this project is and I think we have to find out more of those details.

So briefly, you know, the context of

our analysis, we indicated that we do a policy analysis and then that analysis is in consideration of the many public concerns that were filed in January of 2006 and that's part of the terms of reference of this hearing. And also part of the terms of reference is the issues raised by this project that are regulated by other Manitoba statutes. So we're going to spend a bit of time on that. And what we really wanted to do is see if this analysis attempted to determine if this project fits with stated public policy and legislative instruments.

We also noted that the proponent was required to assess their proposal according to the principles and guidelines of sustainable development. And that was a request made by the CEC. And we let the panel be the judge to see if the proponents adequately addressed those principles and guidelines.

To start off, I mean we heard a lot about the areas. I don't want to talk about it too much more, but we want to look first at the area that we're targeting to move water, the aquifer. And we've heard it is a unique area. The complex, the glaciofluvial complex, it's a

source for five watersheds within the area. And we've heard parts of it supply the sandstone and carbonate aquifer which are two major bedrock aquifers in Manitoba. The area is extremely rich in biodiversity and the water there provides water for the wetlands and bogs and the entire ecosystem.

We looked at some of the policies out there over the last half generation which deal with water protection and we've got Manitoba's water policies from 1994, you know, the water strategy of 2003, similar to the water policies but a different government in power with a different spin, but basically saying the same. And then we've got the Water Protection Act of 2006 and some key amendments to the Water Rights Act in 2006 which happened at the same time we got the Water Projection Act.

Now, the 1994 Water Policy, Manitoba's water policy is very specific for groundwater. It says,

"Groundwater development and utilization shall be managed so that long-term sustainability of aquifers is achieved and existing uses are not

negatively impacted."

And the strategy says much of the same thing. And the Water Protection Act which sort of takes in our policy sort of allows us or enables us, it's enabling legislation, it gives us the legal mechanisms to protect the groundwater. And we can do that by designating that area as a water quality management zone.

And also, the sequential amendments to the Water Rights Act allows the Minister of Water Stewardship to investigate and take into consideration any scientific information in order to protect the aquatic ecosystem. So we've got this new tool now that we can use to protect that aquifer if we wanted to.

And I just want to say, having said what the legislation can do and what our policies are, I just briefly want to reference some material that was sent in a few days ago by Frank Render, who won't be presenting today, but he worked for the Department of Water Resources for many years. He's a retired civil servant and his expertise was the groundwater and he knows the groundwater in this area. And he reviewed all the materials from the proponent. And briefly I'll

just say a couple of things that he said. And it's in the record with the CEC right now and I believe the proponents have this, too. But he says the recharge capability is not known. The area has not been studied sufficiently to allow realistic long-term average recharge number to be stated, water is virtually incompressible so that if a particular pumping situation does draw more water than the average recharge rate, it has to be taken from some other part of the hydrologic cycle.

And he also says, you know, the general region does have considerable aquifer development such as the Steinbach area, the RM of Hanover. And he also states that the contributions of streams and wetland areas and other natural phenomena have not been evaluated. And this follows a lot of the questioning that was here this morning.

So if we do that sort of test as to what our policies are, what the project is and what we have as legislation, we have a good deal of discrepancies there.

I want to get into some of the other legislation, recent legislation that we do have.

We have a piece of legislation from 2000 called The Water Resources Conservation Act. It basically says no person shall drill for, divert, et cetera, remove, sell, convey, transport water from a water basin or a sub water basin. That's the law in the books right now according to this Act.

So in relation to this project, and we haven't seen the full aerial extent of the lower sand unit, we have heard this morning we don't know the eastern or western boundaries and we've got some maps in our presentation. So we predict and we think that the lower sand unit likely extends into the Whitemouth River watershed which is part of the Winnipeg River sub-basin. When I say sub-basin, I mean a sub-basin of the Hudson Bay basin.

We right now are situated in the Red River sub-basin. So the Water Resources Conservation Act says you cannot move water from the Winnipeg River sub-basin to the Red River sub-basin. That's against the law. And so we really question -- I guess we're asking that a more detailed analysis takes place on the size of this aquifer.

We'd also like to mention that the transfer of water also sets a precedent that would signal that additional water from this region is available for the taking. And back in the early nineties, the City of Winnipeg did an investigation themselves on the upper part of the glaciofluvial complex in the RM of Reynolds, just south of Highway 1. They studied that area for two years and so they were looking for a supplementary supply of water, too. And again, in the early nineties, that was after our dry period in the late eighties. So I mean the transfer of water from this region and possibly from the other sub-basin will set precedence which is contrary to the law.

I thought maybe I'd just get a couple of maps. This is the Red River basin. As you see, 80 per cent of it extends down into the U.S. all the way down to South Dakota, the blue highlights, the Red River basin. The green is the Sandilands glaciofluvial complex. You'll see where the proposed well location is with the star. And you'll see, you know, the sub-basin in and around that area. And that narrower drop, actually that's the Lake Winnipeg sub-basin. And

then to the east is the Winnipeg River sub-basin.

Well, here is the close-up of the area. The well site in the red sort of marks our sub-basin boundaries. You know, on the east side of St. Labre is the Winnipeg River sub-basin. And then the west is the Red River sub-basin. If you follow some of the discussion this morning and some of the graphs in their submissions from the proponent and look at the scale, you just have to go about 7 to 10 kilometres to the east which has been identified as one of the recharge areas that they know of right now. And you'll be into the other sub-basin.

And another law we came across, and this is recent, is the RM of Piney by-law. This also has to do with the transfer of water. The Rural Municipality of Piney with by-law 45/06 under The Municipal Act prohibits the removal of groundwater or surface water originating in the municipality's source aquifer by means of pipeline, tanker truck or other equivalent bulk methods.

So some of us sort of question why are we here to start with? The RM of Piney has a by-law that says you can't take the water out of

their jurisdiction.

So we'd like to point out, and we didn't have the time to hire legal experts and we certainly suggest that independent legal advice is required for this, but, you know, in an amazing Supreme Court case, Spray Tech versus the Town of Hudson, it ruled that the municipality had the authority to regulate the use of lawn care products through its by-law making process. And that decision by the Supreme Court upheld the Quebec Cities and Towns Act, which is much like our Municipal Act, which states that a council may make by-laws to secure peace, order of (inaudible) the governance, health and general welfare in the territory of the municipality. And our Municipal Act gives that sort of same authority to our municipalities.

And briefly, another issue that was discussed this morning is climate change and the requirements for using precaution when you make decisions. Again, these principles are contained in the Manitoba Water Strategy of 2003 and it's also in the Water Resources Conservation Act. Part of its preamble, it says,

"Whereas, in light of the fact that

future domestic needs and the potential effect of climate change are unknown, such as a water resource management scheme, should be based on the precautionary principle and on sustainable water resource management practices."

So we don't think the proposal has addressed the issues of climate warming in the particular area where they want to withdraw water from. They bring that up as an issue, as a rationale to bring water into their region but they don't do it justification for the other part of the province.

So just briefly, the summary of the issues specific to the Sandilands glaciofluvial complex. Manitoba is committed to ensuring aquifer sustainability, protecting groundwater resources. We feel that the proponent fails to fully demonstrate that this project will not compromise ecosystem functions to the aquifer. And Manitoba is also committed to the Protected Areas Network. And in that particular natural region, there's some incomplete work. We saw that where the protected areas are existing in place

but there are a lot of areas identified to be designated as protected, and we haven't seen any of that information.

Manitoba is also committed to rejecting sub-basin transfers and bulk removals of water. They are committed to the precautionary principle.

And our conclusion is the proposal is out of step with Manitoba's stated principles and objectives concerning groundwater as well as some of the laws in place.

Now, I want to move to the other side of the river, to the west side of the Red River, and talk about some of the water planning issues in that area and some of the policies in place and laws in place and take a look at what's happening there.

Manitoba's position, again, we go to our water policies and to our water strategies. You know, water use and allocation decisions should ideally be made within the framework of integrated basin, watershed, and aquifer plans. And the Water Protection Act of 2006 lets us do this. Again, as I say, it's enabling legislation. There's not a requirement that people have to do

it, it's voluntary. And that's kind of where we're at right now, trying to do some watershed planning.

And watershed planning is not a new concept. The 1987 Federal Water Strategy called for watershed planning. In 1994, we had an Assiniboine River Advisory Board that called for watershed planning. And that advisory board actually was a result of the Pembina Valley Water Co-op wanting to take 15 cubic feet per second of water out of the Assiniboine River. So we had hearings already with Pembina Valley looking for more water back in the early nineties. And so we got these recommendations, watershed planning. We had a major public consultation process for water use and allocation in the province in 1999 and 2000 it calls for watershed planning.

So we've still got a long ways to go in that perspective.

And in this particular region where the Pembina Valley Water Co-op supplies water, that planning process hasn't started to our knowledge. We are aware of two major planning exercises that have taken place. We've heard about the Winkler Aquifer Management Plan. That's

very specific to that aquifer in the Winkler region. We also have the Stephenfield Lake Watershed Management Plan, and that's a more recent plan. The Lake Stephenfield Plan is a positive step but it captures a real small part of the two watersheds in that area, that being the Morris River watershed and the Plum Coulee River watershed.

And what we do notice, too, is that, you know, watershed planning is good but it's also a result of problems that have happened. And in particular with the Winkler plan, they did the planning process because the aquifer is overallocated. And my understanding, there are still problems with that aquifer.

Again, another visual here. The dark red is the Red River basin. I just want to show you that, it doesn't come up really good, but really, where Pembina Valley Water Co-op supplies its water to, there are two main watersheds, the Plum Coulee which takes in sort of the R.M. of Stanley and Rhineland and north of that is the Morris River aquifer. And there are no conservation districts in the area too. Historically, conservation districts have done

some of the watershed planning in parts of Manitoba and they'll take on more of that responsibility. There is a conservation district just slightly north of the supply area, and that's the LaSalle Red Boyne.

But the majority of the area does not have a CD nor does it have a watershed authority planning process happening yet.

And we did hear this morning, too, that proponents, you know, they are committed to watershed planning and they are committed to an in-basin or in-region solution to their supposed water difficulties. And in fact, the Pembina Valley Water Co-op has a seat on the Red River Basin Board which encompasses the entire Red River basin in the U.S. and Canada. And I know the Co-op is committed to some of the principles that the Red River Basin Board have put out. And that is, you know, in-basin water supply is preferred and conservation being an important priority.

I won't talk too much on water conservation or water conservation policy, the second part of the presentation will deal with that. But I mean water conservation is a very high priority in Manitoba right now and it is also

something that can be done through the Water Protection Act. Pembina Valley Water Co-op has a conservation plan. It was required of them back in 1994 when they were given a water rights licence, an environment licence to take water out of the Red River.

We're not too sure what sort of evaluation or progress or any updates of this plan where that's at and we are aware that the Clean Environment Commission asked some of those questions, too. We haven't seen any response yet and I'm sure there will be more questioning on that later on.

International implications. Just briefly, there are other international implications we think with this project. And if we look at some of the policy Manitoba has been presenting in some of the statements, our province has been emphasizing water management practices that respect natural systems and conservation measures. Some of you are aware of some of the issues, and they are difficult issues as Sam has pointed out. We've got projects south of the border called the Garrison 2. It's called the Red River Valley Water Supply Project. It's an

interbasin transfer of water from the Missouri River into the Red River. That's a possibility. There's NAWS, which is also known as the Northwest Area Water Supply. Again, that's another interbasin transfer of water. And we all know about Devil's Lake and that's more of a watershed transfer. It's an intermittent watershed in the Red River basin.

But Manitoba has been very vocal on telling our American friends that we've got to conserve and we've got to, you know, put forth a sustainable water strategy in the region and in the basin. And we didn't see that when the province, when the TAC, the Technical Advisory Committee, did its review of the proposal.

Some of the international implications, I mean this is a long shot. Again, we're not lawyers and we're not hydrogeologists. But, you know, if you look at the map, the glaciofluvial complex extends into the U.S. It dips slightly into Minnesota. So, you know, the extent of the interconnectivity of the lower sand unit to the entire complex is somewhat undetermined. So I guess we ask the question, you know, is this an international issue and should

the International Joint Commission be notified about this project? It's something that we have to determine.

And we've heard this earlier this morning. This is an international implication. Water security, I guess apportionment, fair share. We do have apportionment agreements in other watersheds and basins across the U.S./Canada border. We heard of the one on the Pembina River where 50 per cent of the Pembina River in Canada has to go in the U.S. We have an agreement on the Milk River that's similar in Alberta, Montana. We do not have an apportionment agreement on the Red River. And before we start talking about, you know, moving water all over the place, we've got to deal with this issue. The U.S. and Canadian governments have to deal with this issue. And I don't think the proponents should be using this as another rationale to say they have to secure water from elsewhere. This issue has to be taking place first.

I mean there is a board on the Red River basin, it's called the International Red River Board. That's the board that functions out of the IJC. They do have a subcommittee right now

that is looking at apportionment. They are trying to determine the instream flow needs of the Red River for various uses at the border. So we should be investigating more of this, this information that's out there for us.

And that's my part of the presentation. And now I'd like to let Dr. Brooks talk about his part.

DR. BROOKS: Thank you very much, Glen. Chairman, members of the panel, I don't have a lineage in Manitoba like Glen. I didn't even grow up in Canada. But I have been working on water issues for the last I guess 20 or 25 years of my life, mainly on water policy. And the decision to build a pipeline is a profoundly political decision. I mean political with a small "p" not a capital "P". It means it's a public policy issue because it has so many implications.

I have written out my testimony and I attach to it a brochure that explains where I'm coming from with the approach to water. I am embarrassed to say there is an error in the very first line. I say that my presentation covers two aspects. We were working on this, amending it, going back and forth with e-mails. It should say

three aspects, not two aspects. The lesson here is something I've learned a hundred times and never seem to learn it adequately, is you should always do your final editing on paper and not on the screen. It always looks good on the screen.

What I'm really offering today from Friends of the Earth, we worked in collaboration with Glen and the water caucus of the Manitoba Eco-Network as we do with the Saskatchewan Environmental Society and the Ecology Action Centre in Nova Scotia across the country and various programs is to offer some suggestive analysis. We don't contend that our numbers here are definitive but we intend to offer evidence that suggests there's a lot of questions to be raised about the pipeline.

I really want to provoke more understanding to indicate where we have to go. We didn't really have time enough between the award of intervenor funding and to do this more carefully, although I think the kinds of analysis we're talking about are entirely possible.

The three points I'll be covering are, first, the cost of the pipeline. Does it make sense to build a pipeline of this kind? And to

look at water rates and what they can get back for it. Second, I want to raise questions about the demand for the water. Do we have to assume that there will be large and necessary increases in water? And third, some questions about land management in this area. A land management decision is always a water management decision or always has implications for a water management. And we think some of these are decisions that need a lot more public scrutiny.

Throughout, I'm assuming that we're talking about a pipeline. I was working on the earlier assumptions that it's basically needed for a growing population that runs short of water in the summer time, particularly but not exclusively in drought periods, but that there is a summer peeking problem and that this creates a need that has to be satisfied. A lot of my numbers come from the Cochrane Engineering Report of 2003 and I want to question one of the statements that's made in there, which I'll come back to.

In particular, from a process point of view, what I am really challenging is the absence of any analysis of the no project option, the null hypothesis or however you want to put it. I see

no test of what would happen if the pipeline is not built. All I see are different alternative pipelines or different alternatives, other supply alternatives to a pipeline. But all environmental assessments and all good cost benefit analyses also test the no project option, and that's really what I'm getting at.

Let me go to my first point. I'm not going to read this statement, you have it before you, I'll summarize it and make additional comments as I go along, having heard something this morning.

I had a lot of trouble finding out what the cost of the pipeline was. Of course the Cochrane report was looking at a broader concept that it had upgrading plants and other treatment areas. I'm not questioning any of that analysis at all. And I am not asserting that the figures I have come from any documents from the proponent. I have chosen some numbers just to get some results. They are reasonable I think. They are the kinds of numbers I use when I'm often dealing with uncertainty of a -- inadequate information.

One figure that's been given for the cost of the pipeline is $11 million. I have taken

that for the sake of argument. I have then said, well, carrying costs for an investment of this kind are going to be about 10 per cent and that you always have operating and maintenance cost. I'm much fuzzier about that one. But again, for the sake of argument, I used another 10 per cent. What this gives me is annual costs for the pipeline of around $2 million a year. When I do the 10 per cent and 10 per cent times 11 comes out to 2.2. Given the roughness of the calculations, $2 million is close enough. 50 litres per second. And from here on, I am simply dividing, I come out with a cost at Morris, where it comes into the PVWC pipe existing reticulation networks pipeline and reticulation networks of $1.40 a cubic metre.

