MANITOBA CLEAN ENVIRONMENT COMMISSION

BIPOLE III TRANSMISSION PROJECT

PUBLIC HEARING

VOLUME 2

* * * * * * * * * * * * * * * * * * * *

Transcript of Proceedings

Held at Fort Garry Hotel

Winnipeg, Manitoba

TUESDAY, OCTOBER 2, 2012

* * * * * * * * * * * * * * * * * * * *

APPEARANCES

CLEAN ENVIRONMENT COMMISSION
Terry Sargeant - Chairman
Pat MacKay - Member
Brian Kaplan - Member
Ken Gibbons - Member
Wayne Motheral - Member
Michael Green - Counsel to the Board
Cathy Johnson - Commission Secretary

MANITOBA CONSERVATION AND WATER STEWARDSHIP
Tracey Braun
Elise Dagdick

MANITOBA HYDRO
Douglas Bedford - Counsel
Janet Mayor - Counsel
Shannon Johnson

BIPOLE III COALITION
Brian Meronek - Counsel
Karen Friesen
Garland Laliberte

CONSUMERS ASSOCIATION OF CANADA
Byron Williams - Counsel
Gloria Desorcey
Aimee Craft - Counsel

MANITOBA METIS FEDERATION
Jason Madden - Counsel

MANITOBA WILDLANDS and SAPOTAWEYAK CREE NATION
Gaile Whelan Enns

GREEN PARTY OF MANITOBA
James Beddome

PEGUIS FIRST NATION
Robert Dawson - Counsel

TATASKWEYAK CREE NATION
Ian Cluny
Shaun Keating

APPEARANCES CONTINUED:

PINE CREEK FIRST NATION
Charlie Boucher
Warren Mills
John Stockwell

INDEX OF EXHIBITS

INDEX OF PROCEEDINGS

Tuesday, October 2, 2012.

Upon commencing at 9:00 a.m.

THE CHAIRMAN: Good morning, welcome back to Day 2 of our hearings. I hate to inform you of this, but according to the Free Press, we were all in the wrong hearings yesterday morning, according to them the PUB hearings were being held in this room yesterday.

Turning to serious matters, on the agenda this morning, we have Manitoba Hydro, the proponent, continuing with its presentation. This morning will be a slight deviation. They will be presenting evidence on EMF, electromagnetic fields, and we will have examination, and questioning of their witness at the end of the presentation. So, with no further delay, I would like to call upon Manitoba Hydro to introduce the topic this morning.

MR. BEDFORD: Thank you very much. If Ms Johnson could have the witness affirmed, I have a couple of questions for Dr. Bailey, and then he is going to present a presentation on his area of expertise.

WILLIAM H. BAILEY, BEING FIRST

DULY AFFIRMED TESTIFIED AS FOLLOWS:

MR. BEDFORD: Dr. Bailey, would you please introduce yourself to us, and, in doing so, I would ask that you outline for us your scientific research training, and, the experience you have had concerning electric, and magnetic fields.

DR. BAILEY: Certainly. As was introduced before, my name is William H. Bailey, I welcome the opportunity to speak before the Commission, representatives of First Nations, and other stakeholders. I am a principal scientist, of Exponent, a scientific research and engineering firm that is engaged in a broad spectrum of activities in science and technology. I am also a visiting scientist at the Wild Cornell University School of Medicine in New York.

I studied and conducted research on electromagnetic fields produced by a variety of sources over 30 years, my research includes laboratory, exposure, assessment and epidemiology, concerning alternating current, or AC, electric and magnetic fields, as well as studies on direct current, DC, electric fields, and DC magnetic fields and air ions.

I earned a PhD in Neuropsychology from the City University of New York. And previous to that,

I had a BA Degree from Dartmouth College, and an MBA from the University of Chicago. Since 1986 I have been a visiting research scientist at the Cornell University Medical College. I have also been visiting lecturer in bioelectric magnetics, at Rutgers University, the University of Texas San Antonio and the Harvard School of Public Health. From 1983, through 1987, I was head of the Laboratory of Neuropharmacology and Environmental Toxicology at the New York State Institute for Basic Research.

For the nine previous years, I was assistant professor and post doctoral fellow in Neurochemistry at the Rockefeller University in New York city. I am a member of the Rockefeller University Chapter of Sigma Xi national scientific honor society, and numerous other scientific societies described in my CV.

Because of my background and experience, I have been a reviewer, and scientific advisor on health related issues to state and federal agencies and scientific organizations, including the US National Institute of Health, National Science Foundation, and other US government agencies.

Specifically, regarding transmission lines, I served on a scientific advisory panel convened the

Minnesota Environmental Quality Board, to review health and safety aspects of a high voltage DC transmission line. In addition, I served as a consultant for the Vermont Department of Public Service, the New York State of Environmental Conservation, and the State of Maryland, and the staff of the Maryland Public Service Commission, and the Maryland Department of National Resources, in assessing health and safety aspects of transmission lines.

I have worked with the US National Institute of Occupational Safety and Health, Delbridge National Laboratories, the United States Department of Energy, and the US Department of Rail Road Administration, to review and evaluate health and safety issues relating to electric and magnetic fields from other sources.

I also assisted the US Research and Policy Information Dissemination Program, or RAPID program to evaluate biological and exposure research as part of its risk assessment process committed by Congress. I also worked with scientists from ten countries to evaluate possible hazards from exposure to static, that is direct current, and extremely low frequency electromagnetic fields for the International Agency

For Research of Cancer a division of the World Health Organization.

I also was invited to assist the International Commission on Non-ionizing Radiation Protection to update its guidelines on human exposure to AC electric and magnetic fields, and I have reviewed their draft guidelines for DC and AC magnetic fields as well.

Most recently, I served as advisor to several government agencies in Canada, and in the Netherlands on topics relating to scientific research on electric and magnetic fields, health and safety. I published more than 50 papers on this and related subjects, before the scientific community. And these publications are listed in my curriculum vitae which has already been provided.

Regarding DC transmission, I have been involved in health and safety assessments, and environmental assessments, for ten DC transmission projects in Canada, US, and Europe, and many more AC transmission projects.

Because of my background, and experience, I have been called as a witness on the status of health related research on electric and magnetic fields at the request of project applicants as well as by

provincial, state, and national regulatory agencies in Canada, United States, and several European countries.

MR. BEDFORD: Thank you. Dr. Bailey, before you turn to your presentation, would you please summarize for us your role or rather Exponent's role in the Bipole project, and the expected purpose of your testimony here today.

DR. BAILEY: Certainly. Exponent's engineers and scientists contributed to the electromagnetic fields, EMF, technical report that is appended to the environmental impact statement. This technical report has four components.

The first, is, environmental and health assessment of electrical requirement, direct current and electric and magnetic fields and corona phenomena. This is assessment of the DC Bipole III modeling data in light of current research and guidelines.

The second is the report modeling of the electrical environment for proposed DC components at the Bipole III project. This includes calculations of the electrical environment of the Bipole III DC transmission line.

The third report modeling the electrical

environment for proposed AC components of the Bipole III project contains calculations of the electrical environment of the new 230 kilovolt AC transmission lines connecting to the Keewatinoow converter station.

Finally the fourth report, research on extremely low frequency electric and magnetic fields from alternating current transmission lines, summary evaluation of the evidence, contains an assessment of the AC data by Exponent Health Sciences in light of current research, and guidelines.

In addition, we provided information about the project, and current knowledge about the electrical environment to stakeholders, including land owners provincial agencies, and Manitoba Hydro employees, in Open House forums and meetings and provided technical input to three communication brochures about the project. These brochures, were posted on the Manitoba Hydro website.

The purpose of my testimony today, is to summarize our conclusions regarding the operation of the proposed 500 kV Bipole III transmission line, and the 230 kV AC transmission lines proposed to connect to the new northern converter station. The electromagnetic fields and other aspects of the

project's electrical environment are compared to relevant exposure guidelines, and evaluated in the context of current research on potential health and marginal effects of these exposures. Let me turn to my presentation.

Here is what I proposed to cover this morning in this overview of health and safety topics. First of all describe the components of the Bipole III project, what are the electro magnetic fields associated with it. And, in particular, the Bipole III field levels. I will discuss the reviews of health and safety aspects of these electrical exposures by national, and international agencies, and talk about human exposure guidelines, and discuss some other environmental issues.

As you have heard before the proposed Bipole III project has three transmission components. The 500 kV DC Bipole line, the northern and southern ground electrodes connected to converter station, and the new 230 kV transmission lines to be built on the Henday-Conawapa corridor.

It is important to keep in mind that the Bipole III line and the ground electrodes are very similar to the Bipole I, and II facilities that have been operating in Manitoba since 1978.

Again here is a schematic of the connections in the proposed project, and what we discussed were the, in our evaluation, are the DC line itself, the ground electrodes, and the AC to AC lines that are connecting to the northern converter station.

Now, electric and magnetic fields are nothing new as part of the universe. They are consist of one of the four fundamental forces of nature, the other three being gravity, and the nuclear strong and weak forces. You will see these fundamental forces describe the behavior of tiny things like atoms, and molecules, and in the case of gravity, much larger objects such as planets.

An important aspect in understanding electromagnetic fields is just because something is called an EMF or electromagnetic field doesn't mean they are the same. In this spectrum which I have laid out. If you start with the far left hand side, you see electric or magnetic fields that do not vary in time. So, they have a frequency of zero Hz. And these are the fields associated with the Bipole III transmission line.

Going that slightly higher frequency, you have the 60 Hz alternating current fields which are produced by the oscillating currents, and voltages on

all of our power systems in North America. That frequency in Europe is 50 Hz, and if you go up to higher frequencies, you can find those in the hundreds of thousands to millions of oscillations per second of AM radio, cellular phones, higher up, going up to the infra red, ultra violet, and as you can see at the bottom the visible light spectrum.

So the reason why you can see me, and I can see you, is because we have developed photoreceptors that are exquisitely tuned to detect electromagnetic fields and the frequencies approximately between 760 nanometers and 390 nanometers. Outside of that range we can not see electromagnetic fields. And the reason why these frequencies are important is that fields of different frequencies interact with objects, and also with organisms quite differently.