This is a lot more at the entrance to the system than many people in Canada pay for water. However, that's not a very good argument from my side since I feel everyone in Canada should be paying a lot more for water. So that's not an argument that I'm pushing very strongly. I think we all pay too little for our water.

But what I am saying is that those costs are going to increase when they get to the final consumer. And that gives us a huge target

for cost-effective conservation and demand management techniques.

There is a lot that can be done. I was interested, and I'm now going off anything I've written here, but what I heard this morning, the concept of desalination was dismissed as exceedingly costly beyond the possibility. I do a great deal of work in The Middle East. In fact, one reason why I don't have a Power Point is I only got back from a three week mission there about two weeks before I had to have this ready. The desalinated water is being at the plant, is available in The Middle East for less than about $1.00 U.S. now, so that is about $1.20 Canadian right now. It's being delivered. Admittedly, these are large plants, much larger than we've needed here. On the other hand, they are starting with sea water. And I couldn't read the contour diagram with the salty water that's coming, it's west of the Red River, but I think the numbers were 3,000, 4,000, 5,000 parts per million which is only a tenth, or a little bit more, 10 to 15 or 20 per cent as salty as sea water. So you're starting from much less of a problem. Yes, you still have the brine disposal problem and that's

not trivial. But I'm just saying that water at $1.40 a cubic metre is a big target.

Now, let me go to the second point. What could we do with this? And I'm going to digress again to mention some of my background.

I was the first director of Canada's federal office of energy conservation. I was the founding director and worked in that program for the first really five years of its life. In the last 20 or 25 years, I had been working in developing countries for the most part where I found that water was a far more approximate issue for many developing countries and many developing regions as is the Pembina Valley area. But I found the same principles are largely applicable. And we're using the same kinds of analyses that we did for energy conservation, most of which are looking for cost-effective analyses. Can you save water at a lower cost than you can deliver water? And that's what I'm contending is true in this case.

Let me start, though, by going back to the Cochrane report. This report, I am assuming, my background is geology and economics, it is not engineering, I am assuming it is a competent

engineering report but it is not very good in its economic analysis, in particular section 2 called Growth and Demand Projections. The problems start right off, I'm going to skim this part of my paper, but there are strong terminological problems. They shift back and forth between the terms "scenario" and "projection." These are two important analytical concepts but they are very different. A scenario is a story. It is a different view. It is a way of changing the way things might develop. A projection is a highly constrained almost mathematical thing. It's an if/then. If population goes up by so much and if the water use is like this, this is what the results will be. It is mathematical, it is not a story. The two are not the same but they are used back and forth in the Cochrane report.

The other pair of terms that are used back and forth are "demand" and "consumption." Consumption is a statistic. It is what is used or, if you want in the Cochrane report, what might be used by consumers. Demand is a function. It's a variable that depends on price, depends on what industries are there, depends on the size of the house, depends on family size and depends most

significantly on price. They are not the same.

Now this explains the confusion when the Cochrane report writes, and I'm quoting now,

"Domestic projections represent a potential need that must be satisfied."

Nothing could be further from the truth. They do use projection correctly in this term but they say demand when they really mean consumption. And then it takes consumption to be equivalent to needs. There are two reasons why these are not needs. First, consumption rates do not include needs. Consumption includes everything from drinking water, which I would agree is a need. In fact, I need some right now, to washing automobiles which very few people would define as a human need.

Second, with the exception of a very limited range of uses, mainly in households, stock watering, very few needs have to be satisfied or, to be more careful, have to be satisfied by water.

One sees over and over again statements that there was no substitute for water. That's simply wrong in most cases. There are lots of substitutes for water, depend on what you're

trying to do.

So going on to make some calculations. We are now talking about scenarios. High rates of water use such as we experience across Canada, across North America are by no means needs. They do not have to be satisfied. It is the kind of no project -- sorry, no pipeline project analysis would use an analysis as presented in the annex to the brochure I have passed around that where you assume there is going to be no new water for this area. We start off with this is more of the nature of a scenario.

Let's assume you couldn't have any more water. What would you do then? What are you facing? I have just done a little bit with a very simple analysis, choosing just one, well, one particular piece of equipment in the house which is the toilet. A toilet will typically use 30 per cent of all water going through a house in the winter time. Or if you want, it's 30 per cent of all indoor use. Typical Canadian toilets use 12 to 15 litres to flush. There are now Canadian standards for 6/3 litre flush toilets. By 6 plus 3, I mean I don't think I need any details, sometimes you don't need as much water to flush as

other times. There's a light flush and a heavy flush and I'm sure I just don't need to elaborate on when you use one or when you use the other. These are available, they work, they do not leak, they are well designed. The early ones I know I'm sure anyone who has put in a system like this 10 years ago found that you had to flush twice to get everything down so it really wasn't a big conservation. That was because the early manufacturers simply reduced the flow on the toilet. Well, you can never do just one thing for efficiency, you have to do several things. These are totally redesigned toilets that work very well.

If we take 30 per cent of the water that's used in the house, it is easy to cut that volume going through the toilet in half.

The other thing of course that we can do, going back to the other, is to ask what about the prices that people are paying for water? I have looked quickly at what the various RMs in the area are charging. They look to be about half metered. That means half are not metered. People just pay a flat rate. We know that putting metres in a house will reduce water consumption.

There have even been some very amusing analyses where metres were put in, people were still charged a flat rate, and still the consumption went down. Just the presence of the metre created such an effect that people were more careful of their water use. And of course, if you charge per unit of volume, ideally with the cost going up, the more you used, just the opposite of what I understand is the situation in the City of Winkler where costs go down the more you use, and the problem is the bigger use, as I'm going to explain, comes at the peak periods. So really it's a double whammy on the system.

So pricing, better equipment, these all can be done, and I'm talking about ways that are cost-effective. The City of Toronto will now pay people to retrofit their toilets to take out the old toilets, put in any one of the newer versions.

I am not talking about going back to outhouses. We are not talking about diminishing, we're talking about changes where the user cannot distinguish the difference in the effect.

Now, we can go a lot further. If you take a new development, not an existing one, but a

new development where you can really go to the limit on water efficiency, actual on the ground, not paper experiments, but on the ground experiments in Australia have produced new subdivisions where water use rates are cut by 80 per cent. The average house uses only 20 per cent as much water as the typical house in Australia. That's also a very water constrained area and they happened to be in the middle of the kind of drought that you experienced in the 1980s.

That includes measures that we're not talking about here but that are well to be considered, capture of rain water from roofs replaces almost all laundry water. Recycling of all water except that coming from the toilet, what's called grey water, for re-use. And no lawn watering because they are shifting the lawns to ground cover that does not require watering.

Now, in a typical Canadian house, water use doubles in the summer which means effectively that, yes, I know there is more laundry in the summer, more showers in the summer. But for the most part, the level of analysis I'm doing here, half the water is being used outside the house which means it's lawns, gardens, car

washing, local swimming pools, household site swimming pools and so forth.

There are a number of things to be said about this. Some of that water can be cut to zero with ground cover that does not require -- lawns are a particularly difficult thing to grow. They were never -- lawns of the type we have were never meant to grow on the Canadian prairies. We can go back to ground cover that is just as nice. If you want, you can grow cactus but that's not -- lawns and cactus don't go well together. It's not a particularly nice thing. But if you just want a decorative lawn, you can go that far.

The biggest evidence is that people will pay a lot for water use in their house. They will not pay very much for water use outside their house. Where there are summer peak rates, water use drops dramatically. In economic terms, the rate of water use is much more elastic outside the house than it is inside the house. It's an economic concept that I think it's easy enough to understand so I won't go into the technicalities of it.

This kind of analysis can be extended on and on. Our point really is simple. That at

the kinds of numbers that we're dealing with, the cost of the pipeline, we think you could save at least as much water as the pipeline would supply. We've done a little look at the non-irrigation agricultural water which we understand is also delivered by Pembina Valley Co-op. These uses are more constant over the year. And I did learn this morning, thank you for the information, that the young pigs do need -- hogs may not need clean water but apparently the piglets, or what you call them, the weanlings do need clean water. That's very useful. However, most agricultural uses do not require potable water. By non-potable water, I mean water that is not acceptable for drinking. It doesn't mean that it's heavily polluted, it just may have a higher salt content or contain more suspended solids than we would like in our drinking water. That's perfectly acceptable for many agricultural uses. And although I know we're not dealing with irrigation today, it is even preferable, in many cases, for irrigation water.

Finally, and very quickly, I want to talk about what are perhaps the most political of the elements of this. Much of this land was designed to drain water. The same problem that's

happening across the border, the same thing that's filling up Devil's Lake is drainage water, a lot of canals that are built to optimize farm production. Those are entirely human-developed channels. They can be undeveloped, they can be redirected. Much of that water, instead of being carried away, can be used to recharge aquifers. We know that our water balances are much more sensitive than we thought in the past. And those channels can be rethought.

The whole future of this area in terms of the agricultural industry or industrial agriculture is again a choice for the people of the region. If water is going to be directed in large quantities to industrial agriculture, it is a very important choice that has to be made politically, not just privately.

The fact that an establishment is privately profitable does not, in economic terms, make it economic. That just makes it commercial. The economic concept brings in other values. It looks at the broader framework for water, what the alternative uses are for water and ultimately what the value is for water. Water, as it is treated now, has no value in the ground. That kind of

concept is an anathema to economics. If I ever said that water has no value in the ground, water that can be pumped and has no value in the ground, I think they'd come and take my degree away from me. Economics is really built on the concept that there are values of that water. Not because of the environment, I'm staying completely away from the environmental issues that Glen was talking about, not because I don't believe in them but because of keeping these parts of the analysis separate, but water has a value and that value belongs to the public, not to the person who is pumping the water out.

So those issues really have to be decided and they are inherently public decisions, not private ones. They are not within the purview of the Pembina Valley Water Cooperative to solve nor the Manitoba Eco-Network for that matter. They are public policy choices for the region as a whole and the province as a whole.

So I'm going to conclude simply by saying the summer peeking does not look like a very strong argument to me. Relatively simple adjustments in the equipment plus consumer awareness emphasized in the summer could cut water

use, cut the peaking water that's so important.

I would even suggest, although I do not have the numbers to justify this, but I would suspect that Pembina Valley Water Cooperative could make some money by going into the water conservation business. Some electrical utility, some of the smarter electrical utilities have become energy service companies. They don't just deliver electricity, they also deliver conservation. They, in effect, sell conservation technologies which seemingly cuts their demand and therefore their revenues but they make enough selling conservation technologies and selling it to people to more than make up the losses.

Even if it's not privately profitable, it is entirely possible that the gains from saving water will more than exceed the losses in -- I'm sorry, the gains from saving water will much more than exceed the costs of building the pipeline. It's a much better alternative.

And if I had to sum up this whole presentation, I think the no project option is a very resilient option and that it has a lot of analytical evidence supporting it. Thank you very much.

THE CHAIRMAN: Thank you.

MR. KOROLUK: Thanks, David. And to just briefly summarize and make some recommendations here. We have raised some significant issues related to the lack of consistency in the Pembina Valley Water Co-op's rationale for its proposed project. We have also examined the project thoroughly with respect to water policy in Manitoba, noting Manitoba's commitment through its laws for watershed planning, watershed conservation and sub-basin transfers of water.

We have noted and echoed the concerns of others who are not convinced that this project will not compromise the sustainability of the groundwater resource the Pembina Valley Water Co-op wishes to exploit.

We have reviewed the Co-op's conservation plan and feel that it requires to be revisited. We have pointed to other experiences with groundwater extraction in the Pembina Valley Water Co-op supply region and the need for watershed and aquifer plans required for further development.

Significant information gaps in the

proposal in combination with the strong set of Manitoba government public policies that do not support a project of this nature lead us to question the suitability of the Pembina Valley Water Co-op's proposed project. Therefore, we feel that before any decision can be made on the sustainability of this project, a number of tasks must be performed over the short to medium term. And I'll let you define the length of the term.

On planning and water demand, a watershed authority and/or conservation district must be established in the Morris River and Plum River watershed to develop a watershed plan. As part of this plan, the authority must compile a state of the watershed report, assemble a comprehensive water budget and develop a source protection plan.

Community development planning and intensive livestock operation policies required under the Planning Act must be integrated into the watershed planning process. Water conservation plans and schemes must be embedded within the various levels of planning exercises, you know, at the community level, watershed level and regional level. And these must set benchmarks and assign

responsibilities for implementation, evaluation and follow-up.

On legal matters, the formal designation of water sub-basin boundaries under the Water Resources Conservation Act must become a high priority.

An independent determination is required as to whether the transfer of water from the lower sand unit aquifer in the Sandilands glaciofluvial complex constitutes a sub-basin water transfer as defined under the Water Resources Conservation Act.

The Clean Environment Commission must seek an independent legal opinion of the RM of Piney's by-law prohibiting the bulk export of water. And in order for this project to proceed, a favourable Court of Queen's Bench ruling must be made on the standing of the by-law.

On protecting a vital resource, given the ecological significance and the importance of the Sandilands glaciofluvial complex, opportunities exist for Manitoba to protect lands above the aquatic ecosystem and this can include action on area already under consideration as part of the Protected Areas Initiative.

Manitoba must reinvest resources to fully study and understand the capacity of this aquifer, its interactions with other ecological services, its recharge and impacts deriving from climate change.

On process and environmental assessment, we support the CEC's recommendation of June 2005 which was with respect to the floodway, calling for the practice of environmental assessment to be enhanced by requiring higher standards of performance.

We would like to have a bit more time and, you know, assessment guidelines, et cetera.

We urge the CEC to take steps to ensure that, as per terms of reference for hearings, all legitimate public comments submitted are responded to by the proponent and that adequate time is given to participants who qualify for participant's assistance.

And for now, and the duration, as our preferred option, the Pembina Valley Water Co-op and their member municipalities must heed advice given today by Dr. Brooks and aggressively implement a demand side management program within an overall sustainable water management strategy.

And thanks for your time.

THE CHAIRMAN: Does that conclude your presentation, Mr. Koroluk?

Mr. Schellenberg, do you or any of your associates have any questions of Mr. Koroluk?

MR. SCHELLENBERG: No, I think we would have some comments, however.

THE CHAIRMAN: Certainly.

MR. SCHELLENBERG: Thank you very much. We just received this particular presentation just prior to it being presented here. So there are some additional questions which we may reserve for later on.

The Piney by-law which you brought up, Glen, is a very interesting one. As a matter of fact, we seriously are considering supporting it. Because there are some very interesting things for us in terms of what it means. It would mean, if it was fully implemented, that when the water crosses the international border on the Red, we could have the RM of Montcalm insist that there be no export of water from their jurisdiction which means that we wouldn't have a problem that in terms of retaining that water for our own use. I would suggest the City of Winnipeg might have a

very serious problem with that kind of approach. I would also suggest if that by-law is allowed to stand, you might as well forget about the Water Rights Act and several other acts that you referred to in terms of the implications of that.

Now, source planning is something that has a catch phrase and it's used a lot. And in our case, this is all about the Red River. And on the Red River, the responsibility we're going to give to conservation districts or to the Manitoba jurisdiction will be a very interesting exercise in as much as we have neither jurisdiction or a role based on international agreement.

And your reference to the International Red River Board, in fact looking at apportionment, the last time I looked at the assignment which they had was to look at instream requirements. And in terms of apportionment within the terms of international agreement, I would suggest that role is ill-defined if there at all.

To some of Dr. Brooks' comments. The Cochrane report. I think we should state up front that the Water Co-op has some serious difficulty with that report as well. It was never adopted

and we certainly see the discrepancies and the inadequacies within that report. We provided that to the Commission at their request, having argued previously that it was one that we did not wish to have submitted and considered in as much as it had not been adopted. So your definitions and comments in that regard are fair and certainly some of the demand issues and demand projections that were in there, as you will have seen from my presentation this morning, are not ours.

However, in terms of your costs -- and before I go to costs, the no project option, which is interesting and one that I agree is something that certainly would normally be looked at. Except in this particular case, what we're looking at is a supplemental supply, particularly as it relates to low levels on the Red, drought planning basically.

And right now, we only have one option and it's from an environmental perspective and from a fisheries perspective. It's abhorrent to many parts of the province, but it is the only one we have. We're looking for a better one. And that is why it is we're pursuing the Sandilands project.

But the no project option, in a worse case scenario, is devastation. It's that simple. If we don't have the water on the Red, if we cannot access the water on the Red, we do not have an in-reach alternative. And, yes, we can cut down on all of our demands and take all of your good advice to heart and carry it out to the letter of the proposal, it is still not going to result in survival in terms of large parts of our region.

To the project costs. If I get 10 per cent return on my money, especially in terms of cash, I'd be the first into it and so would you. It's not that kind of cost we're looking at. As a matter of fact, it is a lot less. And if it wasn't a lot less, I wouldn't be here. They would have found someone else to manage this particular operation. And in terms of 10 per cent overhead and costs of operation, delightful that they won't tolerate that either unfortunately.

So I'm here to tell you that the $5.40 per thousand gallons, which we're presently charging, already includes the projected carrying costs of this particular proposal. And we are doing it for a lot less.

But having said that, I couldn't agree with you more that we all pay too little for water. You know that and I know that and we make no apologies for what we charge for water in our region and neither does my board, a lot of whom are in the audience here today.

The area, I don't quite understand where you got the impression that only part of the area is metered. The area that we provide water to is fully metered, absolutely every gallon. That's the only way we can make a buck and can actually afford to pay for a project like this. So it is fully metered. And what the municipalities provide is fully metered as well. And again, in terms of the Water Co-op, there is absolutely no declining scale, no volume discounts, no deals of any kind.

I would agree with you that grey water in terms of water conservation, and this is certainly something which is being worked on at the federal level and you are probably aware of it, and the last time I checked, I sit on the CWWA board, the last time I checked is the federal health department which is still drying its feet on a plan for grey water re-use. But when we can

finally get that into play, it's already been approved by the CMHC by the way, as you may know, and has the green light from other agencies. When we can finally get this into play and start to utilize this new construction and renovations, the savings will certainly be in the area of 30 per cent. And that is really the way to go.

The dual system, however, since you are the one that was concerned about costs, that would really escalate the cost, that is providing one pipe with treated water and one pipe that didn't have treated water. It's a nice theory, but from an economical perspective, especially with the geography we have to cover, it's not in the cards. It cannot be done.

Summer peaking, which you raise as well, is not our primary issue. That is actually being managed reasonably well, contrary to what you read in the Cochrane report, and it does require once in a while that I do have to go on air and encourage people to reread the material that had been given and cut back on water and it actually does work.

What is our problem is the low flows on the Red River. We need to have, you know, 4.8

metres above our intake in order to utilize our water treatment plants to their full capacity. Anything less than that and we start to lose the capacity that they are to be able to provide.

Public policy choices I agree but those public policy choices should be provincial. You shouldn't pick on one region. It shouldn't be us and them. There's a lot of policies in this province when it comes to water. So if it's going to be a provincial policy, I'm all for it.

And the final point, and I'll get off my soap box, and that's the recharge of the aquifers. This in fact has been looked at and I'm sure you're well aware of the fact that it's full of pitfalls, especially depending on how you're going to do it. And every time we have looked at it, and it's certainly been looked at very carefully as others in this room will attest to in the case of the Winkler aquifer, and the concerns related to it are very serious from an environmental perspective, and particularly from a water quality perspective. So it is something that we have looked at but it has some serious problems attached to it.

Those are my comments, Mr. Chairman,

to the presentation.

THE CHAIRMAN: Thank you, Mr. Schellenberg. Mr. Gibbons, you have some questions?

MR. GIBBONS: Just one question for Dr. Brooks. Basically it's a point of clarification, if I could? In your conclusions, based on the assessments that you have been making for conservation and the like, the conclusion that this could meet the needs of PVWC is an interesting one. What I'd like to know, though, is whether, in coming to that conclusion, are you, in addition to the other things that you considered, giving some consideration to the population growth rates of the sort that the PVWC documents are indicating which, roughly speaking, if we take the last 10 years as an indicator might be thought of as continuing, say, for the foreseeable future at 1 per cent population growth per year. Is it still doable in the context of 1 per cent annual growth?

DR. BROOKS: In a word, yes. I think actually even the most recent material from PVWC mentions that they expect per capita use to decline a bit. The difference between what they

are saying and what I'm saying is I expect it to -- I expect that it could decline a whole lot by more than the population growth. So that the net effect would be a declining municipal or residential use.

MR. HALKET: I was interested in what you were saying about desalination plants in the Middle East. How old is that technology and how old are the plants that you are talking about?

DR. BROOKS: Most of the new plants I use a technique called reverse osmosis and all of the smaller scale ones use reverse osmosis. I'm not an engineer and I'm going to run out of my technical knowledge pretty quickly, but in effect, you have membranes through which water molecules can pass but the salt molecules cannot. And you have a series of these -- these membranes are in series. The cost comes in pumping through those membranes because the water doesn't want to go through them either. So you have to use -- it is a very energy intensive process.

And it looks increasingly -- I once wrote a sentence in a -- I wrote a book on water use in Israel in Palestine and I said that desalination is to water what nuclear power is to

electricity, the idea being that it was much too expensive ever to be useful. I still think it's a wonderful sentence from a literary perspective but it happens to be wrong analytically. And it turns out that desalination is much more economic than I had believed when I wrote that sentence, but only for drinking, only for potable water. If you can afford to pay for potable water what people will pay for it, then desalination will work.

The new plants that are going in in Israel along the Gulf Coast and soon enough, I expect, in Gaza. We're talking about new plants starting with sea water and operating at about 50,000 cubic metres per day. So they are big plants. And they are delivering water at down or below $1.00 a cubic metre. The old ones, when you were distilling water, they are just gone. No one talks about that process. And there were several other processes but all the smaller ones are reverse osmosis.

MR. HALKET: That's sea water that they are pushing through their osmosis filters?

DR. BROOKS: It's sea water on interior area, it's also high carbonate water. There's a lot of -- people call it salty water but

it's got a lot of carbonates in it. This thing that makes stuff on boilers, the flaky stuff, they use the same process for that. And they are also using it for recycled sewage water. Recycled sewage water is increasingly also being desalinated because the salts build up and has adverse effects on soil quality.

MR. HALKET: So would you care to speculate on how much it would cost to push let's say water that is coming out of the carbonate aquifers below the Pembina Valley?

DR. BROOKS: I wouldn't guess but I would be surprised if it's more than $1.00 a cubic metre. I don't have enough information to know what's in that water nor do I have enough of a picture of how the costs go down with scale, the cost per unit go down with scale. I wouldn't guess at that.

MR. HALKET: Thank you.

MS. FUNK: Just a quick question on the desalination that you were talking about. What do they do with the by-products?

DR. BROOKS: The salt?

MS. FUNK: Um-hum.

DR. BROOKS: Either you put it right

back in the sea or just find a place where there's a good current and it disperses quite quickly. It doesn't have much of an adverse effect there. I say that as an environmentalist. You don't put it right on top of a coral reef, but with a few other places you can get rid of it quite easily.

The Middle East has a lot of dry waddies and a waddy is just a dry river bed. And it goes in there and the next rainfall, it will flush down and it will cause a lot of damage but over a very short area. And it's generally accepted as an acceptable trade-off. It is a problem but it's a manageable problem.

MR. GIBBONS: Sorry, Dr. Brooks, a quick follow-up. You said the process is energy intensive and presumably that is where of course the bulk of the cost comes from, as you mentioned earlier. As far as you know, is it the kind of process that could be powered by things like wind power or that sort of thing or through solar power that might reduce costs so you wouldn't have to use, for example, hydro power or perhaps non-renewable energy sources like petroleum or gas or whatever?

DR. BROOKS: I suppose the literal

answer certainly is it could be but it is a hard way to go. So far as I know, all of the desalination plants use fossil fuel generated electricity because you want that steady supply. I've never thought of how it might work with an interruptible supply as you might get with wind. But I think you'd want to be connected to either a hydro system, as you have here, or a fossil system.

MR. GIBBONS: Thank you.

DR. BROOKS: You can desalinate with solar power but you need really lots, lots of flat land and lots of sun. You know, you can always use -- if you have enough land and enough glass and aluminum, you can always generate solar electricity but it's a long and hard way to go.

MR. GIBBONS: Thank you.

MR. HALKET: A follow-up to that, Dr. Brooks. By using power I would imagine, I have no idea what kind of power they are using in Israel.

DR. BROOKS: It's mainly natural gas now.

MR. HALKET: I was just wondering the price that is being put on desalinization of $1.40 per cubic metre, was that it, or $1.00 per cubic

metre?

DR. BROOKS: Yes. They are selling it, don't forget, at somewhere above 50 to a dollar a litre they are selling the product and prices go up very rapidly with consumption. If you use more than what a household would use in a small apartment, you are quickly paying $4.00 and $5.00 a litre for water. So you don't put much on the lawn.

MR. HALKET: Where I was going with this is the price that you were giving is based on how much it takes or how much it costs to generate power in Israel, or in the Middle East, and I was wondering what's a comparable cost to here to Manitoba Hydro?

DR. BROOKS: I know a lot of people in Israel, I worked there, I have never gotten a good figure for what they are paying for natural gas. They never told me that so I can't give you an answer. It's a closely guarded secret.

MR. HALKET: Okay. Thank you.

THE CHAIRMAN: Mr. Koroluk, any final comments? Okay. Well, I thank you and your associates very much for your presentation here today. We'll take about a 15 minute break and

then we'll come back with officials from the Water Co-op.

MS. JOHNSON: Mr. Chairman, just before we break, can I take care of an administrative matter here?

THE CHAIRMAN: Of course.

MS. JOHNSON: As far as exhibits go, the Pembina Valley Water Co-op documents are exhibits 4 to 15. That includes the three presentations, the four reports referenced in the terms of reference, the additional information, the master plan, the expert CV's and the conservation plan. Exhibit 16 will be Mr. Render's written submission to the Commission. And Exhibit 17 through 28 will be the material you just heard and saw, the maps, the testimony, the expert CV's for the water caucus.

(EXHIBITS MARKED)

THE CHAIRMAN: Thank you. We'll break for 15 minutes.

(Proceedings adjourned at 3:01 p.m.and reconvened at 3:20 p.m.)

THE CHAIRMAN: Can we come to order, please. Mr. Schellenberg, you wanted to make some comments before we resume? We'll resume

questioning now of the proponent.
Mr. Schellenberg is going to make some comments.

MR. SCHELLENBERG: Mr. Chairman, commissioners, with your permission, what we'd like to do is go back to where we left off just before the lunch break and just review that issue for just a moment. I'm going to call on Steve to do that and then we can return back to the questions.

MR. WIECEK: Following up on the conversation we were having this morning. As far as the recharge rates go, there are a lot of what-ifs scenarios that we can get into. And certainly the values coded in the Cherry thesis were only one factor that was considered in the assessment of the recharge to that area. Like I ended up in the morning, you have to look at the measured flow through that lower sand unit relative to those assessments of the recharge in the area. It certainly would suggest that there's a lot more recharge occurring than is being accounted for in those estimates. The other factor we look at is the water quality of that aquifer which is very comparable to what we see in the water quality of the upper sand units and the

water quality in the area which suggests that the water is flowing through that aquifer at a fairly significant rate. Otherwise, its residence time will be higher in that aquifer and there's a direct correlation to increasing conductivity or decreasing water quality with resident's time in the aquifer. So basically all those factors have to come into play when you consider the recharge rates and what that sustainability of that aquifer is. That's where we get our estimate that it is conservative.

And just to follow up on this morning about the hydrographs and the question about the 2 metres.

THE CHAIRMAN: I'm sorry, the --

MR. WIECEK: There was a question this morning here and you just asked me to pull up.

MR. HALKET: I think what we're going to do is come back to that a little bit later.

MR. GIBBONS: We can deal with that later. We were going to follow up with that on a separate section.

MR. SCHELLENBERG: Do you wish us to provide that now?

THE CHAIRMAN: No. We'll come back to

that issue a little bit later. If there's nothing else you want to elaborate on, I'll ask Ian to ask his questions.

MR. HALKET: I'd like to start where we left off this morning, too, in that calculation of recharge. And I was wondering if we can put it back up again because I have a question that sort of came from the discussion that we have just heard from Eco-Net and that is that in this calculation that you have up here showing the recharge for the whole glaciofluvial complex, you use a number of 71 millimeters per year I think it is, or is it 73?

MR. WIECEK: 71.

MR. HALKET: I'll wait until we get it up and then I'll go on.

MR. WIECEK: 71.

MR. HALKET: Now you state here that the area of the Sandilands glaciofluvial complex is one, if I read this right, is 1,935,000,000 square metres.

MR. WIECEK: 1.9 billion and that's just based on the aerial extent.

MR. HALKET: Now, my question here is Mr. Koroluk was showing a slide earlier that

painted the extent of that aquifer, that area. Now, that's the same area as we're talking about, the one that Mr. Koroluk was showing, the one that you were showing?

MR. WIECEK: That's correct.

MR. HALKET: Mr. Koroluk stated that there were five watersheds that have their head waters on this aquifer. So would it be fair to say that you could take that 4,300 litres per second that you estimate is the recharge for this total system and split it five ways, that's the simplistic picture, and we're estimating that each watershed is taking the same amount of water from it. But would it not be fair to say that that water is being distributed to three or to five watersheds?

MR. WIECEK: The uplands, not the aquifer, but the uplands Sandilands glaciofluvial complex uplands are, yes, located at the confluence of five different watersheds.

MR. HALKET: Of five different watersheds.

MR. WIECEK: To just arbitrarily subdivide it evenly between them? No, you cannot do that.

MR. HALKET: I know you can't do that. I think it's a very simplistic way of looking at it. But I think the point is is that the 4,300 litres per second is not a recharge solely to the sand aquifer then to the lower sand or to the complex that is moving water -- this is the whole thing we're talking about and it's moving water in many different directions. Would that be fair to say?

MR. WIECEK: I wouldn't agree with that, no. Basically, as I've indicated, there is recharge occurring throughout the area. We're only dealing even with that Sandilands glaciofluvial complex with one small part of the overall recharge to the area.

MR. HALKET: What you're saying I agree. You're dealing with a small part of this area for your cone of influence around the well or cone of depression that is created. But when you look at a recharge estimate for the total glaciofluvial complex, that recharge that you are stating here, 4,300 litres per second, is being distributed into the recharge for five different watersheds.

MR. WIECEK: It forms a component,

each one of those watersheds. That component has not been quantified.

MR. HALKET: Now my question is, if we were to take 50 litres per second out of a particular point in that watershed, how would that affect the recharge downstream in those other watersheds or in all of the watersheds together? Do you have a handle on that?

MR. WIECEK: It's not on each watershed, no.

MR. HALKET: Well, this area is the head waters of five particular watersheds according to Mr. Koroluk's argument.

MR. WIECEK: It's within at the confluence of five different watersheds, yes. Each one of those watersheds receives recharge throughout the watershed so this is a minor component on that just on a spatial area.

MR. HALKET: I think the point I'm trying to make here is that I realize that each watershed has its own particular picture and that this may form a minor or a major part of that recharge for that particular watershed. But my question is, do we have a handle on that? Do we know how much?

MR. WIECEK: That has not been studied as part of this project, no. Water Stewardship would have that kind of information.

MR. HALKET: Okay. Thank you. If we go back to your other calculation on recharge estimate, this is the recharge area around the cone of influence for the well. And your annual recharge rate estimate for this is 400 litres per second. And I think this is where we left off this morning before lunch is that we were looking at a system of recharge to three aquifers here which may reduce that number. We were also looking at Cherry's estimate, which you had just spoken to, and said that or suggested why you were using it as a conservative estimate of your numbers of 174 millimeters per year in recharge.

In your argument here or proposal here, you also say that this 400 litres per second, that the 50 litre per second withdrawal would be okay because the province has, up until now, allocated 50 per cent of the recharge to development, recharge rate to an aquifer to development. And you state that in your engineering report. And I was wondering where that came from.

MR. WIECEK: I do not state that in the engineering report.

MR. HALKET: Oh.

MR. WIECEK: I state that it's 12 per cent of the 400 litres per second. And that elsewhere on other aquifers, the province has applied a 50 per cent rule. I do not say they apply it to this aquifer or that that's the policy for this aquifer.

MR. HALKET: Thank you for correcting me. I was wondering if maybe we could ask the province why we use 50 per cent allocation in other aquifers, why they use that number?

THE CHAIRMAN: Can you introduce yourself for the record, please.

MR. BETCHER: Yes. I am Bob Betcher. I'm a hydrogeologist with Water Stewardship and I'm head of the groundwater management section.

(BOB BETCHER: SWORN)

MR. HALKET: I guess you got the sense of the question, is in some other areas of the province, at least around 50 per cent of the recharge rate to an aquifer is considered okay to assign to development or to the water supply?

MR. BETCHER: It's actually quite

variable. The 50 per cent figure was first applied I think in the early 1990s to the Assiniboine Delta aquifer which is an unconfined aquifer. And the decision to apply 50 per cent was reasonable I guess with a lack of some more definitive information or understanding which would allow us to assign a different figure. So in essence, it was chosen that throughout most of that aquifer, the 50 per cent figure would be applied.