And as we will see, this is a very important consideration to keep in mind when looking at a DC facility where the fields do not oscillate. Now, although we speak of electromagnetic fields at very low frequencies, such as 60 Hz, or the DC fields, we treat these two components quite separately. So we have electric fields which result in voltages impressed on conductors, and really the electric field just represents a difference in the

balance of positive and negative charges on an object. If they are equal numbers of charges, then there is no electric field associated with an object.

We measure these electric fields in units. Very weak fields in volts per meter, for larger fields in kilovolts per meter. The characteristics of these fields is the field is the strongest, closest to the source. As you move away from the source, the field level diminishes quite rapidly. A characteristic of electric fields is most conducting objects will block, or shield the electric field. So, intervening trees or shrubs, or buildings outside of the right of way will effectively block the electric field.

The magnetic field arises from the movement of charges or current flow on conductors. We measure this in units of gauss, or milligauss, and sometimes you may see references to other units of magnetic flux density. Teslas, for convenience if you see reference like this at very weak levels as we are talking about here, one milligauss equals point one micro teslas.

The magnetic fields here, like that of the electric field, also diminishes as you move away from

the source. But unlike the electric field it is not shielded by trees, shrubs or walls. So if I take a magnetic field meter and place it inside a concrete block, it will read exactly the same value of the magnetic field of the earth as it does outside of the block. Or if I placed inside my body, or inside any other material except for, perhaps an enclosed steel box, or some other materials, that magnetic field meter would read the same value despite the materials surrounding it.

The exposures, we evaluated in the environmental impact statement, are those associated with the DC line, including the electric field, the magnetic field, something called space charge, which I will come back to a little bit further on in the presentations, as well as audible, and radio noise. For the AC transmission lines, connecting in the north, that assessment included the electric field, the magnetic field, and audible, and radio noise as well.

I think it is important to point out, that our assessment tracks the scientific reviews of research by national and international organizations. I believe there are about ten such agencies we cited in our reports. The characteristics of these

reviews is that they are performed by large panels of scientists, balanced composition, with experts in many different areas of science, that can bear upon assessment of human health, environmental impacts. These have expertise in multiple disciplines, they follow a defined methodology, and their conclusions represent, in most cases, a consensus opinion.

What distinguishes the output from the scientific review panels is these scientists have followed a scientific methodology for assessing the evidence. They have looked at all of the available evidence, and drawn conclusions from that. This contrasts with the perspective that one sometimes sees in other types of reviews or opinions, in which the reviewer cherry picks information out of the literature, and then draws a conclusion that suits their viewpoint.

Now, as I said before, as we begin discussion of the Bipole III line, the DC fields, either electric, or magnetic are not the same as AC fields. They differ in frequency, and this has an important implication for the interaction with objects, so the wavelength, or the distance between successive peaks for an alternating current field, is, quite long.

And, since you do not have a frequency or wavelength associated with DC, except for minor harmonic contributions, there is no direct induction of voltages and currents in conducted materials, including people or other organisms. The other characteristic is that these fields have been present throughout the evolution of life on earth, and indeed as you will see they are common components of their every day environment.

We looked at health and safety issues, and the environmental impact statement. Potential effects on livestock, plants, and wild animals, and there had been considerable questioning during the process leading up to this hearing about potential interference to electronic devices, including GPS, receivers, cell phones, wireless routers, cardiac pacemakers, and cochlear implants.

The DC transmission line electrical environment has three main components, DC electrical field, air ions, and charged aerosols, and DC magnetic fields.

Let's look at the sources of DC electric fields in our everyday environment. These include distant storm clouds, thunderstorms, the process of frictional movement across a carpet, or of dust

particles, in a dust storm gives rise to charges, and those charges give rise to electric fields. The rubbing materials, dissimilar materials can result in a charge transfer, and of course, DC transmission lines, subject of the current study.

Here in this slide I have presented some of the typical levels of electrical fields in units of kilovolts per meter, associated with common manmade sources such as TV screens, or underneath the Bipole III line, and also from natural sources. As you can see, the outdoor environment, and particularly, the indoor environment, we commonly encounter these fields. The strongest source of these electric fields being the surface charge produced on the body from sweaters, and other clothing elements, as they move.

This slide shows the calculated values of the DC electric fields underneath, and on either side of the Bipole line. And it is a little confusing at first glance, let me take you through it. The distance zero represents the midpoint of the transmission line right of way. And going on distances on either side out to two hundred meters. And the light blue line represents the calculated value of the DC electric field in fair weather. And

the blue line represents the calculated value in foul weather.

Now the electric field, sources of the electric field from the Bipole line are twofold. We first of all have the charges which are all of the conductors, which give rise to a nominal electric field. In addition to that field coming directly from the conductors, the, there is a process called corona, that occurs at the surface of the conductors, which gives rise to charges on air molecules. And these charges on air molecules also are a source of electric field. So the combined electric field that you measure with a meter comes both from the conductor, and from these charges that are in the air.

In foul weather, the amount of corona activity on the conductors increases, and therefore you get a higher value of corona related phenomena in foul weather.

Research on DC electric fields and health have been reviewed by a number of agencies, for example, the International Agency For Research on Cancer in 2002 had a panel of scientists that spent more than a year examining research on static fields and EMF fields, of which I was a member. The

National Radiation Protection Board of Great Britain in 2004, and the World Health Organization in 2006 also reviewed electric field research.

Now, I spoke about this corona phenomenon caused by the electric field of the conductors a moment ago. Corona is a partial electrical discharge in the air. Under ordinary circumstances the line is designed so that there will be no discharge. But you have rain drops, or dust particles, or nicks in the conductor will concentrate the electrical field at that point and give rise to corona. When this occurs, it can be a source of visible light such as that known to sailors, on the corona discharge on the rigging of particularly the old sailing ships. It is not easily seen from an operating transmission line. In fact, every time I have looked at a transmission line at night, I have never been able to see it myself.

This corona discharge, can also give rise to energy released in the form of audible noise, radio noise, and also as I mentioned before the source of charges on air molecules called small air ions. And then overtime some of that charge, if it is not passed around, or neutralized by other charges, can attach to passing aerosols, or dust

particles.

The air ions, that we commonly encounter, in our environment are produced by a number of sources, one is falling water, showers, and water falls. Combustion sources in which energy is attached to molecules around flames, and so on. Air cleaners, you have probably seen ads in Sharper Image and other magazines for air cleaners that are electronically based. And these do so by creating air ions, and increasing the precipitation of particles in the air by tracking these charged particles to a grounded plate. Atmospheric discharges, breakdown of components in the soil, and also transmission lines, are all sources of air ions, and charged aerosols.

Here is a comparison of the levels of air ions from the Bipole III line, to other sources and you can see that they, these sources produce varying levels of air ions. The highest, that we have ever been able to find in literature is that measured over boiling water, for instance, above the tea kettle in which concentrations of a million to ten million ions per cubic centimeter have been measured.

At the bottom, you can see that outside the, at the edge of the right of way, from the Bipole

III line, the calculated values, are far lower, between 12, and 16,000 ions per cubic centimeter.

Again, here is a calculation of the air ion densities from the Bipole III line. These represent a condition of zero wind, obviously, if these components are air molecules then the presence of wind will be able to move them somewhat. And so under a strong wind these peaks will shift lightly to the right or slightly to the left depending upon the direction of the wind. And again, we see the same phenomenon, that the values are slightly higher in foul weather, than they are in fair weather. This difference diminishes as you get closer to the edge of the right of way.

One of the most recent reviews of air ion research was by the National Radiology Protection Board of Great Britain. And, this is a their conclusion,.

"...it seems unlikely, that corona. ions would have more than a small effect on long-term health risks associated with particulate air pollutants, even in the individuals who are most affected. In public health terms the proportionate impact will be even lower because only a

small fraction of the general population live or work close to the corona ions." "The possible implications for health of the mechanisms discussed in this report do not provide a strong case for further research in this area. It is concluded therefore, that it is not appropriate for an epidemiological study to be carried out."

The particular focus their review was the hypothesis that the transfer of charges to passing aerosols might increase the amount of, the extent to which these aerosols are deposited, and retained by the body. With the idea being that, if you attach charges to these small particles, they are normally breathed in, and back out again. If you put charges on them, then perhaps more of them will be retained, examine we will come to that.

When we started this environmental impact assessment, the questions that had been raised concerned this potential mechanism by which exposures, to ambient sources of aerosols, might be increased to exposure to charges on these aerosols. And so we suggested to Manitoba Hydro, that we take measurements around existing Bipoles I and II, to

characterize the extent to which aerosols were charged, and how many charges might occur on these particles.

At the time we began our research there had only been one other report that had characterized charges on individual aerosol particles, and, my colleague, Dr. Gary Johnson, had developed a technology by which this might be done, and so we went out to the, an area around the existing Bipole lines, and took measurements, and we also took measurements in and around Winnipeg and also in various areas around Chicago, Illinois where Dr. Johnson's office is located.

What we found was that the percent of charged aerosols is low, and similar to that measured in other rural, suburban and urban environments in Manitoba, and Illinois. That is percent of aerosols that are charged is, basically a measurement of prevalence, and we did not find that there was a difference in the prevalence of charged aerosols up wind or down wind of the Bipole DC lines.

Now, when we take measurements of the aerosols, we find that in most environments this kind of bimodal distribution. There is, the aerosols can be divided into three groups, there are those, large

number are uncharged, certain percentage have positive charges, certain percentage that have negative charges. If you look at just those aerosols that have charges, we have this bimodal distribution, positive charges, and negative charges, and that is what we found up wind of the DC lines.