So the policy was that through licensing, we could allocate 50 per cent of the amount of recharge occurring in each sub-basin within the aquifer to be extracted and utilized and the other 50 per cent would be to allow continued discharge to wetlands for instance, base flow in streams and to be used by non-licensed utilizers of the groundwater resource.

Now, of the sub-basins that there are present within the Assiniboine Delta aquifer, the 50 per cent rule does not apply to all basins. To one sub-basin, a 30 per cent rule was applied, to another sub-basin, a 15 per cent rule was applied. So there was some assessment being made as to how important the aquatic regime was and how much of

the recharge we wanted to continue allowing to go to, to discharge essentially in one form or another.

Now, this 15 per cent figure has subsequently been applied to a couple of other unconfined aquifers, that is aquifers which are essentially shallow sand exposed to the ground surface. It's a reasonable way of approaching it in the lack of a complete understanding.

Eventually what we would like to do though is we would like to say after 20 years of monitoring in a basin which 50 per cent has been allocated, is the 50 per cent rule an acceptable rule or should it be a 40 per cent rule or a 60 per cent rule? We're not quite at that stage yet.

The difference between the 50 per cent rule and what we're talking about today is that the aquifer that we're dealing with today is a confined aquifer.

Now in a somewhat similar situation, which is the Winkler aquifer, we in fact have a 100 per cent rule. So if you have an aquifer which is something like the Winkler aquifer in essence, it's kind of like an underground lake. And I hate saying that as a hydrogeologist. But

it's a reasonable concept that another which you have recharge coming in, which you really don't have a lot of discharge going out. To get discharge out of the Winkler aquifer, you often need to transport water through maybe 100 feet of clay, a very slow process.

So you can kind of look at that as a reservoir. Recharge goes in, you take 100 per cent of the recharge out and allocate it, recharge goes in again. And over the long-term, in a confined aquifer like that, you shouldn't have an issue with 100 per cent allocation.

You have a different issue when you have essentially a fully confined aquifer such as we're dealing with today in that recharge is a very subtle process. It's not sand at surface. It rains, the rain seeps into the aquifer. Some of the water that seeps into the aquifer flows off and discharges to a stream.

A confined aquifer is very very different in that the discharge process, it's often difficult to understand. Sometimes even the recharge process is difficult to understand.

So the 50 per cent rule is something which the province developed and applied primarily

to unconfined aquifers but we don't have a similar rule which we apply to confined aquifers.

MR. HALKET: And in order to apply that rule or to apply a similar type of rule where you would put a percentage on the amount of water to be extracted from an aquifer, what kind of information would you like or would you need to make that type of decision?

MR. BETCHER: Well, I guess you could look on the 50 rule as saying that of the water which flows or is available in an aquifer, the provincial policy is to allow a portion of that to be withdrawn and the remaining portion will continue to fill its natural function through discharge.

So in a situation like this, if we can calculate the total volume of flow which is coming through an aquifer, then it would be consistent with provincial policies to allow the withdrawal of a portion of that amount of water and utilize it for human purposes so long as we continue to allow a reasonable portion of that water to move through the system and discharge to wetlands or be lost through evapotranspiration or other mechanisms. As to how you would come to exactly

what proportion of that flow that you would allow to be extracted, well, that's a very difficult process. But in a confined aquifer, you can often look on it as being, and this was discussed this morning, is that when you start pumping over time, you come to a new equilibrium and it may take you 10 years to come to a new equilibrium. But that new equilibrium in fact changes the recharge/discharge conditions within that aquifer.

So if we are pumping from the lower aquifer, initially we would be getting water taken primarily out of that aquifer. Over a long period of time, let's say 10 or 20 years when we develop a stabilized drawdown cone, we may find that instead of withdrawing 100 per cent of the water from the part of the water which is flowing through the aquifer itself, that we're only withdrawing a certain proportion or a lesser proportion of the water that's flowing through the aquifer but we may have induced additional downward movement of water through the overlying aquitard. And, therefore, over time, we begin taking more and more water out of the overlying aquifer as it recharges down or moves downwards through the aquitard.

So when you're looking at a confined system, it's often best to look at the development of a renewed stable position, a renewed equilibrium position as opposed to treating it in the same way as you would an unconfined aquifer. The two are quite different.

MR. HALKET: Now what I'm struggling with here is for the aquifer to shift from the pristine condition, let's call it, to a new equilibrium position or dynamic under pumping, how would the province assess any changes to the environment downstream of that aquifer during that process?

MR. BETCHER: Well, that's really the whole difficulty of hydrogeology is how do you quantify the surface water/groundwater interaction. And often with a confined aquifer, the discharge of water from the system can take place a very long distance away from where you're actually doing the pumping or have the development. And that's probably what's occurring here.

So when you take a look at an aquifer like that, you have to make some reasonable evaluation as to how far away the proponent is

going to have to understand or develop an understanding of the hydrogeology and be able to quantify that hydrogeology.

And in a situation like this, if we had a lot of money in five years, we'd come up with a slightly better answer but it wouldn't be a great answer. It wouldn't be all that accurate. It's just that difficult to quantify the hydrogeology. And in part, it's due to the difficulty in quantifying the geology that you're dealing with and the interconnection of various aquifers.

So in essence, I guess the answer to your question is that we have to make a judgment. And in many respects, after you make the judgment, is this a reasonable thing to proceed forward, then you say, okay, well, we'll have to monitor and see what the long-term impacts are.

And this is the approach which has, in fact, been taken on many aquifers around the world where, after many many years, you can come to some understanding through the monitoring of the overall sustainable yield but you can still make your reasonable decision early on in the game and say, yeah, we think that this will come to an

equilibrium very very quickly and that the equilibrium will be such that we aren't in fact having a long-term impact on the aquifer. In other words, we are not impacting sustainable yield of this aquifer. We are not exceeding that sustainable yield. And that essentially is the conclusion we come to in evaluating the report.

MR. HALKET: To me, the idea that you can't assess the impacts of the pumping until a future time frame sort of flies in the face of the sustainable development guidelines in that we should know what the impacts are going to be before we start.

MR. BETCHER: Yeah. If I was a physicist, I'd like to know the theory of everything before I started doing work on physics. It's a very difficult process and we're at a stage where we can make reasonable assessments. And I think we're at the stage on this project where we can make a reasonable assessment in terms of the overall impact. But quantifying the impact, in other words, how would a stream flow change in a certain stream, how much water would be lost through evapotranspiration. For instance, if we have groundwater discharge into a swampy area, to

have to try and quantify that is a very difficult process although we can make some reasonable judgments from the knowledge of hydrogeology.

So the question becomes what's a reasonable judgment. And in essence, we're making decisions under uncertainty, but we feel we have a reasonable handle on the uncertainty in this case.

MR. HALKET: Okay. I would like to ask you some more questions maybe a little later, if you wouldn't mind.

MR. BETCHER: I won't disappear.

MR. HALKET: Thank you. I have a few questions concerning, as we were just moving along here, the down gradient flows, shall we say, into the marshlands and the wetlands around the Bedford Ridge area considering a 50 litre per second withdrawal. And first of all, maybe what we could do, Mr. Render I believe has entered a letter or some ideas and thoughts on this extraction into the public record. And he made some comments regarding the pumping test itself. So before I go down to the downstream, I'll leave the recharge piece alone for now. I'd like to see what your thoughts are on his comments and I wonder if we can just read them into the record, his comments?

THE CHAIRMAN: I think that would be considerable time-consuming. It is part of the record.

MR. HALKET: Okay.

THE CHAIRMAN: It is part of our public record. We've accepted it as a written submission but I don't think we need to read the entire four pages into the record, but you can ask as many questions as you like around it.

MR. HALKET: He suggests that there was a breakdown in the pumping test. Basically the pumping was stopped after so many, was it three hours? Okay, after three hours and 45 minutes, and then it was restarted. And he suggests that this is not standard practice, that once there is a breakdown, there should be time allotted for the aquifer to recover from the stresses of the pumping and then the pump test should be conducted again.

MR. WIECEK: That's correct. As far as the analysis of the breakdown?

MR. HALKET: Yeah.

MR. WIECEK: What happened is the generator, a switch failed on the generator, and until that was repaired, then the pump was

starting and the test was restarted, that data has been analyzed by us and also by other hydrogeologists. And everyone has looked at that particular effect to see if it has affected the results. And the general consensus is it hasn't affected the results, as far as the estimates of the transmissivities, storativity or boundary effects.

MR. HALKET: That's what Mr. Render, he suggests otherwise. He suggests that it has affected the results.

MR. WIECEK: We've conferred with a number of hydrogeologists.

MR. HALKET: You think otherwise?

MR. WIECEK: That's correct.

MR. HALKET: Okay. What does the province think?

MR. BETCHER: We have recently hired a very smart young fellow, compared to me anyway, in terms of age I mean, and I asked him to re-analyze the pumping test on the basis of superpositions. So in essence, in hydrogeology, if you have a pumping cycle, it's causing a drawdown in the aquifer. You then stop that pumping cycle and you go to the recovery of the aquifer. So

essentially, you're pumping for a certain length of time, you stop pumping for a certain length of time, you've got a drawdown, you've got a recovery, you start the pump up again and then you pump until the end of the 72 hour period.

You can take the drawdown, the recovery and the next drawdown. And through the theory of supposition, you can essentially superimpose these three effects.

So what I asked my colleague to do was to use a computer program which would allow us, instead of interpreting this as one constant pumping rate, that we would in fact simulate all three pumping periods or non-pumping periods. We'd sum it together and we would analyze that. Our analysis gave essentially the same data as Pembina Valley, give or take 10 per cent.

So on this case, we don't feel that that breakdown for two hours early in the test had any significant effect on the results of the test.

MR. HALKET: Okay.

THE CHAIRMAN: Thank you.

MR. GIBBONS: Before you go, is a three day test period considered standard for this kind of study? And if it is, is that sufficient

to estimate long-term drawdowns on aquifers? It seems to me it's a rather short period given the potential for drawdowns that are going to be taking place over 10, 20, 30, 50 years.

MR. BETCHER: Yes.

MR. GIBBONS: So are the measurements, for example, precise enough that one can get a reasonable estimate of what is likely to happen to the aquifer in that longer period based on a three day test?

MR. BETCHER: The answer to your first question, which is whether 72 hours is standard in the industry, and it is. A 72 hour test is essentially a typical length for a pumping test where withdrawals are in this order of magnitude. Will that tell you 10 or 20 years down the road what you're going to see?

MR. GIBBONS: All else being equal, in other words, not assuming droughts or anything of that sort, but if all else remained equal, would that give us a good reading?

MR. BETCHER: It gives you a good prediction. Over time, over years, what you will find is that the drawdown cone will actually expand until it comes to equilibrium. As that

cone expands beyond the area of the aquifer that you influenced over the 72 hour test, so if you then start the project up, after one week, the cone will have expanded farther than the 72 hour test. After a year and after 10 years, it will have expanded farther than the 72 hour test. Whether that cone will intercept either a recharge boundary or a no-flow boundary and, therefore, affect the results of or the amount of drawdown that you would get for pumping over that long period of time, we can't predict that. Although because the cone becomes so broad, it affects such a huge area that if you have a disturbance in one part of that area, because the cone is so large, it doesn't really affect the entire drawdown. In other words, you would see a minor effect but not a major effect.

So it's pretty reasonable to do this and make our predictions on the basis of a 72 hour test. We do want to see on any pumping at this rate long-term monitoring. And the long-term monitoring is because we simply can't run a test for a year and see what the effect is.

But generally speaking, the longer the amount of time that you have, the less likely you

are to start seeing individual boundary effects in an aquifer like this.

THE CHAIRMAN: As that cone spreads out, the drawdown cone spreads out, does it eventually stabilize or does it just keep going down on a wider area?

MR. BETCHER: The theory of a non-equilibrium test is that it expands essentially forever. In nature, that never occurs. And in a situation like this, as the cone expands, it allows the or causes the increase in the head gradient through the overlying aquitard. And as that head gradient increases, the amount of seepage that you get down through the aquitard into the cone tends to stabilize the cone. It almost acts as a recharge boundary or does act as a recharge boundary.

So over a certain period of time, yes, the discharge will be matched by equal amount of recharge coming into the cone.

THE CHAIRMAN: Thank you. That seems to be it for now.

MR. HALKET: Bob, actually this whole discussion will probably involve you, so you may as well get settled there. Okay, the cone is

going out due to continuous pumping and I noticed that the downstream or the cone as the cone of influence for the 72 hour test or for the 50 litre per second drawdown intersects some of the wetlands below the Bedford Ridge area. And if I was to look at the wells, the test wells that are in that area, what I notice is that the wells that encounter the lower sand unit show that they could be flowing artificial wells in that area. The piezometric surface is almost the same as the marsh water level surfaces looking at the contour maps.

Now, my question here relates to then if that is the case, there may be Artesian wells that are feeding from the lower sand aquifer in that area that would maybe be feeding the wetlands in that area. Is that a possibility do you see from the province?

MR. BETCHER: Sure, certainly. If you have water moving through an aquifer, there has to be balance. The amount of recharge that you have is equal to the amount of discharge that you have otherwise you're trying to change the volume of the water in the aquifer. So discharge is often, and probably in this type of situation, a very

distributed thing. In essence, discharge is going to occur because the head in an aquifer is above a discharge boundary, essentially above ground.

MR. HALKET: So my question then is if we have this large cone of influence around the well that is extending into the wetland area, then that cone of depression is basically saying that, is pulling the water level or the piezometric surface from the well or from the aquifer in that area down, isn't it?

MR. BETCHER: Yes. If it extends that distance, yeah.

MR. HALKET: Certainly from the test wells that I have looked at in this report, they seem to be intersecting or pretty close to the water level surface of those marshes.

MR. BETCHER: Yes. Well, the other thing you have to look at, depending on how that's drawn, was that the zero drawdown or was that one metre drawdown?

MR. WIECEK: The one metre drawdown.

MR. BETCHER: The one metre drawdown, yeah. So essentially what you're looking at is a change in gradient but you're at the outside edge essentially of the drawdown cone.

MR. WIECEK: It was also --

MR. BETCHER: I'm not quite sure whether I should be answering that particular question. I believe the proponent should be answering that one, not that I want to get back to my seat or anything.

MR. WIECEK: It is the drawdown within the lower sand aquifer which is under Artesian pressure. And so that indicates that the aquitard is present and is restricting the flow upwards to that upper sand unit which is what the wetlands are underneath or the wetlands are on top of.

You've got to keep in mind is that you're going from a confined aquifer to an unconfined aquifer. In a confined aquifer, the storativity value, the amount of water that's released per unit change, is on the order of 1 per cent. In an unconfined aquifer, because you can drain the pours, you are into a 20 to 30 per cent. So the net effect of say a one foot drawdown in the confined aquifer, because that's a pressure reduction, actually equates to substantially less decline in the water table because there you have much more water being released. Say if it's a one metre -- how does this work?

MR. MAATHUIS: A one metre drawdown in an unconfined aquifer times .3 and if you are dealing with a confined or a semi-confined aquifer, you're looking like a multiplication factor on average of 10 to the minus 4. So there is a huge difference in the amount of water which is being released if you draw down an unconfined aquifer back a unit drawdown, say one metre, between an unconfined and a confined and a semi-confined aquifer. Does that answer that question?

MR. HALKET: I guess my point is getting to, if I look at the piezometric head on the lower sand aquifer at the wells that are downstream or below the Bedford Ridge in the marshlands there, it shows me that there's a high piezometric surface and that a well sunk in there shows quite a high rise to the level of the marshlands. I'm wondering what the possibility is then of that aquifer feeding those wetlands? What is the connectivity there? Is there a connectivity or isn't there? And do we have answers to that question?

And I put this to the proponent but I also put it out to the province because you have

wells in that area that you're looking at and you also have surface water gauges and I'm just wondering if --

MR. BETCHER: The nearest surface water gauge is actually near Ste. Anne.

MR. HALKET: Pardon me?

MR. BETCHER: The nearest surface water gauge is actually near Ste. Anne. It's a very long distance away. It's not anywhere near the area that would be influenced by this test.

MR. MAATHUIS: I think this may give you the answer. What we are looking at is a map and then at site number 16. At that site, there are three wells, one is in the upper aquifer, one is in the lower aquifer and one is in the Winnipeg formation, the sandstone. It's also the area where, as indicated on the topographical map, a kind of bumpy area. Water level data for this particular site indicates here are the water levels plotted as a fraction of elevation over time and the time being a short time this past summer.

We see that the water level in the lower sand is the highest. It is higher than the water level in the upper aquifer as well it is

higher as the water level in the Winnipeg formation. What does it mean in terms of flow? There's flow from the lower aquifer, flows upwards towards the upper aquifer as well as downwards into the Winnipeg formation.

I may need to switch slides again. My apologies. So keep this in mind, this kind of setting, and then I'll come back to that after I find my next slide.

MR. HALKET: So what you're saying here is that flow is going to move from the highest piezometric surface to the lowest and that therefore, that lowest sand aquifer is feeding both the upper aquifer and the lower aquifer? Do I understand that correctly?

MR. MAATHUIS: At this particular location, yes, just for you to keep that in mind when I come back.

Recharge area, whatever is coming in here in part flows like that. This is the bumpy area. And a significant portion flows in here over here. At this particular site, as I just showed in the previous slide, there is a somewhat upward flow and a somewhat lower flow. Now, we don't even think that the drawdown caused by the

proposed pumping will actually get here. But if it gets here, what is the impact if you lowered the water level in the lower sand by a small amount? The small amount will change the hydraulic gradient over here by a small amount. So the actual amount of flow involved will be relatively minor. So there might be a very minor impact. Inasmuch there will be a very minor impact on the amount of flow which may go down here.

We're talking about volumes which are all relatively small so the impact, certainly in this particular area. And because we're dealing also with the fact that this is unconfined, it will be very small. To see any significant effect here in the upper aquifer in terms of water level changes, they are very small because the Storsjo efficient is relatively high. To see a significant effect, very large volumes, you will have to go up or down in order to see, you know, a noticeable effect, that is just not going to happen. So there will be very little change in this area. Have I explained your question?

MR. HALKET: Yeah, you did. That was great.

MR. WIECEK: One other thing is to understand the effect that surface drainage will have on groundwater levels. It's very pertinent to this particular area here. Insofar as this area down through here is that Watson Davidson Wildlife Management area. That area used to be hay land. It was donated as a wildlife management area. It was revegetated. As part of that turning that into a WMA, to improve the habitat, they did install drainage in a number of places. Part of it goes up through Marchand to the Seine River. The bulk of it certainly goes off towards the Rat River swamp and eventually into the Rat River.

Now to understand the effect that drains can have on shallow, unconfined water levels which, if you look at these marshland areas, the water table was very close to surface. And the effect of drains is to lower that.

The most dramatic, and not necessarily pertinent, but the most dramatic of that is the Red River Floodway itself. This is a well that was installed prior to the construction of the floodway. This was the normal groundwater level at that time. The floodway being a big ditch also

allowed groundwater to drain to it which suppresses the water table. And ever since then, the water does not continuously drain, the aquifer is not continuously draining dry. This becomes the -- this level in here is now the normal condition because the condition of that ditch has been changed. Any time groundwater tries to rise because of flow to it, it just increases the rate of flow into the ditch, the water is carried out very quickly.

So again, what happens is the water shedding off the uplands here through the upper sand is being intercepted and diverted out of the area. It's not allowing the water table to rise back up to the surface. So the effects on the wetlands, it's already been -- the desirable condition based on having these ditches put in there is to keep the water table suppressed in there, partially for the WMA but I'm sure it's having effects down gradient on the agricultural areas in keeping the water that would normally flow through from coming through there. It's allowing it to vert out.

And just an example of how quickly this water can move out of here. This photo was

taken in 2005. It's this culvert just outside Marchand here. This culvert was washed out back here and this was taken after it had been replaced. So there can be a very fast flux of water after major recharge events. Instead of the water just slowly infiltrating through the ground, it's allowed to quickly discharge the area. So those are some of the major effects that this will have, this kind of drainage will have and that's drainage throughout the whole watershed.

MR. HALKET: So what you're telling me from this here is that that lower sand unit at its discharge point downstream is distributing its water to or at least has the potential to distribute its water to the surface or to the sandstone aquifer below it, right?

MR. WIECEK: That's correct.

MR. HALKET: Hydraulically speaking.

MR. MAATHUIS: Or it can go straight.

MR. HALKET: Yeah. But it's the highest head system in the whole complex at that particular point.

MR. WIECEK: It's the highest --

MR. HALKET: It's got the highest piezometric head.

MR. WIECEK: Of the aquifers in an area, yes.

MR. MAATHUIS: It doesn't have the highest head in the area. The highest head is in the recharge area.

MR. HALKET: But I'm talking about the down -- at the foot of the Bedford Ridge area.

MR. MAATHUIS: You can't talk in terms of highest.

(INAUDIBLE)

MR. HALKET: I would like to then think that we would know a little bit more about what's happening to that water as it comes out of that aquifer since it seems to have the possibility of going so many different ways. And it is discharging otherwise the aquifer would be filling up and overflowing.

MR. WIECEK: That's correct. Eventually, it always discharges.

MR. HALKET: From my understanding of this.

MR. WIECEK: Yes.

MR. HALKET: So my point is, is where is it discharging? What do we know about where it's discharging?

MR. WIECEK: Again, it comes down to, like Bob was talking about, for how far downstream does the proponent have to go to quantify the discharge?

MR. HALKET: That's a good question.

MR. SCHELLENBERG: I think at this point, we spent somewhere close to three-quarters of a million dollars in terms of the research we've done here. And I think we have contributed very substantially to the additional knowledge that both the province, the regulator and everyone else has related to this. And so from a research perspective and given what you've already seen in terms of the monitoring program which we are recommending ourselves, it should be continued if this is approved, the knowledge that we gain thereafter in terms of what happens here will be very substantial as well. And again, the costs will be borne by the proponent.

So as to how much of the cost the proponent should bear? It is already considerable and I think it is reasonable and it will continue to be borne by the proponent in this particular case in terms of the monitoring which should very materially contribute to your knowledge base

related to some of the questions that you have.

MR. HALKET: So your point is then that we know enough already?

MR. SCHELLENBERG: I guess my point is that I'm not the specialist in this area. But my common sense tells me that based on the research that we have done, based on what the Technical Advisory Committee has requested and what we have provided and what we had at the discussions, that there is enough information there right now to proceed to a decision on this particular project. However, there is a lot more information that is needed and this information is going to be gained over time. It will be gained over time from our projects through the monitoring, will probably be gained through additional research which hopefully will be done by grants or in other ways, financed in other ways through the university and others. This is a huge area here that requires and will certainly necessitate a lot of research and we have done quite a bit. But it's never enough.

MR. HALKET: I agree. You've done quite a bit of research here and I applaud you for that. I think it's good.

One of the questions I have here is

the downstream interconnections of this aquifer with the surface water systems and with the other groundwater systems in the area. And I don't see that we have much information on that, okay. And I am asking for more. I'm asking do you know what's happening down there? And I guess this comes back to the idea of the drought. I know that we have, and the drought periods that you are referring to that you need the water for.

Now we can go back to the long-term monitoring records here. If I look at some of these surfaces, these piezometric surfaces that you're talking about here, the potentiometric surfaces and we look at those long-term monitoring stations, I see that in the upper sand unit, we have a fairly good record and I think this is what Ken was talking or alluding to earlier, is that we have a fairly good record and it shows the response of the system over a period of years and there was quite a drawdown.

THE CHAIRMAN: You had that chart earlier, Mr. Wiecek.

MR. WIECEK: This is in the upper sand unit, this particular well, and it's been monitored since '66.

MR. HALKET: So this is from a period of 1966 to --

MR. WIECEK: To present. And this well is located basically in the centre of the uplands.

MR. HALKET: So this is an upland well we're talking about?

MR. WIECEK: Yes, it is an upland well.

MR. HALKET: Here what we have is we have a drawdown over that period -- or not a drawdown because nothing has been pumped, but we have a fluctuation in the water level of it looks to me of around five metres.

MR. WIECEK: Five metres at this particular location, yes.

MR. HALKET: In this particular location. Do we have an equivalent of that for the lower sand unit for this period?

MR. WIECEK: Yes, we do. And I show you in just a minute. One thing to note here, because we don't have the equivalent long-term record, the best record we have for the lower sand starts in '95 which is basically the end of this drought period when water levels start to recover.

So when we are looking at the hydrograph, this is PH 002, which is in the lower sands, and this is starting in 1995 when the province installed it and has been monitoring it since then.

What we see is a general rising trend much like what we saw in the upper sands. But the difference in this case is about a metre and a half to two metres at this particular well. There is another one in the lower sands, this is station OE-040. That one, they only started monitoring in about '98, '99 so there was probably some rise occurring prior to that. Here we see, again, it's on the order of two metres of rise.

So in the lower sands, from the available information, it's approximately plus or minus two metres from wet periods to dry periods. Within the upper sands, it's more in the order of plus or minus five metres.

MR. HALKET: And that's just the, if we were to go back to the upper sand because that's a longer term record and we were to look at that from 2000 on for the last six years, we could say that that's not really a drought period, that's a recharge period. It's a wetter period, it seems to me, as it's rising.

MR. WIECEK: That's correct.

MR. HALKET: I wonder if you would care to comment on what would you expect that level to be at say in the early nineties where it shows a real depression on the upper sand? Would you expect the lower sand unit to parallel that, the water level drop?

MR. WIECEK: In the early nineties?

MR. MAATHUIS: Maybe I can interject here. When we talk about water level records and there is the fundamental concept, you have to keep in mind, that it depends on where in the whole aquifer system, in the three-dimensional space and with respect to recharge and discharge, for water level records, it's not the magnitude which is significant but it's really significant in terms of long-term water level records, the provincial network in Saskatchewan as the networks here. And not so much the degree of fluctuations, the magnitude of the fluctuations, what is important is the trends of what has been the trends over time rather than the magnitude. I just wanted to make that statement so that we don't get hung up on values about magnitudes of fluctuations.

THE CHAIRMAN: We see here that during

a drought period, this upper sand unit aquifer has gone down. Woodbury, in the one article that was provided, found that for both the sandstone and the carbonate aquifer in the Sandilands area during a drought period, the aquifers went down. That very short period of monitoring in the lower sand unit would indicate that it also was down during a drought period. But the whole reason for, or at least as I understand it, the principle reason for this project is for periods of drought.

Is there not a concern that in that period of drought, when you want this water, the water levels are going to be significantly down?

MR. WIECEK: As we discussed in the report, there is a difference between surface water droughts and groundwater droughts. There's a delay effect that occurs. And, therefore, it is quite often that groundwater lows do not correlate to surface water droughts because of the way recharge occurs. There's a time delay behind when the precipitation hits the earth and it actually gets into the aquifer. So that's what makes groundwater less susceptible to that sort of thing.

MR. GIBBONS: On that last point then,

what you're suggesting is that at the time that you would be needing the water, the recharge would be sufficient to handle that load because the effects of the drought at that time would not be felt until 10, 20 or 30 years later?

MR. SCHELLENBERG: And by the time with the normal drought period, that in fact this aquifer is starting to feel it, our normal supply should be back in play and we have options.

MR. GIBBONS: Can I follow up on one other aspect relating to this particular discussion?

One of the things that I am not clear about in terms of some of the documentation, and I'm not sure whether or not you have this information, so perhaps you can enlighten me about that as well. And this is part I think of what Ian is trying to get at also. And that is do we know what the interaction is between the aquifer and the significant wetlands in the area of things like the Popcock Lake and the Watson Davidson Wildlife Management area and so forth. For example, you don't need to go back to that last chart, but if there is a drawdown for whatever reason, whether it's this project or droughts, or

whatever, that cause a decline in the water table and so forth, do we see historically significant changes to those areas in terms of the wetlands, the bogs, marshes, et cetera? Is that something that you have information on?

MR. WIECEK: That is not something that's been monitored, so there's no information available on that. As a part of this project, though, we will be monitoring that and we will be implementing a long-term monitoring program in those Popcock Lake area down in the wetlands. So the data will be there in the future.

MR. GIBBONS: That takes care of a future question I was going to ask.

MR. HALKET: Yeah. I guess that's where I was going with this, is that if there is, if we are talking about extracting water at 50 litres per second from a period that is similar to the nineties there, but we don't have a long-term record so we don't know what the lower sand unit has done over time or maybe we do. Maybe we have other wells in that area that have a long-term, longer term record? No? Okay.

What then would be the effect of withdrawing water at 50 litres per second using a

cone of depression, a long-term cone of depression that's developed on a fairly low piezometric surface with a piezometric surface now intersecting with the water table of the wetlands? Okay? Further down the road, if you were to drop it, that it's not intersecting with that water table, so there could be effects there on the wetlands.

MR. WIECEK: Well, the piezometric surface does not intersect the water table, the piezometric surface is at the same elevation as the water table. But there is no direct connection between the two.

MR. HALKET: Well, we don't know that.

MR. WIECEK: The piezometric surface is measuring the pressure in that aquifer.

MR. HALKET: Is measuring pressure in a well and water can rise to that, I agree, water will rise to that. What I am trying to get at is that there is a possibility that those wetlands at the foot of the ridge are being fed by that lower sand aquifer. Is that not a possibility?

MR. WIECEK: Based on the analysis, is the water coming from the lower sands is disbursing amongst the three different aquifers

and it's only a small component or a portion of it would be going upwards. That can't be quantified and it would be very difficult to do that. Given that the water quality in the lower sands is very equivalent to the water quality in the upper sands. So you can't use methods like conductivity surveys of the water to try and detect springs or seeps. It's almost impossible to find springs and seeps. It's very rare that you actually find the location of where these things occur. So to actually go out there and try and quantify that, it's not possible. All you can do is monitor it, which is what we're doing, and try to detect those changes.

MR. HALKET: Okay. That answers my question. I was wondering what the interconnections were and if we knew anything about them. Thank you.

MR. GIBBONS: Since we are talking about the monitoring and so forth now, it seems perhaps appropriate to ask the question about what happens if, and this is based on an assumption that we can pursue for the moment, that if, in the process of monitoring, PVWC discovers that there are, I'm not suggesting this is what will happen,

but if it happened, that there were significant impacts on the water table and so forth in the Sandilands region, in the aquifer region. You talk about mitigation and there were three things that would be done in terms of mitigation. Some of these I think are fairly straightforward in that presumably, for example, if there was a problem with an existing well, that PVWC could enter in negotiations with the owner of that particular well and either repair it or provide a new well, things of that sort. I think that's fairly straightforward. But the third element, which is the reduction or cessation of pumping by the proponent, can you outline a scenario where PVWC might find itself in a situation where they would either reduce or cease the use of that pipeline? In other words, is there a contingency plan -- when you talk about the contingency plan, I guess what I'm asking for is a little bit more detail as to what might be done, and in particular, under that third element. In particular, what, in essence, triggers or could trigger that move towards reduction or cessation? In other words, is that something that would only be done by virtue of a decision made by the

department? Would it be something where the co-operative itself would be expected to notify the government on this, the department on this? Could it be triggered by complaints coming from citizens in the area who either noticed problems with their wells or would suggest that there's significant problems with the wetland regions and so forth? Can you add a little more detail as to what that process might look like? And in this particular case, I realize that you may have to call on perhaps someone from the department to suggest what their own particular process might be.

MR. SCHELLENBERG: I can give that question a first shot, certainly of our interpretation of what would happen. We're undertaking an extensive monitoring program. There's also an existing monitoring program, as you've heard, that's in place that's run by the province. What is being proposed is that the results of this monitoring are going to obviously be presented to the province and be presented on whatever schedule is appropriate, we're suggesting quarterly, and with quarterly, semi-annual and/or annual reviews.

This monitoring should indicate fairly early on whether your findings that you had when you went into this are in fact confirmed or whether, in fact, we're seeing things that should give cause for concern. And if that is the case, we're certainly going to be looking at options, at other options that might be exercised.

We have a large number of wells that we will be monitoring. It is quite possible that perhaps one of these other wells might be a more appropriate draw. I'm just giving you one example. Again, that will be up to the judgment of the department of the specialists there and quite possibly might end up being another Clean Environment Commission hearing for all I know. However, we'd have to look at alternatives.

The one thing the Co-op will never do, and you can ask any of the members who are represented here today, we're not going to try and solve our problems and our shortcomings in terms of water supply by creating problems for someone else or for the environment. That is not the intention here. We will have substantial capital investment in a pipeline. But as you already saw this morning, there are other places along that

pipeline where we could have access to water. So perhaps what we may have to do is draw much more likely from two, three or four locations if that becomes an appropriate option and one that doesn't negatively impact anything. And that is the route we will follow.

There isn't a preconceived or a predetermined strategy here but there is certainly a collaborative one where we will, in fact, be sharing that information on a very regular basis. Nobody should be taken by surprise, least of all us, and certainly not the department and not the regulator. And then between those three, we're going to have to then determine how it is to resolve the situation and make sure that there is no harm done.

MR. GIBBONS: If I could pursue just a follow-up to that. Can you conceive of a situation where citizens in the Sandilands region might notice effects that might not be picked up through the monitoring process? I'm really grasping at straws here perhaps, but in terms of the confidence of the citizens in this region might have with the monitoring, they might want to know if, without getting into great detail,

perhaps the kind of monitoring you might be doing that would give them confidence I guess?