What we found down wind, however, was slightly different. That down wind of the DC lines the percent of positive charges decreased, and the percent of aerosols with negative charges increased. The total number of aerosols carrying a charge was roughly about the same as it was up wind, but what changed was the polarity of those charges. It is still the case that down wind most of the aerosols, are uncharged, or as I said, fewer of these aerosols have a positive charge than a negative charge. The reason why that there are fewer, there are more negative charges down wind is that the down wind, the conductor that was directly up wind from our measurement site was the negative conductor. And, so, therefore, that was the main source of ions down wind of the negative conductor. And, by reason that the way that the Bipole I and II lines are constructed, the up wind conductor is also negative.

We went further and measured the density of

charges on aerosols, in this small range where they are potentially respirable, and found that the charge for aerosol was too low to affect the deposition in the respiratory tract.

Now turning to DC magnetic fields, of course, the main source of DC magnetic fields in the environment is the earth's geomagnetic field. Various appliances containing magnets, for instance electric trains, magnetic resonance imaging, research and industry, DC transmission lines, are all sources of DC magnetic fields.

Here is is a visualization of the earth's magnetic field. Near the equator the values are low, in the range of two to three hundred milligauss, as you get to the north pole you see the field lines concentrating at the poles, and so therefore, the magnetic field higher at the poles, reaching perhaps 700 milligauss. And it is this geomagnetic field that we use when we make use of a compass.

Here is an example of fields from other sources 3000, to 10,000 milligauss associated with magnets in ear phones, telephones. High fields associated with high speed trains. The highest magnetic field sources, of course, are associated with diagnostic imaging, MRIs, which get 15 million

to 40 million milligauss. Also the MRI devices make use of other fields besides the static magnetic field, namely radio frequency fields, and radient fields and other frequencies in order to achieve this imaging.

And again, here is a comparison of the magnetic fields associated with the sources. And you could see that the underneath the Bipole line, even directly underneath the conductors, the field levels are weaker than that of the geomagnetic field. And one thing to remember, as you will see in a moment, is that magnetic, and electric fields, unlike other environmental quantities that we measure, for instance, the concentration of oxygen in the air, for instance, we have a concentration, but these fields have not only a magnitude, or intensity, but they also have a direction. And that is important aspect in their interactions.

So, here is an example. If you look off to the right or left you can see that the earth's magnetic field is about 580 milligauss in Manitoba. And, as you approach the Bipole III line, we calculated the magnetic field to increase lightly, until you are on the right of way, and then very curious enough it might seem the magnetic field

intensity drops, so instead of being 580 milligauss it is around 300 milligauss on the right of way, and as you keep moving across the right of way the strength goes back up, increases slightly above background, and then returns to that background.

Now how is it that the presence of DC line causes the field to go down underneath the transmission lines? That is because in this depiction, which the line is oriented in a north south direction, the magnetic vectors of the earth which are pointing up are being counteracted by the magnetic field vectors, from the line which are pointing down, since they are going in opposite directions they tend to cancel one another.

At other places the magnetic vectors of the earth, and the line are going in the same direction and so that is why you see this increase at the edge of the right of way.

There are numerous reviews of research on static magnetic and electric fields since 2000, I have given here a timeline showing some of these agencies. We have mentioned the National Radiological Protection Board before, International Agency For Research on Cancer, the International Commission on Electromagnetic Safety, World Health

Organization, Health Protection Agency of Great Britain, and the International Commission on Non-Ionizing Radiation Protection, and an organization that advises on occupational exposures, ACGIH. Here are some of the reviews that focus just specifically on magnetic fields.

Now, there are two organizations that have recommended limits on human exposure to DC magnetic fields. And I presented here the values recommended for the general public, and for workers. And, you can see that these are thousands of times higher than the geomagnetic field of the earth, or the geomagnetic field of the earth which has been perturbed by the Bipole III line. And so, there really is not really any question that, as to whether DC fields from the earth, or sources in our common environment would even approach these limits on human exposure.

DC electric fields do not enter the body. They can affect charges on the surface of the body, and so that at high levels, they don't produce biological changes by means of affecting interior processes, but they can be detected, and so two organizations have made recommendations for exposure limits at which people -- above which people might be

able to detect or perceive DC electric fields. I have done experiments as part of a research team in Quebec, in which we measured people's ability to detect these fields, and found that by themselves, 25 kV perfect meter was a very conservative limit, that typically people required field levels of perhaps 45 kV per meter in order to detect the field.

We also looked at studies of DC lines, and effects on livestock, plants, and wildlife. What when I was a science advisor to the State of Minnesota, we, there were questions raised by ranchers about the DC line affecting dairy cattle. Minnesota is a very large dairy population, and so, we designed a study, and asked the university to carry it out. And we asked them to analyze records from the dairy association, on the thousands of cows that were living around the DC transmission line.

So they analyzed four years of data before the line was energized, and four years of data after the line was energized and the population of cows, during this time was, on an annual basis about 24,000. They analyzed daily milk production, reproduction and mortality, and they compared the performance of these cows before and after the line was energized, and for those herds that were living

within a quarter of a mile in different exposure categories, up to those living six to ten miles away from the line.

They reported that there was no relationship between exposure to the DC line and performance and reproduction in this large study with very sensitive health indicators for these cows.

Another study was done by Oregon State University. There is a 500 kV DC transmission line that goes from Oregon all the way down to Southern California, and they constructed two pens, one directly underneath the line, and the other about 615 meters away. And, they randomly allocated cows, and calf pairs to the pen directly underneath the line, and to the control pen further away. And, they monitored their breeding, conception, and calving, weight, mortality, and behavior over a period of three years.

In another section of the line nearby they constructed experimental plots of wheat, and alfalfa going perpendicular to the line, and also in the control area, and monitored the growth quality, and the disease incidents in these crops, they did not find an effect on these measures that are important in commercial ranching and farming operations.

Going back to 1970s studies have been done about DC lines and wildlife. These studies suggest that the habitat change from the construction of the transmission line itself sometimes involving clearing the right of way is the critical factor, not the static fields associated with the line.

Now we know there are reports that some varieties of birds, and bees can use some aspect of the earth's magnetic field as a supplementary travel aid moving within or between habitats, but the research does not suggest that the behavior of birds or other species would be adversely affected by the relatively small change in the magnetic field from the Bipole III line.

You heard yesterday about the ground electrode, normal operation of about estimated at about 92 percent of the time there is a very small current that would be, on the feeder line balancing out the circuit. During certain maintenance and emergency operation the current flow on the line would increase to that of like that normally carried by the Bipole line. The electric and magnetic fields below the line would still be meeting international standards, and this monopolar operation poses no threat to health and human safety.

Here is a schematic diagram of the ground electrode buried underneath the soil, and the inner connecting line for the converter station would enter in the center of this ground electrode. Here we have calculated the change in the magnetic field associated with the overhead electric line going to that ground electrode. As you can see, under normal operation there is just a very small change in the earth's geomagnetic field.

One of the most surprising things to me, was the number of questions that Manitoba Hydro received regarding potential effects of the Bipole III line on electronic devices. We helped develop a brochure, which is shown here which explains what is known about this. As well as several other brochures to address DC lines in general, and AC lines.

Not considered as part of this topic, but I will mention it here, we calculated the levels of audible noise that crackling sound that you sometimes hear when you are underneath AC transmission lines, and sometimes can be heard under DC transmission lines as well. As you see here the levels of audible noise, are somewhat lower, in this case under foul weather than they are in fair weather. And if

you look at the levels in decibel levels, the peak level is 40 decibels, and so this makes it a barely audible source against a background level of let's say 35 dB.

Now here is the calculation that is most relevant to the question about potential interaction with the Bipole III lines with electronic devices, and this represents the calculated levels of noise with corona activity on the conductors. As you can see it is highest on the right of way and then it quickly diminishes outside of the right of way.

Here is a conclusion from the brochure we produced. The radio and television interference may be noticeable particularly, when near a DC transmission line. If you look at that graph near a DC transmission line means being within a hundred feet of it. So if you are driving down the highway, and you have your AM radio on, and you pass under high voltage transmission line, that static that you hear, as you go underneath the line is the type of radio interference we are talking about here that would also apply to the DC line. FM radios are not affected by corona noise, as are a number of other sources.

The explanation of why AM radio would be

affected directly underneath the line, and for a short distance on either side is explained here on this graph, and it also explains why other sources would not being affected by the radio noise in the line. If you look at the bottom access, that represents the frequencies going from 100 kHz, to above 1 GHz. And as you can see, the frequency range occupied by the D -- produced by the DC line is in the range of about 100 kHz up to most of the energy is up to 1 MHz, but it could go to higher frequencies.

And if you look at this dash dot, which starts at the top of the graph, left hand side, and then goes down, that represents not frequency, but represents the intensity of this radio noise as a function of frequency. As you can see in that range from 100 kHz to 1 MHz is highest, but as you start increasing the frequency, the intensity of this radio interference signal coming from the line goes down, and becomes weaker, and weaker, and weaker. So you can see, for the green band here of frequencies occupied by AM radio, why passing underneath an AC line, or a DC line would cause interference, because the frequency of the radio signals overlaps that with the frequencies produced by the line, and underneath

the conductors, the intensity of the radio noise from the line is highest.

But if you see, if you go out to higher frequencies, then there is not much overlap between the frequencies of the radio noise of the line, and the intensity of the radio noise of the line at these higher frequencies is far lower. So if you look at FM radio reception, or TV reception, or cell phones, or global positioning satellites, RTK refers to a correction signal which enhances the accuracy of global positioning satellite receivers. You can see why that these other communication technologies are not interfered with by a DC line, or for that matter AC lines, which produce similar corona phenomena.

Manitoba Hydro also, in order to nail down, and confirm the above assessment commissioned two studies of GPS receiver performance, and these were performed by two different groups underneath the Bipole I, and II DC lines. The first, by the University of Calgary reported no power line effect on measurements was found to affect the quality of the navigation solutions. This is for the most accurate form of GPS reception such as might be used on highly accurate farming vehicles.

And, the other done by professional

surveying firm that uses GPS all of the time in their work for exact determination of locations on earth, the.