MR. SCHELLENBERG: Certainly we want to be kept well-informed as to any impacts that there might be. And if you take a look at the location of some of the new wells that we're proposing if this is licensed, some of those locations and those locations precisely for that reason. For example, the one that is very close to Marchand and others.

I think the one thing that you want to always have is objective confirmation of any problems that might be there and if, in fact, down the road, it calls for some additional observation wells and if that's what the province and we agree upon, certainly that road can be taken.

We're not going to take any complaints lightly. On the other hand, we're also not going to be taken and held responsible for problems that are not ours. So we have to work on that very carefully. If the problem is ours or maybe could be ours, we're going to reach a settlement or reach a determination of that as quickly as possible. We don't like outstanding issues.

THE CHAIRMAN: Mr. Schellenberg, I

have some fairly general questions that come out of your opening presentation this morning and there's not many of them I don't think. I think one of them you answered in your response to Dr. Brooks' presentation. I think you said that you've already accounted for the paying off of this project. It's already written into your current fees.

MR. SCHELLENBERG: Yes.

THE CHAIRMAN: Thank you.

MR. SCHELLENBERG: I'll add one qualifier to that. Until you actually proceed with a project, you don't actually know precisely what the cost is. If the bank rate goes as we anticipate, if petroleum prices stay where we hope they do, yes, we do.

THE CHAIRMAN: When you talk about wet industries, and I think I know, but could you give us a little bit of a description what you mean by a wet industry?

MR. SCHELLENBERG: A wet industry would, first of all, the obvious first part of that definition is one that uses a great deal of water. But the bigger problem with wet industry is in fact the discharges. The sewage, how do you

deal with the waste product? I mean it's fine for Portage la Prairie, for example, location for wet industry. They're sitting on the banks of the Assiniboine River. They can treat it and they can dispose of it. We don't have those options. And so that, for starters, eliminates the larger wet industries.

The wet industry that we have, and it's only wet in terms of the volumes of water which it uses, is Bunge. It's the largest one in Altona. It's been there forever and ever and we will support. But as you have seen from this morning's presentation, it takes 40 per cent of the water that Altona requires. And that is the type of thing that we cannot support in any great volume or to any great extent and we are well aware of it.

THE CHAIRMAN: So a wet industry might be Simplot's processing plant in Portage?

MR. SCHELLENBERG: Yeah. The potato processing, for example, which goes on there would be a very good example.

THE CHAIRMAN: Okay. So if Simplot or McCain's or somebody came to the Town of Winkler and said we want to put up a potato processing

plant, Winkler would just have to say no?

MR. SCHELLENBERG: That's right, because Winkler would have to come to us and ask us whether we are prepared to put out the water. We would have to advise them that -- well, first of all, just imagine, a 12 inch pipe is not going to be sufficient for the supply. Take a look at the cost not just to mention the water and it's just not doable.

THE CHAIRMAN: Now, you're talking about the flow of water across the border in the Red River. And you gave us an example of a proposal in North Dakota to route water back into the Sheyenne River. And I think you said that if that were to happen, the rate of flow across the border would be 8 litres per second?

MR. SCHELLENBERG: Eight cubic feet per second.

THE CHAIRMAN: What is it right now? What is the sort of normal given that the Red River fluctuates year long?

MR. SCHELLENBERG: That's a question to which I don't have an immediate answer. It's an awful lot more.

THE CHAIRMAN: It's a lot more than

8 cubic feet per second?

MR. SCHELLENBERG: Oh, absolutely. The lowest flow that we had to compare that in 1988 when Dale Hoffman walked across the river at five different places, at that time it was 32 cubic feet per second. So just as a comparison. It's huge right now compared to that.

THE CHAIRMAN: Now, this is sort of a big overriding question on the whole need for this project. And in the initial documents that I read some months ago, it was positioned as being for drought relief. And my assumption reading that was that this water would not be used at all until sometime in the future which may be a year or two or 10 or 12, there was a significant drought. Now, at other times I've read this described as a supplemental system, just to supplement your current supply. What is it? If it's a supplemental system, I assume you're going to be drawing from it all the time.

MR. SCHELLENBERG: It is in fact both. And let me try and explain that. First of all, let me state that at the present time, we are ready to do some expansion to the system to take care of some of the growing needs that we have.

We have the ability to do that at Morris on the Red River where we have an existing water rights licence which would allow us to triple the size of that plant and we could do that for less than a third of the cost of what we're proposing to do with this Sandilands supply.

However, when you look at the insecurity of the supply on the Red, when you look at the fact that we need 4.8 metres of water above our intake in order to maximize the efficiency of our plants and anything less than that decreases the output that we can use, it would be less than prudent not to look for supplemental supplies.

If you're going to look for supplemental supplies, and you start putting water into a pipe, you have to run a minimum flow through that pipe in order that you can assure the Canadian drinking water standards to that pipe at all times, otherwise, you're going to run into huge expenses in terms of cleaning, flushing and trying to keep the system available to you and appropriately cleansed.

THE CHAIRMAN: What would be a minimum flow?

MR. SCHELLENBERG: The maximum flow

that we'd be able to use, I think is probably a greater concern to some people, would be 35 litres per second, and that only very seldom during the year. Over time, we may develop the capability of being able to utilize the full 50 litres per second, but it will cut down to considerably less than that, for example, during periods where we have, you know, lower demand and also during periods which we have good supplies from the Red. But there will always be some flow through the system. And it is there basically as a supplemental supply but it is also there to make sure that we have an available option in the event that we run into problems on the Red.

THE CHAIRMAN: So if this pipeline and well were in place, the Red would still be your first choice for water?

MR. SCHELLENBERG: Oh, it is. And when we need the next level of expansion, and let's assume the region continues to grow and this will be well beyond my retirement I sincerely hope, and we have to expand the next time, that next expansion will be at Morris and it will be on the Red River because the Red River is a good source of supply if it's there. It is a very

economic way for us in order to provide the water requirements that we need. And the next phase and the next step would be to triple the size of the Morris water treatment plant.

THE CHAIRMAN: And in 1988 when the mayor walked across the river, how much water was that? How much water would you have been able to take out of the Red at that time?

MR. SCHELLENBERG: We had one water treatment plant on the Red at that time, it was at Letellier, and the size at that time was capable of 32 litres per second. We had some challenges related to the head waters over the intake and weren't always able to produce the full 32. But we were able to produce enough in combination with other supplies that we were then getting from the Pembina and Inichi (ph) water treatment plant which the Water Services Board still owned at that time to meet for the bare needs.

By comparison, however, right now, the Letellier plant is at 100 litres per second and can in fact do 110 without too much sweat. And our Morris plant is at 35 and has certainly been known to do 40 without any great effort. These plants are normally sized conservatively.

So that's the demand that you're looking at. So what we're trying to do, if you want to look at it this way, is hedge a portion of it, supplement a portion of it. So if I have to pull back, I can pull back. It also buys us time. In the event we're looking at a prolonged drought scenario, which isn't going to come overnight, you can now look and say all right, we've got this, here are the other measures that we have to take. And I can give you an example of some of the other measures we're going to have to take.

And our friends with the Eco-Network who are concerned about our price be appalled but one of the first things we would do is put a drought surcharge on our water. And a drought surcharge would escalate the price of water and would in all likelihood double the price of water in our region and would make everyone extremely conscious of the fact that they have to use it with great caution and great care. That's the only way you can deliver a message like that. There are other measures we would take.

Coming back to your specific question, there is a specific need for the supply and that is it. We want to supplement the supply. Yes, we

will have some water flowing from that well on a continuous basis. In the next year or two, it will max out at 35. Eventually it may come as high as 50. In the meantime, however, as we're moving ahead, the monitoring system will be in place and we're going to know what effects it has. And hopefully, if there are negative effects, we will know this before we actually need this well at 50 litres per second.

THE CHAIRMAN: Dr. Brooks, in his presentation, mentioned a number of demand side issues that you might consider including peak summer rates or summer peak rates, 6/3 toilets, lawn watering restrictions, I think somebody else mentioned shower heads. Have you done anything as far as promoting and even subsidizing?

MR. SCHELLENBERG: We have not, and this is where you have to realize that we are a wholesaler of water and it is in fact the municipal entities that do the retail. And some of the municipalities have done some of this. And certainly a lot of them have some of these things written into their by-laws and into their code.

Restrictions on lawn watering is pretty much standard throughout the region. And

we can enhance that if we have to. And to give you an example, we did that this summer with Morris. We know when the Stampede comes into town, they use a lot more water. And at that particular time, things were pretty dry, pretty warm. So I basically called their office and advised them that it was either going to be grass that was going to be watered or the Stampede that would have water and I kind of gave them the option. They had water for the stampede I might add. So what they did in that case is they hand-delivered bills to every home.

In the case Winkler, for example, it's a standard system which is in place as it is for several of the other communities in terms of lawn watering. There are further restrictions which have been taken and can be applied. And Dr. Brooks is correct, maybe our vehicles don't have to be washed and polished for every weekend and there are restrictions there that have gone into place in the past. Certainly in terms of fixtures and appliances, there is a strong encouragement in terms of the building codes to bring in the three and six litre toilets which he referred to. And as I mentioned in my response to him, if we can

get grey water reuse and recycling into place and we can get the Health Department to agree to something which is an extremely intelligent approach, then this I think is going to become a possibility not just in our region but across the country and it will reduce in fact the water demand very substantially.

And one more item, and not to sell it short, because it has made a dramatic difference in some areas, and that's the front-load washer. It does more than you think.

THE CHAIRMAN: I have one and when I first got it, I was sure it wasn't working properly because there's almost no water used in it.

MR. GIBBONS: Getting back to the question of wet industries. Just for clarification, hog farms or pork processing plants, would one or the other or both of those be considered wet industries? Presumably there is some interest at times in Manitoba in moving those kinds of plants and farms into various regions, and yours would be included I suppose.

MR. SCHELLENBERG: In terms of processing, we have a number of smaller processing

plants in the region. If you enjoy pork burgers, for example, on the barbecue in the summer time, most of those come from our region. Those are kind of mom and pop operations and the amount of water which is utilized is not excessive, it's quite reasonable.

If, on the other hand, you're talking about a Maple Leaf, there isn't a chance. There is no way.

MR. GIBBONS: The second follow-up, it's actually a follow-up to my earlier question because I think I inadvertently cut myself short. And that is in terms of the reaction to monitoring data which might well be negative, you indicated that there could be changes and so forth distributing the drawdown in different areas and so forth and so on. But what I didn't ask at the time was whether you, as an organization, would be prepared, given the time invested and the money invested, the capital invested in this project, be willing to countenance the possibility of an actual cessation altogether if it came to that?

I know that it was in the presentation earlier and I wonder if, for example, a cynic, there's always a cynic in the crowd I suppose,

might say oh, sure, they say that. But in reality, if they put all that time and all that money into this, I don't think it's likely that they're going to actually cease operation. Can you speak to that briefly?

MR. SCHELLENBERG: There is certainly a possibility in the short term, and let me qualify what I mean by a short term. If in fact there is a major problem at the well head which is not anticipated, we will shut her down. We will however invest every energy in finding alternate sources and supplies within that region and related regions on route and there's a number of other areas which were specified that we could look at to try and recover and make use of the capital investment which we've got on the ground, namely the pipeline, and to make sure that we can still supplement our supplies which was the original intention with this approach. But if we need to shut it down, we'll shut it down. Thank you.

THE CHAIRMAN: Okay. It's just a few minutes to five. I am going to propose that we break now for supper. When we come back after supper, we will have brief presentations by

representatives of a number of municipalities and other organizations. There will also be an opportunity for any members of the general public who wish to make comment. So we'll be back at 7:00 p.m. Thank you.

(Proceedings recessed at 4:55 p.m. and reconvened at 7:00 p.m.)

THE CHAIRMAN: Okay. Could we come to order, please? I hope everybody is well fed. We have four presentations that have been scheduled. Nobody, to my knowledge, nobody from the general public has indicated that they want to make a presentation. However, at the end of the four presentations, I will invite anybody from the general public who does wish to. If anybody out there has not registered and would like to make a presentation, please let either Joyce at the door, or Cathy over in the corner here, know over the next hour.

We will have the four presentations. If anybody from the public wants to make a presentation they will be able to. Also at the end of these presentations, if anybody from the general public wants to ask any questions of the proponent, you will have an opportunity to do

that.

The first presentation is from Lindy Clubb. Ms. Clubb, will you please state your name for the record, and then Cathy will swear you in.

MS. CLUBB: I have been sworn in, Mr. Sergeant. If you would like me to do it again?

THE CHAIRMAN: No, you are correct, you were there earlier. So just state your name for the public and then make your presentation.

MS. CLUBB: Hello, my name is Lindy Clubb. I'm a resource person for the North American Stormwater & Erosion Control Association, the assistant executive director of the Mixedwood Forest Society and a member of Manitoba Eco-Network's water caucus.

I am the orphan who sat up here at the front and didn't get to make my presentation while the caucus people were up, so I am back here by myself now.

I'm considered a citizen expert in water. I'm doing a presentation now because I have to work on Thursday. I'm a volunteer, nobody is paying me for anything. If the tone of the presentation or any of my remarks seem

disrespectful to the groups that I'm representing here, I'm sorry, but we have to be ourselves to speak up at these things.

And the two groups that I'm representing, NASECA and MFS, are opposed to the findings of the study material that supports this request for a water supply system. We believe that this project with harm the aquifer that lies beneath the Sandilands Provincial Forest and the ecological life above it. While the proponents believe the area to be unsuitable for development other than logging, they believe that the groundwater will accommodate additional growth for the region's population. The basis for their application is that not enough water may be available to them during drought times.

The forecast for what may be able to the aquifer in times of drought is not readily apparent in the study material. I had a really difficult time understanding the graphs, the charts, the diagrams, the maps and the conclusions that the proponents have come to, even though I'm a citizen expert in water, and I'm a little dyslexic with numbers, but I had a hard time with this material. If I had a hard time with this

material, and I have been looking at stuff like this for fifteen years, I would think the average member of the public would have a hard time with this material too.

We are being asked in many ways to rest on faith when it comes to the assertions and the promises that are being made by the proponents. I would rather just see the evidence and be convinced. I haven't been convinced by the written material and I haven't been convinced by what I have heard here today. Although, I appreciate the investment that has gone into it so far and the cost of the material that has come forward.

Anyway, my main question is about what I haven't seen from the proponents. They seem to arrive at the same conclusion every time. There is enough water under the Sandilands Forest to fill the pumps and pipes so developments can survive. But who sustains the aquifer? What does the aquifer complex need to survive? Who will replenish the recharge areas in times of drought? Who has established the response times and the systems for this aquifer?

If our Provincial departments charged

with the responsibility of unraveling the mysteries of this complex hydrological system couldn't come to conclusions about it, then how can the proponents' consultants be so sure? If I was to expand at the rate of the Pembina Valley Cooperative, I wouldn't be able to fit into my skirt. I would have to begin using elastic waist bands to accommodate the growth, and if I grew too much, the elastic would stretch to the point of no return. That's why I worried about this aquifer. How much and for how long can it give until the system collapses?

Response monitoring, which is the equivalent of oh, oh, the waist band is tightening, may be too late. It is lacking in common sense to measure the long term response of the aquifer to the project if it means the aquifer's demise.

As for the proponent's claim the environment will not be affected, the U.S. geological surveys contradict this.

I felt like a high school student preparing this so-called presentation. I'm not a hydrogeologist. I appreciate the questions that Mr. Halek has been offering, and I think they are

very good. But if I can access USGS material like I'm about to read off the internet, like a high school student preparing for an essay, I'm wondering why the proponents haven't done it.

I do have some material in here about water budgets. I ask you to bear with me while I read from the text. It starts with groundwater and surface water interaction.

"Ground water pumping can affect not only water supply for human consumption, but also the maintenance of in-stream flow requirements for fish habitat and other environmental needs. Long term reductions in stream flow can affect vegetation along streams, riparian zones, that serve critical roles in maintaining wildlife habitat and in enhancing the quality of surface water. Pumping induced changes in the flow direction to and from streams may affect temperature, oxygen levels and nutrient concentrations in the stream, which in turn affects aquatic life. Perennial streams, springs and wetlands in the

U.S. are highly valued as a source of water for humans and for the plant and animal species they support.

Development of groundwater resources since the late 1800s in the U.S. has resulted in the elimination or alteration of many perennial stream leaches, wetlands and associated riparian ecosystems. The chemistry of groundwater and the direction and magnitude of exchange with surface water significantly affects the input of dissolved chemicals in lakes. In fact, groundwater can be the principal source of dissolved chemicals to a lake, even in cases where groundwater discharge is a small component of a lake's water budget.