> "Transmission lines that supply direct current have no appreciable effect on either GPS measurements or ultra high frequency radios/cell phones that supply GPS correction messages. The results obtained were well within the manufacturer's quoted equipment accuracies."

That is accuracy to the nearest centimeter.

As you saw from the graph before, the frequency that cell phones operate are signals range from 850 MHz to 2150 MHz, and the radio noise from DC line does not overlap with the signals from mobile phone, and therefore does not interfere with the phone's function.

A question came in to BC Hydro about whether the line could affect wireless routers, or Internet in home. These operate at frequency of 2400 MHz, and obviously, for the reasons we went through before, the DC line would not affect those either.

Serious questions about whether the

electric and magnetic fields might affect cardiac pacemakers, or other implanted medical devices, and the one that we looked at in particular, were cochlear implants. The reason question looked at cochlear implants was that there had been reports of children with these implants which assist their hearing, basically, they have electrodes implanted in the hearing organ, which are then stimulated by signals from an external microphone. And this external microphone, then directly simulates, the hearing apparatus, to allow them to have partial perception of sound, including speech.

And what had been reported is that children who would be sliding down plastic slides remember how we talked about how charges could develop as a result of friction, and material transfer, they would develop very large charges on their body, and, then when they got down off the slide, there is a chance, that they could have a large discharge, basically, to the microphone, behind the ear, and damage that apparatus. We looked into this, and found that the amount of charge even directly below the Bipole line would be too weak to produce such an effect. And cardiac pacemakers, reported not to be affected at magnetic field levels below 5000 milligauss, and so

the magnetic field from the DC line is far too weakto affect cardiac pacemaker.

And, interesting question arose during the environmental assessment process, as to whether the Bipole III line, which passes, depending upon how it is routed either through, or close to the Thompson nickel belt might affect the ability of mining companies to perform surveys for determination of locations of nickel ore. Now, the methods that are used by the mining companies, and there are several different methods, but one of the methods uses, measures the variation in the earth's geomagnetic field, and looked for very, very small changes down to a thousands of a milligauss, this is one of the tools that they use to detect the positive -- potential ore deposits.

Well, obviously, if the DC magnetic field from Bipole III is producing a magnetic field that at some place is larger than that of the earth, and may not be entirely as stable, although, I would point out that the earth's geomagnetic field varies very slightly during the day, and during the year. But, nevertheless the mining companies were concerned that the operation of the DC line might interfere with their ability to make surveys.

We looked at what options might be taken to address these concerns, and, the obvious one would be for them to take surveys in the area around the line before it is placed into operation. Another is that we found examples of cases where people were mining around a high voltage DC line in Europe, and basically what they did was to collect the measurements, and then to subtract out the magnetic signature of the line from the measurements in post-production processing. There are other survey methods which are less affected, or not affected by the magnetic field from the line. And, another option, of course, would be to shift the line further away from the nickel belt, where these mining operations are focused.

Now, up to now, I have spoken exclusively, about the DC line, and the associated ground electrodes, but as part of the Bipole III project there is construction of new AC transmission lines. And, here is a diagram showing the locations of the existing Bipole line to north, the Bipole I and II lines coming in in blue, and then there is a dotted green lines representing the new lines being proposed.

The research on electromagnetic fields,

from our AC electric system including household wiring, distribution lines, AC transmission lines, and so on, has been reviewed by many different scientific organizes. Here just some of the ones since, up from 1998, to 2007. And, 2007 is noteworthy because that is when the World Health Organization released its large report and assessment on AC electric and magnetic fields.

Now, in Canada, the Federal, Provincial, Territorial Radiation Protection Committee in association with Health Canada is the organization which is established to support government radiation protection agencies in Canada. They performed a review of the epidemiology and laboratory research on power frequency or ELF 60 Hz fields, and here are their conclusions,.

> "Adverse health effects from exposure to power frequency EMFs, at levels normally encountered in homes, schools, and offices have not been established." Since there is no conclusive evidence that composure to EMFs at levels normally found in Canadian living and working environments is harmful, they are of the opinion that the moderate measures and participation in

the process of acquiring new knowledge are sufficient.

Is since the WHO reported in 2007, there have been five other major reviews of the evidence performed by national, and international health agencies, the latest being in 2010. And, their conclusions are similar to those of WHR, the Canadian agencies.

In 2008, the federal provincial territorial radiation protection committee responded to public concerns, about electromagnetic fields, with the following statement?

"Public concerns, appear to arise from periodic media reports and from dubious Internet websites, which contain inaccurate, unsubstantiated, controversial or contradictory statements regarding EMF-health issues."

In summary, the assessment that we provided in the four reports concluded that,.

The electrical environment of the Bipole III project is expected to conform to exposure limits recommended by provincial, national, and international agencies.

The evaluation of studies of human,

animals, and plants exposed to magnetic fields, electric fields, and space charge, air ions and charged aerosols, conducted in laboratories, and around DC transmission lines does not show that these exposures would have adverse impacts. Furthermore the field levels of the proposed line were not found to pose any likely effect on electronic devices.

This completes my presentation, and I would welcome any questions you may have.

THE CHAIRMAN: Thank you, Dr. Bailey. Mr. Bedford, do you have any further questions for Dr. Bailey at this time?

MR. BEDFORD: No.

MR. MOTHERAL: Mr. Bailey, on page 20 I just underlined a spot where you said "no effect on measures that are important." Page 20 of your report.

DR. BAILEY: There are four reports, so -- the presentation. Okay.

MR. MOTHERAL: Talking, about the agriculture study, "no effect on measures that are important." And I underlined that, which to me leaves an opening, there are some possible effects.

When you say not important, I don't know exactly what that means.

DR. BAILEY: Okay. Let me clarify that. In the, in the case of the, of that study, in some of the measures they took, they found that there were differences in where animals stood at various times of the day in relationship to the line. But that was not consistent, and they could not relate those differences in any way to the measured levels of electric, and magnetic fields that they were monitoring at that time.

I guess the statement was more focused on those measures of performance either physiological, or biological, in the case of the wheat that were important measures for people who have ranching operations. The other observations were made might be of interest in terms of people who are interested in sensory perception, whether the cattle could detect the fields or not. But they were not something that in any way influenced their health.

MR. MOTHERAL: I just underlined when you said it, I don't like to see something that says, that are important, without seeing something else. Thank you.

THE CHAIRMAN: Dr. Bailey, just a question

of clarification, when you spoke of audible noise, would this be constant? Is there a constant noise from these transmission lines? It is, it would be constant, except that the levels during when the conductors are wet, like during rain, and so on, would be, would be lower. And in foul weather, you would often have masking of noise by noise of wind, rain, hitting the ground, and so on. But, it would be, a continuous noise level, though, but hard to detect.

THE CHAIRMAN: There is a constant hum coming from the lines?

THE WITNESS: I wouldn't, I wouldn't, it is slightly different than a hum. It is sort of, a weak crackling sound. I have been under many different DC lines, and it is the kind of thing that unless you kind of are looking for it, and know what to listen for, it is hard to detect,

THE CHAIRMAN: How loud is about 20, to 40 decibels loud?

THE WITNESS: 30 decibels is something that might be in a very, very quiet library. Background, ambient noise levels in a rural area might be 35. Speech might be in the range of 65. Now the one thing to remember is that these audible noise levels

from different sources do not add arithmetically. You don't take background of 30 and 40 from the line and get 70. They add arithmetically. So the increment of 40 dB even underneath a line is a small additional contribution to that background. And you when you do that, you will find that the, it would be hard to distinguish against a background, unless you are directly underneath the line. And, even then, have you to be sort of looking for it to try and identify it.

THE CHAIRMAN: Thank you. Any other panelists have questions of clarification at this time?

MS MCKAY: Yes, I have one. This, is on page 16 of the slide version. Looking at Bipole III Magnetic Field Being Added to the Earth's Magnetic Field, I was puzzled why in this case, in the trace there is no evidence of the Bipole nature of the, of the line. Why is that, why does it not show in its trace, that the positive, and negative sides of the line?

DR. BAILEY: The, that is with regard to the DC magnetic field, and the DC magnetic field, as we said before has a magnitude, and a direction.

MS MCKAY: Yes.

DR. BAILEY: And you are, indeed, correct that the direction of the fields from the current flowing on one conductor, going this direction, will be different, from the conductor going the opposite direction. What we have represented is the combined field of, if you had a magnetic field meter, of what you would actually measure, as you walked across the right of way. So it is the combined incidence of the geomagnetic field, and the earth's magnetic field.

In the other cases, where we presented the DC electric field or air ions, you had a peak on one side that was for positive, or other side for negative. Those are, their directions are not really changing, but we just display them that way, so you could distinguish between positive, positive electric field on one side of the line, and negative electric field on the other side of the line. But in the case of the electric fields, in the case of magnetic fields in that slide, we presented the combined influence of geomagnetic field. So the individual conductor influence has been swamped out by this presenting the total field.

MS MCKAY: It is just a reflection of your technique of displaying it.

DR. BAILEY: Right. And if you go to our

board, you can see we have a plot that shows the DC magnetic field produced by the line itself. And it is a unimodal peak.

MR. GIBBONS: Dr. Bailey, critics in the community raise various questions about EMF. And you have spoken briefly to some of these points. One set of criticisms, I suppose, comes from those who advocate the precautionary principle that suggests that what we should be looking for is not conclusive evidence, that what we should be looking for is conclusive evidence that EMFs are safe, as opposed to the wording that appears on page 29, which says, that there is no conclusive evidence, that exposures at levels normally felt in Canada are harmful, in other words, they reverse the onus, that is, I guess, what I am trying to say.

I am wondering, if you could speak to that question briefly, and as Part 1 of the question. And secondly, some of the, towards the very end, sorry, page 30, so I guess it is Slide 59, there is a response taken to public concerns where it mentions that there are periodic media reports, and so forth. Some perhaps, inspired by the precautionary principle, but others that are concerned about whether or not the research that is publicly

available tends to come from organizations that might be supportive of the industry. Could I have you speak perhaps briefly to both of those kinds of concerns, as to regard to where you stand on that.

DR. BAILEY: Certainly. Well, the precautionary principle is something that over the last, you know, 20 years has certainly gained more and more prominence both in Europe and the US, and it is also enshrined in Canadian legislation as well.

The purpose of the precautionary principle, is to, having based upon an assessment of potential risks, to then take precautionary matters if that assessment has determined that there is a likely risk. The, this issue about precautionary principle has been well developed by the European Commission, and by the World Health Organization, and if you go to our assessment report, which is, I give you the title, so you have it, Research on Extremely Low Frequency Electric Magnetic Fields From Alternating Current Transmission Lines, Summary and Evaluation of the Evidence. That is our fourth report. If you go to page B22, there is a, several pages of discussions about precautionary measures that were outlined by the World Health Organization, and, as regards ELF, or 60 Hertz magnetic fields, those same

principles would apply equally well to considerations of DC electromagnetic fields.

And I think all of the evidence together, does not indicate there is a likelihood that these exposures associated with Bipole III line would have adverse health impacts. And of course, the way that we, science cannot prove the absence of something. You know, you could ask the question prove to me, that Winston Churchill is not alive, and well, and living in Argentina. Well, how can I prove that? The only way to do that would be to go and examine every person in Argentina, and if we did that, we could determine whether any one of those was Winston Churchill. But absent doing something like that, the best that science can do is continually keep testing hypotheses, and more, and more often, and more and more evidence that we have that there is not a risk, or if there is a risk that it is small, then we get to the point where we feel comfortable with that exposure.

And as you saw from the presentation, and if you go into the details reports, you can read the conclusions of the national and international health agencies that have reviewed all of this research, and, their conclusion is that these exposures are not

strong enough or of a character that would produce any likely effect on animal, or health, or human health, or adverse affect effects, on the environment.

So, and I think these agencies, are quite well aware, and have applied the precautionary principle, and, as mentioned in the brief citation from the Federal Provincial Radiation Protection Committee, they also have been aware of the precautionary principle, nd, in their opinion, the application of the precautionary principle with regard to AC fields, which have the potential for stronger interactions with the environment, and with organisms, was that they hadn't determined that there is was a health risk, and that the types of activities that they were engaging in, such as continuing review, and evaluation, communication with the public, and so on, were sufficient.

Now, in the case of AC magnetic fields, the World Health Organization has recommended a precautionary approach, that in building of new facilities, that the, the applicant consider ways of reducing magnetic field levels to the extent that this can be done without incurring, either at low or no cost. And the rationale goes back to another

version of the precautionary principle called prudent avoidance, that was coined by Granger Morgan (ph) many years ago, and when the questions first began to be raised about AC magnetic fields, he and his colleagues at the university, evaluated the research, and they posed the question, was perhaps, this, prudent avoidance principal, might be applicable to EMF.

But the idea was, would you spend more money to avoid an unknown or speculated risk, than you would a known risk? And that was the question that was asked about electric and magnetic fields. And I think that is where the World Health Organization is coming in, in terms of their recommendations, that if you were to -- some low or modest amount of money might be worthwhile to spend to minimize magnetic field exposure when new facilities are proposed. But if you were to spend more money than that, then that would mean you were spending more money to avoid something that you didn't know was a risk than you do on things that are a known risks. That is kind of the boundary, that the WHO and other people have said on how much attention, and consideration, should be given to precautionary things.

I would also point out, that, we are dealing here with exposures that we have been living with since life evolved on this planet. In the case of other things that we scientists are pressed to address, we are dealing with things, that are entirely new, or novel, to make some aspect of biotechnology, of making genetic changes to organisms that have never existed on earth, and they maybe in a form that there is no way of addressing potential impacts. We have no history of research on these organisms, once they are released into the environment, may have potentially catastrophic consequences.

In the case of electric, and magnetic fields, static sources, we have hundreds of years of direct experience, and the last hundred years, certainly much more capable, and detailed assessments of potential effects of these fields. And, despite all of that, you know, I think you saw from the presentation, you can go into detail in the report, that the exposures, are not really outside of the range that we have on our daily environment. And, certainly, people don't live underneath transmission line conductors where the exposure is the highest. And so, I don't think that the evidence that we have

reviewed, that has been pulled together by national, and international health agencies, in any way recommends that we would take special precautions regarding a DC power line.

MR. GIBBONS: Sorry the second part of the question was, media reports, and so forth, where there is a concern about research that may be perceived, rightly or wrongly, as being industry based or industry funded and so on, can you speak to the reports that you are referring to, in terms of their independence, and so on -- how should I phrase this? Not whether there is no industry representation, I think you used the word balanced earlier, in one of the earlier slides. To what extent are the research projects that you have addressed, and used as sources, reflective of that notion of balance, that they are not strictly industry based, or are they, and I guess that is my question.

DR. BAILEY: Well, I think it is important to recognize that lots of different organizations have been involved in research on electric and magnetic fields. Many of those studies have been funded by government agencies in order to get additional information. Some of those have been

funded by private research organizations, like the Electric Power Research Institute.

Very few studies have been entirely privately funded by industry. And I think if you look at the research that has been reviewed by these agencies, they have made no distinction in their assessments that the information, is any different, depending upon what source it has come from. One of the advantages of the entire peer review process is that if a report is published that comes out from a particular source, whether it is a government agency, or private scientists, or whomever, that if those findings cannot be replicated by others, then that work, no matter what the source, is given very little weight, or attention by the scientific community.

On the other hand to the extent that different investigators at different places, and different times, and I would assume different funding organizations, can all come to agreement, as to a phenomena, and that can be replicated, then scientists tend to believe that that is more likely to be an accurate description of whatever that phenomenon is. So I think that we don't draw conclusions based upon environmental, or public

health issues, based upon single individual studies. Certainly one would like to see more studies, that would confirm conclusions of those studies that have already been published in literature. But, it is very hard to get funding agencies interested in supporting research on something that the scientific community has regarded as a nonissue. And allocation of funds, are placed on things that are either, either to the legislative bodies, or scientists of higher importance.

And, in this case it has actually been hard to get the attention of agencies to support certain types of research. So I, myself, have made applications to scientific agencies for research to investigate various questions that have arisen in the literature, and gotten back the answer, as we don't see this as something that is worth our agency funding, or pursuing because there is no fundamental issue of health or safety involved.

So that, that, is one of the issues, that is a factor in determining how much funding is done and where it comes from.

MR. GIBBONS: One point of small clarification. I take then, just so people in the audience are clear on that, it is not that it is not

important, but there is consensus already, and no need to reinvent the wheel? When you say, if a funding agency, doesn't want to support research, it is not that the issue is not important, it has been resolved in terms of scientific research at that point.

DR. BAILEY: Right, for instance, I will give you an example, the quote that I gave from the National Radiological Protection Board, in 2004 was focused on this hypothesis, that had been put forward about an electrical charges, being added to aerosols, and then there by increasing the retention of these aerosols in the respiratory tract, that was 2004.

In the following 8 years, because of the sort of audacity of this hypothesis, considerable amount of research has been done, and including the study that we published, and today the situation is much clearer than it was in 2004. And, I think, now, scientists recognize that that hypothesis was not based upon studies of living humans. And, in fact, when you take into account the factors that affect deposition of particles in the respiratory tract, such as humidity in respiratory tract, temperature gradient in respiratory tract, that the modeling study that had been relied on back in 1999

to support this hypothesis, when you consider those factors, as has been in recent years, it turns out that deposition is not increased. And, we relied on studies that had been done of human subjects that had breathed in known quantities of aerosols, with known amounts of charge on them, and those studies report that it requires a very large number of charges per particles, dozens to hundreds, to, you know, in case thousands, of charges to meaningfully increase the deposition in the respiratory tract.

So, I think science is a continuing process. We have more information today, than we did in 2004, and that information that has come forth gives us increased confidence that this hypothesis has been addressed by the scientific community, and, I note that even the laboratory that put forth this hypothesis, the investigators have recently reported that the measurements that they have relied on for their estimates of human exposure, that were based upon measuring the, the field around AC power lines, in fact, did not predict the amount of charged aerosol to which people might be exposed at ground level. And so they have essentially retracted that aspect of their, of their hypothesis based upon their increased understanding of what these phenomenon are.

THE CHAIRMAN: Thank you. In a moment we are going to take a break. First I would just like to note when we come back from the break, we will have examination by the participants, it will be in the same order as opening statements were made yesterday, so, very quickly, that, is Tataskweyak, Pine Creek, MMF, Coalition, Consumers Association, Sapotaweyak, Peguis, Wildlands, and Green Party, a number of those parties are not here this morning, but, just try to remember your place, in that order, and, we will, we will get to the examination right after the break.

So, please come back, and be ready to start at ten to eleven.

(HEARING RECESSED BRIEFLY)

THE CHAIRMAN: We are going to start with examination of Dr. Bailey on the presentation made this morning, I understand there are at least two, or three participants who wish to ask some questions of Dr. Bailey.

I note, and I will probably say this every time we get into an examination, please be courteous, and also please do not be repetitive, don't ask

questions that have already been asked. So, I gave out the order this morning, Tataskweyak, Pine Creek, MMF, anybody want to ask questions? If you do, please, Pine Creek, are you going to ask any questions at the time? Is there anybody from Tataskweyak? Okay, no. Mr. Mills?

MR. MILLS: Thank you, Mr. Chairman. Welcome to Dr. Bailey. My name is Warren Mills, I assist the Pine Creek First Nation, community of approximately 1500 people on the west side of Lake Winnipegosis. Bipole III, the proposed route, cuts perpendicular to four major waterways that flow down out of the Duck Mountains and into our community. And the Community's concern, and what they have asked my associate, and I to flush out is the effect of Bipole III on their way of life.

So, we have some thoughts, and I would like to start by indicating we are unfunded participants, and we certainly heard, and appreciate your funding frustrations. It is difficult to do the work when you don't have the assistance.