Changes in flow patterns to lakes as a result of pumping may alter the natural fluxes to lakes of key constituents such as nutrients and dissolved oxygen, in turn altering lake biota, their environment, and the interaction of both.

Wetlands can be quite sensitive to the effects of groundwater pumping. Groundwater pumping can affect wetlands, not only as a result of progressive lowering of the water table, but also increased seasonal changes in the altitude of the water table."

And this gets pretty technical.

"The altitude and frequency of water level fluctuations through changing seasons, commonly termed the hydro period, affect wetland characteristics such as the type of vegetation, nutrient cycling, and type of invertebrates, fish and bird species that are present. The effects of pumping on seasonal fluctuations in groundwater levels near wetlands adds a new dimension to the usual concerns about the sustainable development that typically focus on annual withdrawal."

That came from a study in Bacchus in 1998.

"Groundwater development can lead to

reductions in spring flow, changes of springs from perennial to ephemeral..."

That means, perennial is all of the time and ephemeral means every once in a while,

"...or elimination of springs altogether. Springs typically represent points on the landscape where groundwater flow paths from different sources converge. Groundwater development may affect the amount of flow from these different sources to varying extents, thus affecting the resultant chemical composition of the spring water."

I was taken by a couple of calloused hand farmers out to see a spring in the Interlake area. It was really beautiful, you wouldn't know it was there. These guys had been in the area for a long time. And the spring was coming out of quite a bit of spongey beautiful mosses. So it was kind of hidden, it was just trickling out. I didn't even know it was a spring. I thought springs were something you see on TV, you know, they flash up, and they are like Artesian wells, and they are

gorgeous and they create rainbows. That's not what it was about. It was a little tiny trickle of water. It was going into an area that supplied habitat for fish in the Washout Bay drain in the Bifrost municipality. And like I said, if somebody hadn't taken me there and showed it to me, I wouldn't have known it was there. I don't know where the springs are here. And I imagine not -- is there anybody in the room that knows where springs are in this area?

THE CHAIRMAN: Ms. Clubb, you are making a presentation, you are not asking questions.

MS. CLUBB: I am not allowed to ask questions? I have asked many questions in the presentation.

THE CHAIRMAN: Okay, but you also are given 15 minutes and you have used half of it already and you are not a quarter of the way through.

MS. CLUBB: Oh, I might have to skip over some parts.

Springs are important. We haven't seen very much in the way of information about springs.

"In summary, we have seen that changes to surface water bodies in response to groundwater pumping commonly are subtle and may occur over long periods of time. The cumulative effects of pumping can cause significant and unanticipated consequences when not properly considered in water management plans. The types of water bodies that can be affected are highly varied, as are the apparent potential effects. A common response to droughts is to drill more wells. Increased use of groundwater may continue after a drought because of installation of wells and the infrastructure for the delivery of groundwater is a considerable investment. Thus a drought may lead to a permanent unanticipated change in the level of groundwater development."

Then the USGS reports go on to talk about climate change. They go on to talk about,

"Consideration of climate can be a key but often under-emphasized factor in

"...ensuring the sustainability and proper management of groundwater resources."
I'm afraid we haven't seen much about climate change in this particular proposal.

Then they talk about the common factor of all groundwater systems is the total amount of water entering, leaving, and being stored in the system, and how it must be conserved. And that requires an accounting of all of the inflows, outflows, and changes in storage, which is called a water budget.

Then we talk about human activities and how that affects it. And then we get into what the consultants talked about, which is the water budget myth.

Now, it seemed like they were cherry-picking a little bit about the information about the water budget myth. Because what I looked up on the internet said this:

"Some hydrologists believe that a pre-development water budget for groundwater system, that is a water budget for the natural conditions before humans used the water..."

that would be like a known hypothesis,

"...can be used to calculate the amount of water available for consumption or safe yield. In this case the development of a groundwater system is considered to be safe if the rate of groundwater withdrawal does not exceed the rate of natural recharge. This concept is being referred to as the water budget myth."

Bredehoeft others, 1982, is the citation.

"It is a myth because it is an oversimplification of the information that's needed to understand the effects of developing a groundwater system. As human activities change the system, the components of the water budget, inflows, outflows and changes in storage also will change and must be accounted for in any management decision. Understanding the water budgets and how they change in response to human activities is an important aspect of groundwater hydrology. However, as we shall see, a pre-development water budget by

itself is of limited value in
determining the amount of groundwater
that can be withdrawn on a sustained
basis. First the use of groundwater
and surface water must be evaluated
together on a system wide basis."

Now, correct me if I'm wrong, but I did hear the proponents say that a large amount of money had gone into producing the information that we heard about this morning, which was a pretty good start I thought, but then when it came to an evaluation on a system-wide basis, Mr. Schellenberg said no, we have invested in that and we are not going further, we don't need to evaluate the whole system, we have got information from here, and that's it.

I can understand that, we all have limits for budgets, I understand that. My concern is about the system-basis. And there has been nobody in the room that has spoken up on behalf of the systems that are going to be affected by a pipeline into this beautiful area we don't know about. We are still unable, I'm still unable to understand where the recharge points are, and also where the water is going to go out, for instance,

to support the wetlands. Every time the proponents were asked, we got a whole bunch of information but I still don't understand it. But what I'm reading about from the USGS models is they have really hurt those systems by not putting in the right information before they started and not tracking it afterwards. I have not heard the details of how we are going to monitor the system if this project goes through. That's a concern as well.

The computer model USGS information is providing is a simplified representation of an actual system, and the judgment of water management professionals is required to evaluate model simulation results and plan appropriate actions. Okay. We all understand that. I don't understand the models that are being used. I didn't see an evaluation of the models that were presented. Actually, I didn't see a model for future monitoring of this water system. I would really appreciate doing that.

There was a bewildering amount of information, but I did not get to see an evaluation of the Thornwaite method, it wasn't explained, I don't know about Cherry's study.

Maybe I can get that information afterwards, but I consider that an oversight on the part of the presenters this morning.

The effects of groundwater development may require many years to be evident, and there is an unfortunate tendency to forego data collection and analysis that's needed to support the informed decision-making until well after problems materialize. We call that too late.

So now that I have done a little bit of, let's say criticism, we move to solutions. And the solution is, from USGS reports from the years that they have been looking at their areas of aquifer supply, is that groundwater models depend in large part upon the quality and extent of historical data used to calibrate and test the model. Okay, that makes sense. Garbage in, garbage out, or if it is good, it is good. I don't see a groundwater model being used that I can evaluate as a citizen of the Province of Manitoba in connection with this particular project.

When we, in erosion control fields, turn to our experts we are usually supplied with an answer to do with how we can do things better.

The Emmons and Olivier Resources have provided a very simple sheet that I also got from the internet about hydrologic, hydraulic and pollutant loading studies. They have mentioned exactly what models they are using, it is a computer evaluation. They talk about making certain issues a priority and they used a water shed model. So if they can do it, and I agree it might cost an awful lot of money, but if they can do it, we can do it. So I would like to send this to the panel that's evaluating this project so that they can take a look at what I found easy to understand material.

THE CHAIRMAN: You can bring it to us after you are finished your presentation, please?

MS. CLUBB: So one of the limitations of a model, and as I said, I haven't really seen a model, although this is a good example of one, is the underestimating of the surface water depletion and groundwater development. I'm still not sure that we have the expertise that's being offered to us to be able to understand how the water that's going in is going to stay or go out again, and how it is going to be recharged. I guess that's our greatest concern right now.

For a system to replenish itself, we should see or understand how it reacts in drought or the kind of climatic conditions that we discussed earlier. If Pembina Valley Water Cooperative was to limit its growth, particularly in areas of high consumption and pollution potential like intensive livestock operations, it would give us a chance to look at the system as it sits now and thoroughly understand it, and do a little more work in the 1980 study by the Provincial expert, Mr. Thatcher. If the proponents had been serious about safeguarding the health of the aquifer that they intend to source, they would have planned for recharge of the system. Like putting money into our bank account, making efforts to allow water to get back into the ground is vital. When the proponents assert the withdrawals are approximately in order of magnitude less than the existing groundwater flow rate, they are ignoring the dynamics of change. How then will the aquifer make up for the withdrawals except by lowering itself?

The Commission should recommend to the Province that efforts to recharge the aquifer take place whenever there is a withdrawal or a water

licence issue. This would constitute a balance. The most efficient way to do this is to maintain areas that allow water to percolate or penetrate into the ground, they will seep through the grounds between the stems of plants, beneath the settlements of bogs, streams, lakes and ponds. We must preserve and protect wetlands, keep our plant shelter belts, forests, and riparian zones, install water gardens and native prairie gardens to compensate for the concrete and sod, and compost or rebuild our depleted soils in agriculture. There are so many techniques for reducing wind and water erosion, preventing silt from contaminating surface water, et etcetera, much more than adherence to guidelines in stream crossing, as the proponent has stated.

Where are the erosion control plans for the pipeline work? Where is the basic analysis of slopes, the predictions of slumping, emergency plans to deal with human error, the consultation with certified professionals in erosion and sediment control?

The simple fact that this Commission had to again ask for additional material for a meaningful discussion of this project is telling.

The fact that the Pembina Valley Co-op has come to the province for additional water supply and source over and over again is telling. It is not time for a generous new wardrobe in a larger size for the Pembina Valley Water Co-op, it is time for them to control their appetite. That's it.

THE CHAIRMAN: Thank you very much.

Mr. Schellenberg, do you or any of your associates have any questions of Ms. Clubb? Thank you. Thank you, Ms. Clubb.

Next up is Mr. Scharien from the RM of Grey, et cetera.

State your name and Ms. Johnson will swear you in.

(Mr. Charles Scharien sworn)

MR. SCHARIEN: Thank you, Mr. Chairman. First of all, I would like to thank the Commission for allowing us to speak and give a presentation, as well as I would like to introduce right now the Reeve of the RM of Grey who has come along with me, and also Robert McKenzie, the former mayor of Carman, whose presentation is in here that I'm about to read.

This presentation is being made on behalf of the Rural Municipality of Grey, the

Village of St. Claude and the Town of Carman in support of Pembina Valley Water Cooperative Inc. supplemental groundwater supply project.

The Rural Municipality of Grey has a population of 2,147, which includes the local urban districts of Elm Creek, Haywood, and the Hamlet of Fannystelle.

We have no potable water supplies such as lakes, rivers, or high yielding wells within the boundaries of the municipality capable of supplying safe and reliable water to our residents. Residents of THE eastern portion of our municipality rely on surface run-off water into dugouts or trucked water into cisterns, while residents in the western portion rely on low yielding shallow sand wells. These sources are not reliable, especially during drought years, and produce water of extremely poor quality.

It is hard to believe, but the basic necessity of life such as a safe potable water supply was not available to the residents of our municipality until 1980 when we installed a water treatment plant in Elm Creek. The water supply for this plant is a deep well yielding water of poor quality, requiring reverse osmosis treatment,

which is a very expensive process. It has a limited capacity and is only capable of supplying 161 customers in Elm Creek and 28 customers in the surrounding rural area with potable water.

In an attempt to find other water sources capable of meeting the needs of the residents of the municipality, Manitoba Water Stewardship carried out an extensive test drilling for groundwater sources but were unsuccessful.

A local group know as the RM of Grey Water Development Committee sampled private wells in the St. Claude, Haywood area during the period of November 1998 and March of 1999. In response to their report, a memo dated April 19, 1999 was sent from Dr. Shelley Buchan, Medical Health, Officer of Health to Water Public Health Inspector, appendix 1 is attached, in which she stated in summary,

"I have concerns on the vulnerability of the water sources for St. Claude and Haywood. These appear to be longstanding, and repeated presence of coliform and nitrates pose a health issue. I recommend that another water source and delivery system be explored

with the Water Services Board so that a consistent source of reliable water can be made available for those communities. Good drinking water is essential for health and we need to support communities that recognize the value of this basic service."

On September 20th of 2000, Dr. Buchan issued a boil water advisory for the Village of Haywood, appendix 2 is attached, stating,

"The results indicate that of the 55 wells sampled, 90 per cent contain evidence of bacterial contamination; 12 per cent are further contaminated with faecal coliforms."

Council met on December 14th, 2000 with the Pembina Valley Water Cooperative, Manitoba Water Services Board and PFRA to discuss a regional water system that not only would address the serious potable water situation in Haywood, but also throughout the municipality. We subsequently joined the Pembina Valley Water Cooperative with a water supply line from Stephenfield water plant to Haywood being installed. This was the beginning of the Grey regional water utility.

Since 2001 we have installed a second supply line from Stephenfield to the Village of St. Claude and approximately 67 miles of water pipelines into rural areas around Haywood and St. Claude. Currently we serve 215 customers from the Stephenfield water plant. We have also installed two water supply lines from the Cartier Regional Water Co-op, with approximately 91 miles of water pipelines in the rural areas around Fannystelle and Elm Creek, serving 146 customers including the Hamlet of Fannystelle. There is approximately 65 miles of water pipelines and 100 customers left to be served with potable water in our municipality.

The Grey Regional Water Utility total combined water sales for all three sources, PVWC, Cartier and Elm Creek, was 31.7 million gallons in 2005, of which 16.2 million or 51 per cent was supplied by Pembina Valley Water Cooperative.

Out of the 215 customers being supplied potable water from Stephenfield, 205 or 95 per cent use this water mainly for domestic purposes. The remaining 10 customers use their water supply for both domestic and livestock, dairy and poultry, and annual consumptions ranging

from 380,000 to 1,618,000 gallons for a combined consumption of 9 million gallons in 2005.

Dairy operators have found that potable water supply improved the quality and the quantity produced by their cows. It must be stressed that livestock operations is just as viable an industry in a rural municipality as an industrial business is in an urban centre.

All water used by these customers is metered and charged at a water rate of $8.40 a thousand, with no discount allowance for large volume users. Water flow restrictors of four U.S. gallons per minute have been installed on all 32 millimetre services, service connections of 10 U.S. gallons per minute on all 50 millimetre service connections, thereby limiting the volume of water that customers can draw from the system.

The municipality does comparisons between water purchases and sales in order to minimize the volume of unaccounted for water to less than 5 per cent. Customers are also encouraged to monitor their meter readings and are provided with tips on how to detect water loss due to leaks.

The Village of St. Claude, with a

population of 558, joined the Pembina Valley Water Cooperative in 2002 to address two concerns with their existing water supply. First, water being piped from a well in the Rathwell area was poor in quality due to high levels of hardness and turbidity. This resulted in residents having to use softeners in their homes, which in turn caused environmental problems for their lagoon operation due to high levels of salt in the discharge. Secondly, the water supply pipeline was barely meeting the current water needs with no room for the village to expand or grow. Parmalat, a major employer in the village, uses approximately 7 and a half million gallons a year and were looking for an expansion which the existing water system could not handle.

The Rural Municipality of Grey and the Village of St. Claude must rely on potable water being piped in from outside sources. The Pembina Valley Water Cooperative proposal for a supplemental groundwater supply project is vital to ensure that they can continue to meet not only the current, but future water needs of our residents, especially during drought conditions. That's the RM of Grey, St. Claude part of the

presentation.

The Town of Carman is a community of approximately 2,800 people and has been a member of the Pembina Valley Water Co-op since its inception. We own the water plant, water treatment plant consisting of an old plant capacity of 14 litres, which is no longer in use, and newer plant capacity of 18 litres. The town purchased 25 per cent of its water of the water produced from the Co-op Stephenfield plant, approximately 23 million gallons. It makes the balance of water needed in our own plant. Our contract to purchase water from the Co-op expires in June of 2008, with an option to extend the contract for another ten years. This option has already been exercised.

We draw raw water from the Boyne River which runs through Stephenfield, through Carman, to the Red River. Our system is only as strong as the original groundwater source. During the dry period of approximately 1989/90, water levels in the Stephenfield Lake dropped very sharply while the flow in the Boyne River became minimal. The Town of Carman expressed great concern to the Province of Manitoba, and the height of the dam at

Stephenfield was increased by approximately 2 feet as a result. While a positive step, this does not resolve the issue of severe drought and lack of rainfall.

Since that period, Pembina Valley Water Co-op has built a large water plant which draws water from the Stephenfield Lake. We believe that this plant, combined with the buildup of silt to dam face can greatly reduce the water available in a dry period to a point no one can be certain of. There is no doubt that a drop in the lake levels could be severe and could probably create a crisis.

During periods of low rainfall, the quality of the water tends to fail, and the sight and smell of the water becomes an issue. In summer of 2006, Carman briefly shut off the pipeline from the corporation because of concerns over water quality. This problem, we believe, would be lessened if very high demands on Stephenfield Lake and the Boyne River could be alleviated.