Our bottom line concern is what effect any Bipole will have on the members of Pine Creek, as they travel, hunt, occasionally fish, and certainly harvest blueberries, and traditional medicines. The

route of Bipole III passes through significant blueberry fields that our members have relied upon arguably for centuries as traditional food source. And the last question, I will have of you is what is the effect of the membership spending long periods of time with children under and around the Bipole line harvesting blueberries at seasonal times during the year? The community is concerned about that. I will ask that question last.

We have some other just short snappers if you could help me with. The calculation slides that you presented, are those your calculation, and is that your work? Or, are those, we heard your voice, are those your words, or are those calculations, and presentations Hydros's information? Page 9 the Bipole III DC electric field showing the distance off the right of way. We are relying on your assurances, and you are presenting us with that information, and I am just wondering if you can be clear to us where that information comes from?

DR. BAILEY: All of the information that I presented today is based upon our calculations, and assessments of the data. In this project I had three Phd electrical engineers, working with me. And, they have taken the data about the design of the

project, and used that in the calculations that are presented here in our reports, and in the slides.

MR. MILLS: Okay. Great, thank you. Some of the units you presented us with, and some of the assurances you provided us with seemed to be instantaneous measurements. You talked about the static electricity of shock of a sweater, and paired that effect of being under Bipole. It seems to me, that one instance is very, very short, and your someone standing under Bipole would have a continued, or cumulative effect of Bipole. Are, are the numbers that you provided us with as a scientist, Dr. Bailey, is it fair to compare the effect of Bipole on a human being as opposed to a unit of static electricity of sweater shock?

DR. BAILEY: I understand your question. The purpose of that slide, different slides is to give people an indication of the common sources of electric, and magnetic fields and air ions that we encounter in our every day environment. And what the magnitudes of those sources are, I did not rely on those comparisons in drawing conclusions about human health. Those were based upon studies that are reported in the literature, which involve some short-term exposures, and other long-term exposures,

as well. So, those are, those slides, are for indications of what sources are, and what the field intensities are associated with them. But they are not themselves an assessment of potential health risk.

MR. MILLS: The disparity of the units is quite dramatic and it paints a strong picture that static is down here, and Bipole is down here, but wouldn't it be fair to say, that static electricity is instantaneous, and Bipole is cumulative, and continuing, and unrelenting?

DR. BAILEY: Well, I wouldn't characterize Bipole as being continuous, or cumulative in the following sense, that I suppose if you lived, build a residence directly underneath the line, then you could talk about continuous exposure. But I don't know whether either the Band you represent, or elsewhere, that that is the case. Certainly not the case anywhere that I know of.

And as I pointed out, once you get outside of the right of way, all of these electrical quantities which we have characterized, the fields, and ions, and so on, diminish very rapidly to much lower levels. And so, I don't see that the presence of the Bipole line in an area is necessarily going to

involve this continuous exposure to, of people to the fields from it.

MR. MILLS: I will get back to that. I think we are, we are going to want to talk about duration. You provided us with some assurance with regards to magnetic resonance imaging. Is it, is it fair to say that people who work around MRI equipment do so without any particular safety practice, or are there safety practices involved that people are required, through workplace safety, or health safety to, are there periods of time that people can work around intense DC equipment, or, is it no concern?

DR. BAILEY: The safety concern associated with magnetic resonance imaging equipment has to do with the very strong magnets, which produce fields. And the weaker magnets are 1.5 teslas. 1.5 times 10,000 gauss. Some of the newer MRIs, go up to 9 teslas. Those DC magnetic fields, are so strong, if I was to walk into that facility and get close to the magnet, this pen would fly out of my hand, and probably go through another person's body, before it got to the magnet. So, there would be a strong magnetic attraction of the magnet for any ferromagnetic object.

There have been serious accidents at MRI

facilities where, for instance, a technician was carrying an oxygen bottle into a facility for patient, and, got within a line that had been marked for safety reasons, and the bottle flew out of his hand, and went towards the magnet, and killed the individual within the, in the MRI.

These very strong fields, do not anywhere characterize a fields in, and around the Bipole III line. So, there is no concern, about metallic objects being attracted to the line. If, if I walk with a piece of steel underneath a line, it is not going to fly up to the line because of magnetic attraction at all.

MR. MILLS: Slight side bar. Hydro's preferred construction style of materials, I note, that the conductors are aluminum. Would there be less Bipole electromagnetic effect if materials, say copper, or better conductors than aluminum were used in the line? And, I guess my deeper question is, are there decisions of economy in terms of tower height, spans, line droop, that Hydro might be making that could be, or should be considered vis-a-vis the electromagnetic effect of the line itself?

DR. BAILEY: Let me take the first question. The fields that we have calculated from

Bipole III, would be the same irrespective of the material of the conductor. The second point is --

MR. MILLS: Height off the ground.

DR. BAILEY: If you turn to, you probably don't have available.

MR. MILLS: I think I do.

DR. BAILEY: In our report, modeling of the electrical environment for DC components of Bipole III project, on page 28, we present a comparison of the characteristics of the Bipole III line, Bipole I and II lines, and five other DC transmission lines operating in North America. We indicate the voltage, the height, the separation of the poles, how the conductor bundle is constructed, and so on, and it gives the levels of electric fields, small ion densities, and current densities from these different lines. What we note is that all of these measures of the electrical environment of the proposed Bipole III line are lower than all other DC lines in, operating in North America except for one, and the values are, are just in the same range, or just above that DC line.

So the design which has been proposed by Manitoba Hydro results in lower levels of these fields, and ions, than these other lines all except

for one no North America.

MR. MILLS: Thank you. The obvious next question. Are there any decisions, or changes, to Hydro's style of construction, or choice of material that would further reduce that effect, would taller towers, larger diameter conductors, different materials, is there, candidly I am wondering if, if the effect has been factored into those decisions as opposed to the cost, are there things that Hydro could do to the style of construction, or choice of materials that would further reduce the assurances you just provided me?

DR. BAILEY: I really don't know about anything about choice of materials, that would be that would be relevant. You know, to my knowledge, Hydro has gone through a very detailed assessment, and design process in coming up with the proposed design. And I expect that that represents a balance of cost, and minimizing environmental impact.

MR. MILLS: With respect --

DR. BAILEY: And that aspect you would have to ask them. I mean, there are some factors that I can briefly describe, that I think will help you understand how some aspects of the electrical environment can be affected by the design, and

construction of a line.

So, for instance, obviously, if you, if you are measuring quantities directly under the conductors, the further away those conductors are from you, the lower the values of all of the quantities that we calculated. So, you could make the towers twice as tall. That has the impact of increasing cost, increasing visibility, but the fields would be considerably lower underneath the line. And, for some small distance, away from the line, but the further away you go from the line, the effect of that increased height of the towers would be minimal. So, it is all of the directly underneath, and immediately around the line that that would have any difference.

One could, one could divide the electricity among many more wires on the, on the line, that would tend to adjust the fields to some extent. One can put very large conductors on it, so that the level of audible noise as low as it is, could be driven lower, and other corona related phenomena. But again, if you put on very much larger conductors, then the cost of the conductor, the size of the, and strength of the conductors, would have to be increased and so on. So, there are you know, practical limits for

adjusting the design of the facilities. And certainly, the costs that would be involved in making such adjustments in terms of dramatically more conductors, larger conductors, higher towers, would be far outside of the range that I think the WHO would regard with being compatible with a precautionary principle.

MR. MILLS: Okay. Thank you. In closing, there are times during the blueberry season when when my client's membership might spend days with family, young children harvesting blueberries, and traditional medicines in and around Bipole, are they at any risk?

DR. BAILEY: I don't know, of research, and scientific literature that would support there being any risk to their spending as much time as they wanted to underneath the lines. The standard guidelines that I presented in my slide, and the reports, call for unlimited duration of exposure. And, I think you, you mentioned earlier about people working around MRI devices. Today there are physicians who are operating on patients, who are simultaneously being exposed to MRIs, so that they can see structures within the body that aid them for their operations. And we have, probably in North

America, more than a hundred million people who have had MRI examinations of one type or another without ill effects of those exposures. And the people who are working around those individuals, so long as they don't have ferromagnetic materials on them do not report any health effects that I have seen in the studies.

MR. MILLS: Thank you. I have one last question. Early on under magnetic fields, you mentioned not shielded by trees, shrubs, or walls. And I have heard your position that there won't be an effect, but would the residual effect of the magnetic fields be further reduced if Hydro's chosen construction technique was to clear individual sites for their towers, and leave the brush, and scrub, and growth between? Would that concept have any net benefit to whatever DC effect there might be on people in and around the lines?

DR. BAILEY: I am not aware of the extent of Hydro's practices about clearing of the right of way. Typically underneath transmission lines, small shrubs, and even small trees, are allowed to grow up to feets of 10, 12 feet. And, it is only when they achieve heights where there is potential they might grow higher, and then pose some kind of threat to the

integrity of the line that they are removed or lopped off. So, certainly, all types of vegetation underneath the line, you know, can be allowed, and, often is present, if the, if the ground supports that kind of vegetation around transmission lines, and to the extent that those trees and shrubs are there, they will effectively shield the electric field. I don't know that there is a health reason for, for advocating for this, but it is a fact that those trees, and shrubs, would reduce the electric field around them.

MR. MILLS: So, if Hydro could encouraged not to clean, and clear, and grub, and scrub underneath the lines, it would have a positive effect on, on the electromagnetic issues?

DR. BAILEY: As I said, it would, if you are, if you are near, or behind a tree, or shrub, it will be tend to lower the electric field around you. I don't believe that the scientific evidence that I have reviewed, indicates there would be any health benefit from that. And the field exposures are below recommended guidelines. So, it is, it is something that, you know, it is a fact that will occur around that type of vegetation, but, I don't know, that there is any benefit from it.

MR. MILLS: So, in closing, you are confident that if a family with children spent days, perhaps weeks harvesting, in and around a Bipole line, you are not aware of any health risk that they would have?

DR. BAILEY: That's correct.

MR. MILLS: Thank you.

THE CHAIRMAN: Thank you, Mr. Mills, Mr. Madden, do you have some questions?

MR. MADDEN: Good morning. I am counsel -- my name is Jason Madden, I am counsel for the Manitoba Métis Federation.

DR. BAILEY I have a little trouble hearing, sir, if you could speak louder.

MR. MADDEN: I have never been asked to do that. I am usually quite loud. My name is Jason Madden I am counsel for the Manitoba Métis Federation. The Métis are distinct aboriginal people within Manitoba, we are not First Nations, but, we are recognized as aboriginal in the Constitution nonetheless.

I have a few questions about your technical study, or your report, and do you have it with you?

DR. BAILEY: Yes, I do.

MR. MADDEN: I wanted to go to page --

well, I guess, I will start off with, was the focus of your study on direct health effects, on individuals, animals, et cetera? So what I am talking about is biophysical effects, versus behavioral effects?

DR. BAILEY: Any effects that had been reported in the literature, associated with the exposures, were considered in our assessment.

MR. MADDEN: That would have included behavioral effects.

DR. BAILEY: Direct behavioral effects of exposures to these electrical quantities, yes.

MR. MADDEN: So at page 52 of your technical report, it says, In conclusion, an evaluation --

DR. BAILEY: Excuse me. As I mentioned before, there were four technical reports, so, if you could just read the me the title of the technical report, then I can be sure which one to go to.

MR. MADDEN: Sure. It is Manitoba Hydro Bipole III Environmental and Health Assessment of the Electrical Environment Direct Current, and Magnetic Fields, and Corona Phenomena.

DR. BAILEY: I am with you. Which page?

MR. MADDEN: Fifty two. It is your

conclusion in relation to the analysis of impacts on wildlife.

DR. BAILEY: Yes.

MR. MADDEN: I am just getting to it myself now. Sorry, now, I have missed it. What technical report is -- now, I have lost my place of where it was.

DR. BAILEY: Would you like me to read the conclusion?

MR. MADDEN: Sure, that would be helpful.

DR. BAILEY: In conclusion, an evaluation of studies of human and animal exposures to magnetic fields, electric fields, space charge conducted in laboratories, and around DC transmission lines, does not show that the electrical environment of a DC transmission line would have an adverse impact on these populations or on plants.

MR. MADDEN: When you are saying no adverse impact, you are talking about health impacts to them so their reaction to the field, to the field, or, are you actually talking about, that their activities wouldn't change because of the fields, in any way, shape or form?

DR. BAILEY: The reaction to an exposure could be a direct biological consequence, or it could

be a behavioral consequence, that might be potentially adverse. So, we are not making a distinction there. The fact that if, if, I walk underneath a line, I may be able to, if I am paying close attention, I might be able to detect the electric field, or sense the audible noise from the line doesn't mean that there is a health impact, or adverse behavioral impact of that sensation or that perception. And the same thing would apply to animals, as well.

MR. MADDEN: So, are you aware that any studies, where a deer, would, potentially hear, and react to the electromagnetic field, and stop prior to going through the area?

DR. BAILEY: I am not aware of studies that would indicate that deer would be reacting to the electromagnetic fields in the line. Deer have very acute hearing, and I would assume that they would be able hear, depending upon the ambient noise level, and other factors, they would be able to hear the noise, particularly, as they got very close to it. I am not aware of studies where this has altered their behavior in any significant way.

I know studies have been done looking at other large animals such as reindeer around AC

transmission lines, and it has been noted that they will very quickly adapt to that environment and do not appear to pay further attention to that, as salient aspect of the environment.

MR. MADDEN: Have you looked at the studies as part of your report, did you look at the studies in Norway, with respect to effects on reindeer herds there to kV lines?

DR. BAILEY: Yes.

MR. MADDEN: What were the conclusions of those studies?

DR. BAILEY: I don't recall the specific aspects, but I think there was clear differences in the animals habituation, whether they were wild reindeer or native reindeer, there was some differences, but I don't, I don't recall that there was any adverse effects of the lines on their behavior at all.

MR. MADDEN: So there was no change to their migration patterns of whether they would cross the line, or or whether they wouldn't. That is your understanding of those studies?

DR. BAILEY: Yes.

MR. MADDEN: Have you looked at, have you looked at the studies that have been done in the

Northwest Territories, with respect to the caribou herds, and their reaction to electromagnetic or new linear corridors being put into their areas?

DR. BAILEY: I am not aware of studies that have been done that you have mentioned in the Northwest Territories, with regard to transmission lines, with respect to electro and magnetic fields.

MR. MADDEN: Are you, are you saying -- so, you would agree with me, though, that animals can hear the electromagnetic field, and it may have changed their, they may have a reaction to that?

DR. BAILEY: No. I would not agree with that. They cannot hear the electromagnetic field. They can hear audible noise, or in some small crackling sound coming from the conductor. But, they could not hear the electric, or magnetic fields.

MR. MADDEN: They don't have a reaction to that crackling noise?

DR. BAILEY: The reaction, that they would have to that noise, would be like any other noise in the environment at that intensity level. There is nothing that I know of, about that noise, that would represent a, a unique noise in the environment to them.

MR. MADDEN: But would they stop, would

they stop upon hearing it?

DR. BAILEY: I would imagine that most of these animals would stop upon, or pause before entering onto a right of way if they were coming from a wooded area, whether or not there was noise coming from a line or not. But I wouldn't suspect that the research I have reviewed, that there, that that noise would be strong enough to scare them away or deter them in their migration.

MR. MADDEN: As part of your reports, did you review the Goodwin study from 1975 about deer and their reaction to those noises?

DR. BAILEY: Yes.

MR. MADDEN: And did you, is there, has there been extensive studies on larger animals such as elk, and caribou in relation to those noises?

DR. BAILEY: I wouldn't say that there has been a lot. I think the Goodwin study you pointed to, is one of the studies that has been done on DC lines, and large animals. There are not many other studies of large animals such as caribou, and elk, that I know of.

MR. MADDEN: So, you aren't aware of any studies that have looked at that issue?

DR. BAILEY: There are studies that have,

as I mentioned before, that have looked at the animals encountering transmission line right of ways, and environments, but there there are very few studies that have evaluated animal's behavior with respect to specific measurements of field levels around, or noise levels around those transmission lines. But the observations of animals, around those lines do not indicate that the audible noise or whatever other factors may be associated with the lines would provide a sort of deterrence or obstacle to their normal behaviors, apart from, whatever is associated with the transmission line right of way.

MR. MADDEN: But you have acknowledged that there haven't been studies done on that, that you are aware of? That have looked at that extensively?

DR. BAILEY: There are studies that have looked at animal's behaviors in regard to transmission line environments. What I said, was where there has been specific monitoring of the electromagnetic fields associated with that animal behavior, there are very few. One of the studies that I indicated was the study that was done by Oregon State University, which they purposely retained animals underneath, and around the lines and at distances away. And there they were able to

monitor the behavior of the animals, and directly relate the location of where the animals were, to specified levels of measured, and calculated fields of ions.

MR. MADDEN: Did you look at any reports in the Northwest Territories, or the north in relation to caribou? Or were you aware of any, of where that reporting has actually been done?

DR. BAILEY: I am not aware of studies in the northwest, where that reporting has been done, as I described.

MR. MADDEN: In your, on page 52, in the paragraph above your conclusion, it, you, there is a line that says, An analysis of the orientation of deer, and cattle in satellite photos has suggested that they tend to orientate their bodies along the north south field lines of the geomagnetic field. Can you explain what, so, what you are actually saying there is, or what the conclusion of that study was, is that there were behavioral changes noticed, or I know in the next sentence it says Other investigators have been unable to confirm this finding. But they don't at all dispute these data and analysis to which heard, they have replied.

DR. BAILEY: Well, I wouldn't exactly

describe these as behavioral studies. What the investigators did was to examine satellite imagery, and attempt to, from these Google Earth photographs, attempt to determine what the objects were, and they attempted to identify herds of cattle, and, in some locations deer and to then, based upon that probable identification of those animals, determine what their orientation was with respect to the ambient geomagnetic field. Essentially, where they aligned in a north south, or some other direction? And their observation was, that it appeared to them that the animals tended to face in a north south direction. And as you correctly read, there are other investigators who attempted to replicate this, and, who believe that there were errors, and problems in that analysis.

MR. MADDEN: And in your opinion, were there errors and problems in that analysis, or are there studies that do illustrate changes in behavior, or alignment of animals in relation to transmission lines?

DR. BAILEY: I would say that these studies, given various types of problems in both of these studies, leave much to be desired, and that I would not draw conclusions about the effects of the

ambient geomagnetic field based upon behavior based upon such indirect evidence.

I think that these studies would have to be done, with much better methodologies, and addressing, you know, potential confounders, that A, we could identify that the observation about the orientation of the animals is correct, and, B, that it was the magnetic field that was a determining factor in that orientation.

MR. MADDEN: With respect to caribou, elk, and moose, would they have the auditory, all three of those, or some of them have the auditory capacities to hear the noise?

DR. BAILEY: I would assume they would.

MR. MADDEN: And your conclusion is that the effect of that would be they would possibly stop for it, but it wouldn't change their migratory patterns in any way, shape, or form?

DR. BAILEY: When we notice things in our sensory environment we tend to pay attention to them. If they are novel, or, we are unfamiliar with them, and the more that we become familiar with them, the less, and less, attention we pay to them. This is, this is what neurobiologists call habituation.

And, that, applies to auditory stimuli, like the noise from the transmission line, and other noises in environment. So I would expect that these animals, if they had not heard something similar to the noise from the line, that they may stop. They may pay attention to it, and as they listen longer, that they would determine that it did not have any likely significance for them, and they would continue their, whatever their behavior was.

MR. MADDEN: And just to restate, you haven't looked at any studies, or you aren't aware of any studies that look at that in relation to elk, caribou, and moose?

DR. BAILEY: Other than the studies, that I cited in my reports.

MR. MADDEN: In relation to the reindeer study that you did look at, what was the trigger, why was that study undertaken? Are you aware of why that study was undertaken?