Carman is a growing town with a busy industrial park. We purchase approximately 23 million gallons from the corporation and

manufacture approximately 67,292,000 gallons in our town plant in 2005.

We are currently meeting our winter needs without difficulty, but during hot summer weather our plant works at near capacity. There is little or no room to fit major industry requiring significant water into our community at the present time.

The Town of Carman water plant has had many control improvements made in recent years, including the automatic shut-off system and extensive new metering. Our efficiency rate, according to the recent filing with the Public Utilities Board, is approximately 13 per cent. We view the Pembina Valley Water Co-op proposal as a visionary plan for the community and indeed for all of Manitoba.

THE CHAIRMAN: Thank you, Mr. Scharien. Anybody have any questions?

MS. FUNK: In appendix number 2, did you find out the cause of the faecal coliforms?

MR. SCHARIEN: Appendix number?

MS. FUNK: That's in appendix 2.

THE CHAIRMAN: The boil water advisory.

MR. SCHARIEN: There was conjecture, they thought because of the village having all shallow wells that they drew their water from at the time, and also every home had its own septic field, so that the two intertwined eventually. And that was rectified, we hope it has been rectified. There was a low pressure sewer system put into Haywood with the lagoon to try to clean up the coliforms from the wells.

MS. FUNK: Thank you.

THE CHAIRMAN: Thank you, Mr. Scharien. What do you propose?

UNIDENTIFIED SPEAKER: I would like to ask a few questions, Mr. Chair.

THE CHAIRMAN: Our procedures do not allow to ask questions of the presenters. The presenters make a presentation. There can be questions from the proponent or from the panel for clarification and that's it.

UNIDENTIFIED SPEAKER: The proponents and the panel, but not the big P participants?

THE CHAIRMAN: No, sorry. Mr. Martens. Please state your name for the record?

(Herm Martens sworn)

MR. MARTENS: Good evening, Mr. Chair, members of the CEC Commission, ladies and gentlemen. Thank you for the privilege to give a presentation in support of Pembina Valley Water Co-op supplemental groundwater supply.

I'm Herm Martens, Reeve of the Rural Municipality of Morris, and I will be representing both the town and the RM of Morris, as well as the Rural Municipality of Montcalm. Together we represent an area covering the southern most 50 miles of the Canadian side of the Red River Valley. Permit me to introduce to you Dale Hoffman, Mayor of Morris and Flo Beaudette of Montcalm.

As leaders of our respective municipalities, we have a responsibility and obligation to provide a healthy environment as well as opportunity for growth and development for our area. One very important way to do this is by providing good quality water, both during a flood stage as well as during a drought. This is why we want to see this project carried out, to provide for a supplemental supply supporting our withdrawals from the Red River.

After the '97 flood, the province did

a lot of water quality testing of wells and found that many did not meet the health standard required. Unfortunately, there are no wells in our municipalities. This is not for lack of trying, but the groundwater in our area is extremely saline, not fit for human and/or livestock consumption. We have to depend on surface water that was stored in ponds and cisterns or taken directly from the river. This water then needs to be cleaned and filtered for human consumption, a detailed process that requires a lot of expertise, and each individual homeowner does not have the expertise or the time to carry out this detailed process. This is why, along with our neighboring municipalities, we established the Pembina Valley Water Co-op to provide top quality water.

Because the Provincial Public Health Department in 1997 only tested wells, we, as a municipality, were left to do our own water testing. We tested many ponds and many cisterns. The results were alarming. Only one of the tests came back fit for human consumption. The rest all called for a boil water order or do not use for human consumption. This again illustrated the

need for a proper water treatment facility and a distribution system that would deliver water meeting all of the Canadian Drinking Water Standards.

Another flood related concern came out of the '97 flood and that was the need to produce and deliver clean potable water to the area recovering from flood. The residents of Grand Forks were forced to stay in temporary accommodation for an extra three weeks so that their contaminated water system could be cleaned out and restarted to produce clean potable water. This was very disruptive to those families, very expensive, and added to the huge flood mitigation costs. The people hooked up with the Pembina Valley water could move back as soon as their homes were accessible. This again demonstrates the value of leadership in providing clean water, an absolute necessity in flood recovery.

Now, this brings me to the fact that Pembina Valley water requires this type of capabilities, not only during periods of high water on the Red, but also during drought situations. For all the same reasons that the treated water service is critical during excess

water, we have to have the ability to provide this water in case of drought. That is why we are seeking this supplemental groundwater supply.

There is a great difference between urban and rural areas in regards to the average daily use of water. I would like to present some comparison. What you have to appreciate is that most of the area we represent has had a history of chronic water shortages. We have melted ice, used snow, and learned to value water. We are talking about this generation, and it includes my children.

This means that the average person in the RM of Morris uses just over half as much water as the average person in Portage la Prairie or in Winnipeg. And the same holds true for the RM of Montcalm. To say another way, for every two litres of water per person per day in the RM of Montcalm, it would take almost four litres per person per day in Winnipeg. That is a huge difference. We place a high value on our water, and while we may use half as much, we charge twice as much, a full recovery cost.

Both the RMs of Montcalm and Morris provide water for residential and for agricultural

purposes. Water connections are made to the house, or to the houses in our municipalities and that is where the meter is located. Most livestock operations have piped water to the barns, but most are only using the water for their homes and human use in the barns. The livestock water is produced on site from holding ponds. This is the case on my own farm. There is no irrigation off the Pembina Valley Water pipelines.

So the big question is, in the case of a drought, where will we get our water? We are guaranteed nothing at the US/Canada border. There are no minimum flows established. What happens if the Americans cannot or will not allow any water to flow north? We would be without water. And if they give us a trickle at the border during the hot summer months, evaporation will take most of that water before it reaches the plant in Letellier.

The drought in 1988 did cause a lot of concern. The mayor of Morris, Mr. Dale Hoffman, walked across the Red River at five different places. This was dangerously low. The U.S. released some water to help us out, but this still resulted in flows of only 32 CFS, not really

enough, not nearly enough to meet our present needs. Will the U.S. be willing to do this again? Will they keep the water if they need if for their own use?

There are too many uncertainties. Given our responsibilities as elected officials and community leaders, we must have some security of supply. We have to supplement the Red River water supply. It is not prudent or wise to have to rely on a neighboring country to assure our water supply, when we have that capability at home ourselves. Therefore, it is essential that this project proceed. Thank you.

THE CHAIRMAN: Thank you very much, Mr. Martens. Art Petkau.

Please state your names for the record?

MR. ZACHARIAS: And I am Bill Zacharias.

(Art Petkau sworn)

(Bill Zacharis sworn)

MR. PETKAU: Good evening. Mr. Chairman, Commission members, hearing participants, ladies and gentlemen, my name is Art Petkau, Reeve of the Rural Municipality of

Stanley. I'm making this presentation on behalf of the RM of Stanley, the Town of Morden, the RM of Thompson. A presentation for the City of Winkler will be made later within this allocated time slot.

With me are Irvin Wiebe representing the Town of Morden, George Jackson representing the RM of Thompson, and Peter Froese also from the RM of Stanley. My presentation is in support of the water rights licence application filed by the Pembina Valley Water Cooperative. The three jurisdictions that I'm representing are members of the cooperative and all rely on the water cooperative as a water source to varying degrees.

Obviously water is a necessity for all of us. In a growth area such as ours, a reliable source of quality water is critical. The water cooperative has provided that source for us. None of us, however, like to have all of our eggs in one basket, and this is evident by what has happened in our area. Where Winkler draws the bulk of their water from the Winkler aquifer and supplements that with water from the Water Cooperative, where Morden draws the bulk of their water from Lake Minnewasta and supplements that

with water from the Water Cooperative, the RM of Thompson takes water from the Water Cooperative from both the Stephenfield and Morris plants, and Stanley draws water from three aquifers which are basically being fully utilized, and takes some water from Morden, with the bulk of the treated water at present coming from the Water Cooperative Letellier plant, and with some also from the Morris plant. As you can see, a supplemental source is very important in our present systems, and it is imperative for expansion of our systems and anticipated growth.

Stanley covers an area 18 miles by 18 miles. The City of Winkler and the Town of Morden fall within that area. In 2002, Stanley's population was 5,100. We are projecting the population now to be near 6,000. This is based on 15 new housing starts per year over the past five years. This level of growth is expected to continue as there doesn't appear to be any slowing of activity in the commercial and industrial sectors in the area. In the 2002 census, Stanley had one of the youngest populations in Canada. Our residents generally are a source of labour for the urban centres as well as for the agriculture

industry. Most of the growth has been in villages that are in close proximity to Winkler. Water to these villages is supplied by the Water Cooperative.

Nowadays in Manitoba when a farmer retires, it seems no one is interested in purchasing land and yard. This, however, has not lead to any abandoned farm yards in our area, as such yards are in high demand as acreages, which has resulted in demands for potable water.

In Stanley the bulk of water usage is domestic. Average household usage is around 200 litres per day, which is comparatively low. To encourage this trend, Stanley is considering an incentive, an initiative to require low-flow or low-volume fixtures to be installed in all new homes and considering incentives for people to convert existing fixtures to low-flow or low-volume.

The Boundary Trails Health Centre is a regional hospital serving most of southern Manitoba. It is located in Stanley and the Health Centre's water source is the Water Cooperative. Water quality and assured supply are obviously critical for a health care facility of this size.

The Town of Morden has a population approaching 6,500. As mentioned earlier, the Water Cooperative is a supplemental source at this time. With Lake Minnewasta also being a recreation area, we anticipate that efforts will continue to ensure adequate water levels in the lake.

In the RM of Thompson quality water supplied by the Water Cooperative has provided several important benefits for residents, the first being confidence in a safe water supply. Wells were the only alternative in the past and have proven unreliable and inadequate in many instances. Also the RM is experiencing situations where residents are creating alternative sources of income, with greenhouses and tree nurseries being examples, the third being the increased attraction and value of existing farm yards to people wanting a rural lifestyle with a safe water supply similar to the situation in Stanley.

Both Stanley and Thompson anticipate expansion of water services as there are still areas in both municipalities that remain unserviced. In Stanley's case there are approximately 200 households waiting for potable

water. The water source for the bulk of these would be the Water Cooperative Morris plant.

Why a supplemental source? There is growth in our areas, people bring business and business brings people. Water is a necessity of life. The area needs an adequate supply, a safe supply, a reliable supply, and a sustainable supply. Supplemental sources provide options, supplemental sources provide backup, and supplemental sources create a level of comfort for businesses, industries and people.

I would now like to turn the microphone over to Bill Zacharias, director of planning and engineering for the City of Winkler, who will make the presentation on behalf of the city. Thank you.

MR. ZACHARIAS: Mr. Chairman, with your permission?

THE CHAIRMAN: Go ahead.

MR. ZACHARIAS: Mr. Chairman, members of the Commission, participants and attendees, on behalf of the City of Winkler, a member of the Pembina Valley Water Cooperative, I would like to introduce a councillor for the City of Winkler and appointee to the Winkler Aquifer Management Board,

Ron Neufeld, as attending the proceedings today with us.

As Mr. Petkau said, I'm Bill Zacharias, director of planning and engineering for the City of Winkler, and wish to offer a brief presentation in support of the Pembina Valley Water Cooperative's application for water rights from the Sandilands aquifer.

The City of Winkler is one of 18 member municipalities of the Pembina Valley Water Cooperative. The city is celebrating 100 years of incorporation and within the past century has grown from a small railroad siding to a regional service centre. Its population growth at 3 per cent per annum is one of the highest in Manitoba communities. The water vital to this growth is obtained from the Winkler aquifer and the Pembina Valley Water Cooperative.

Water supports residential growth, education and medical services, recreation and cultural services, commercial and industrial development. Under present agreements, Winkler supplements up to 40 per cent of its water supply from the Pembina Valley Water Cooperative and the remainder is drawn from the Winkler aquifer. The

Winkler aquifer may be described as a water bearing deposit of sand and gravel. It is approximately 17 miles long and varies from one to three miles wide. Current studies indicate that its recharge is about 337 acre feet per annum fresh water and 230 acre feet per annum salt water. It is estimated to contain 170,000 acre feet of fresh water and 400,000 acre feet of salt water.

Water quality in the Winkler aquifer varies with location and it has decreased somewhat over the past 40 years. In general, the aquifer's fresh water quality deteriorates with the depth.

At the present time it has been determined that the sustainable yield of the Winkler aquifer is 337 acre feet, as I mentioned earlier, and Winkler's present demand is 900 acre feet per year.

The City of Winkler, together with the Province of Manitoba, recognized that the community's growth and water demand exceeded the aquifer's sustainable yield in the late 1980s. Governments and city officials began round-table discussions with all stakeholders to strategize a long-term management plan for the aquifer and to

develop supplementary water supply sources for our community. The round-table and city officials determined that an aquifer use reduction plan would be required. In addition to Winkler's reliance on the aquifer, ten other user groups were identified as dependent on the aquifer, many without licences and many with licences granted after the city's proprietary licence.

It was determined and agreed that with cooperative actions of the provincial officials, the city officials, and stakeholders, an aquifer management board be established to develop initiatives to reduce the reliance on the aquifer, enhance the aquifers natural recharge, encourage water conservation, implement an aquifer protection plan, establish a dedicated aquifer water quality monitoring program, manage pollution risks, and seek public input and acceptance of an aquifer management plan.

In 1997 a board was established which continues to function to this time. The Winkler Aquifer Management Board's executive committee comprised of government officials, technical advisors, stakeholders and citizens at large, meets regularly and holds public annual general

meetings. Their mandate is and remains to be proactive in accomplishing the initiatives set out in the Winkler aquifer management plan. We are making good progress in reducing our reliance on the aquifer from 976-acre feet some years ago to 555 acre feet in the past eight years. Further reductions to the sustainable yield will be made possible with supplementary supply from the Pembina Valley Water Cooperative.

The aquifer management board has successfully negotiated the elimination and/or reduction of several water use licences over the past several years. Supplementary water supplies were required to replace some of these reductions.

The enhancement of the natural recharge has been made by additional snow catch plantings and by restricting spring run-off flow from the primary recharge area. The City of Winkler has encouraged water conservation by regulating lot watering and encouraging low flow bath and kitchen facility installations, and most effectively, increasing water rates to our customer. Large volume water use industries are not encouraged to locate in our community.

Implementation of an aquifer

protection plan has included the discontinuation of asphalt production in the recharge area. It monitors aggregate quarry operations and high intensity livestock operations and registers the installation of geothermal heat systems in the aquifer area.

A dedicated aquifer monitoring plan is now coordinated by provincial agencies and shared with stakeholders. Aquifer levels and water quality reports are gathered regularly for judicious future management. Management of pollution risks remains as a constant watch and vigil of the aquifer management board. The recharge and aquifer area is posted with signs identifying the area as being underlain by an aquifer.

The Winkler aquifer management plan emphasized open house meetings for public input. This served as an excellent forum to hear suggestions, address concerns and disseminate facts from fiction. In conclusion, the Province of Manitoba, the City of Winkler and Pembina Valley Water Cooperative have cooperatively worked towards the management of water supply resources and aquifer management.

It's Manitobans working together to build a stronger Manitoba. Thank you for your time.

THE CHAIRMAN: Thank you very much. Thank you gentlemen.

Now, I had indicated earlier that at this time I would invite anybody from the general public who wishes to ask questions of the proponent to come forward and do that. Is there anybody that wishes to question the proponent? We have nobody that wants to make a presentation? Nobody has indicated they want to make a presentation. Okay. I think we will adjourn in a moment or two then. We will reconvene here Thursday morning at 9:00 o'clock.

Initially the panel will continue with some questions of the proponent, that will be followed by Mr. Koroluk on behalf of the Manitoba Eco-network. Once that is concluded, we will have a number of other presentations by individuals and organizations.

Thank you all for your patience and your time and your attendance here today, and drive safely home and we will see you all Thursday morning.

MS. JOHNSON: Mr. Chairman, before we go, I have an administrative task. Exhibit number 29 will be Ms. Clubb's presentation; exhibit 30 will be Mr. Scharien's presentation on behalf of the RM of Grey, Dufferin and the Village of St. Claude. Number 31 will be Mr. Scharien's presentation on behalf of Town of Carman. Number 32 is Mr. Martens presentation; and 33 is Mr. Petkau's presentation.

THE CHAIRMAN: Thank you.

(Adjourned at 8:05 p.m.)

COURT REPORTER'S CERTIFICATE

CECELIA REID, LISA REID and DEBRA KOT, duly appointed Official Examiners in the Province of Manitoba, do hereby certify the foregoing pages are a true and correct transcript of our Stenotype notes as taken by us at the time and place hereinbefore stated.

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