DR. BAILEY: I don't recall the exact circumstances under how that study came into being.

MR. MADDEN: The other studies that you cite that are from Oregon, you would agree with me, that it is not the same type of animals that are in place in those environments of squirrels, not that

there aren't squirrels, but the large, those studies from Oregon that you rely on, or from the United States, don't have the same type of animals that we are looking in the Bipole III environment, such as caribou, moose?

DR. BAILEY: That is correct.

MR. MADDEN: I have no further questions.

THE CHAIRMAN: Thank you, Mr. Madden, Mr. Meronek:

MR. MERONEK: Morning, Dr. Bailey.

DR. BAILEY: Good morning.

MR. MERONEK: My name is Meronek, and I represent a coalition of people who are going to be directly or indirectly impacted by Bipole III, including farmers, including farmers who have livestock operations, and poultry operations, and hog operations.

So, I am going to be asking you questions related to that area. With one caveat. Given that I failed first year physics, I would ask that you go easy on me. Could you do that?

DR. BAILEY: I don't see that there is any reason to.

MR. MERONEK: I am going to be dealing with the same report that you were dealing with with Mr.

Madden, but I want to back up to page 48. And it is entitled Dairy Cattle Wild Animals, and Plants. And, I have gone over your report, I can't say that I understand most of it, but having said that, it would be fair to say that this one page, page 48, is the entire narrative, that you have produced in these reports relating to dairy cattle?

DR. BAILEY: There may have been mention elsewhere, but I think this is the major point, yes.

MR. MERONEK: As I read that particular page, there were two studies to which you refer, one in Minnesota, and one in Oregon.

DR. BAILEY: Those are the two areas that were studies.

MR. MERONEK: And did you participate in any of those studies?

DR. BAILEY: I was involved in the, with the other science advisors in designing the study in Minnesota that was carried out by the University. And I was a scientific advisor to Oregon State University on the second study in evaluating the methodology by which they were monitoring the animals and their exposures.

MR. MERONEK: But you didn't author either of those studies; is that correct?

DR. BAILEY: That's correct.

MR. MERONEK: Now the first study, and, I am not sure that I have the dates correct. In your, in your presentation today, you indicated that the study in Minnesota was 1986, but I see a reference 1983 in, on page 48, which was, which is correct?

DR. BAILEY: Let me just check something here. There were two, two different reports with different dates, one was the report, the technical report and then there was a later publication and a peer review scientific journal. The reference in 1983 to Martin et al, is, the report from the University of Minnesota. And the later reference would be to the published paper by Dr. Martin, and his colleagues.

MR. MERONEK: As I understand the written evidence, that study related to dairy cattle only correct?

DR. BAILEY: That's correct.

MR. MERONEK: And, it related to a kV line that was less than 500 kV?

DR. BAILEY: A 400 kV line.

MR. MERONEK: And that study related to assessing the impact of that particular line on dairy cattle not underneath the line, but a certain

distance away, approximately 400 meters.

DR. BAILEY: Well that was one category. So one category would have described the location of herds that were underneath the line and out to 400 meters. And then there were different distances away from that line.

MR. MERONEK: Can you explain then the last sentence in the first paragraph that says the herds were grouped according to the, to distance from the farmstead, from the transmission line, with the closest herds less than four hundred meters from the line.

DR. BAILEY: That's correct. So they were within 400 meters of the line.

MR. MERONEK: You don't know how close though?

DR. BAILEY: The line went through farms, and so that would have included animals that would be underneath the lines, as well.

MR. MERONEK: Now, this study is approximately 29 years old, correct?

DR. BAILEY: Yes.

MR. MERONEK: Are you aware of any other studies dealing with the effects of DC lines, on dairy cattle subsequent to that time?

DR. BAILEY: Nothing like this.

MR. MERONEK: And would that conflict with your observation that hypothesis should be tested continually?

DR. BAILEY: I think the, you know, as a scientist, we are always looking for more information. And it would be as a scientist, I would prefer that there had been other studies replicating the study from the department of Minnesota.

But, given that that study was very well done, and had unique characteristics, and subsequent research such as that by Oregon State University did not indicate anything else, it is hard to persuade scientists, or funders, to continue to at times test hypotheses, if they don't see that there is any likely benefit.

MR. MERONEK: But, as a scientist, would you agree, sir, that the more you would rather see more current studies before you came to a definitive conclusion one way or the other?

MR. BEDFORD: I think he just answered that.

DR. BAILEY I did.

MR. MERONEK: Dealing with the second

report, as I understand it, that report dealt with beef cattle.

DR. BAILEY: Correct.

MR. MERONEK: And that, again, would you confirm that correct dates of the studies, in the narrative, the dates I have, are 1990, 1991, but in your presentation, you reference 1998, and, 2001?

DR. BAILEY: That is a typo. The dates in the report are the correct dates. 1990, and '91.

MR. MERONEK: So the same answer would prevail, with respect to my question then -- let me rephrase it. Is this the only study that you are aware of, with respect to beef cattle?

DR. BAILEY: It is the only study I am aware of with beef cattle where there has been careful monitoring of exposure, and it has been done in an experimental fashion, so that you were able to isolate differences between a control pen, and exposed pen. There are other, you know, more anecdotal reports of beef cattle around DC transmission lines, but none with this experimental design.

MR. MERONEK: Are you aware of any studies or reports dealing with the hog industry as it relates to transmission, DC transmission lines?

DR. BAILEY: No. I am not.

MR. MERONEK: Are you aware of any studies, with respect to transmission lines, and the possible impact on poultry operations?

DR. BAILEY: Not specifically. But, I am aware of research that has used DC electric fields, and the generation of air ions, in order to control particulate matter and the spread of disease in poultry barns.

MR. MERONEK: Would you agree with me, Dr. Bailey, that these two studies which you have identified, the studies show that there wasn't an effect, but don't prove that there no effect, would you agree with that statement?

DR. BAILEY: I would agree that these studies did not report effects that could be attributed to the DC line that were in any way adverse. As I said before, one has more, and more confidence in results the more they are replicated. However, I would note that these studies are both of an extremely strong design. They were, received extensive peer review. Both before they became technical reports or published in the scientific community, and so I would give these studies more weight than I would dozens of other studies, that had

not been conducted with this powerful designs, or with as close attention to quality control.

MR. MERONEK: You are aware of studies that have been conducted concerning the impact of AC lines, on animals are you?

DR. BAILEY: Correct.

MR. MERONEK: And those are demonstrate different results than these studies?

DR. BAILEY: To some extent, yes.

MR. MERONEK: You had mentioned on a few occasions that the further away from the right of way the, whatever impact there is, the less it becomes dramatically, correct?

DR. BAILEY: Yes.

MR. MERONEK: What about the length of the line, does that have any impact in sense a shorter line would have less of an impact than a longer line?

DR. BAILEY: Well, first of all, I think we have to be careful. It was not my testimony that the line would have any effects on humans, or animal health. The line will affect the electrical environment around the line, and to the extent that the line is longer, rather than shorter, it will represent a, a physical presence in a space, and it will have a right of way associated with it, that

will be larger than as if it were a shorter line. But the magnitude of the fields, and ions, around that line, will not, will not be greater because the line is longer or shorter.

MR. MERONEK: I just want to speak for a moment about the testing that was done. You have done some testing on Bipole I, and Bipole II, to come to conclusions about Bipole III, correct?

DR. BAILEY: Yes.

MR. MERONEK: Bearing in mind that Bipole III is not built, is there anything about the, the features of Bipoles I, and II, that are different than Bipole III, which may impact the measurements that were taken? For example Bipole I, and II, are two lines, in a narrow right of way. Would that have, is that a difference worthy of note in reference to Bipole III?

DR. BAILEY: Well conceptually, you consider, I mean, each one of those lines, is very similar to Bipole III. So, one could consider them as being similar, analogous to two Bipole IIIs, being conducted on the same right of way. So, whatever influence, one line would have in certain respects, that influence would be greater, because of two lines together at the same location.

MR. MERONEK: This will demonstrate my ignorance, wouldn't the two Bipoles, cancel each other out on the same right of way.

DR. BAILEY: To a certain extent there can be an interaction, but they were not close enough that the cancellation would be very great. And that there are some quantities that would not be easily cancelled out by the second line.

MR. MERONEK: Now when you say that there was, there were measurements taken in relationship to Bipole III, what are you referring to? What kind of measurements would you be taking given the fact that Bipole III has not been constructed.

DR. BAILEY: We made calculations based upon the design of te line and its operating characteristics using well-known physical equations to, to make those predictions about Bipole III /-RBG and given the extreme similarity of Bipoles I, and II, to Bipole III, we believe that the measurements that we took around Bipoles I and II, are very applicable to, and can be extrapolated to Bipole III environment.

MR. MERONEK: Thank you, I just have a few questions, on the issue of the ground electrodes which you spoke about this morning. With respect to

the southern ground electrode, can you tell us what the zone of influence would be under a full current flow?

DR. BAILEY: You would be able to measure a magnetic field above the ground electrode, and, underneath the electrode line, and that would be the primary influence of those facilities. Because of the underground electrode, there would be no electric field above ground from that. And the electric field, from the line connecting the ground electrode to the converter station is of quite low voltage, so the electric field would be negligible. And the voltage on the interconnecting line would be of such a low voltage, that you wouldn't have corona phenomena, such as described for the Bipole III line.

MR. MERONEK: And, if I caught your evidence accurately this morning, you indicated that the electric current through the ground electrode occurred about 8 percent of the time.

DR. BAILEY: Based upon the operation of Bipoles I and II, that is a characterization, as I understand, of the operating history of those lines. Because of certain design features, where the operation of Bipole III, I am told that that history would likely be of multiple operations would be

greater than what the history was for Bipole I, and II.

MR. MERONEK: You were advised by Manitoba Hydro of that percentage?

DR. BAILEY: Correct.

MR. MERONEK: And lastly, are you aware, or do you have any concerns about health and safety effects around ground electrode?

DR. BAILEY: This is one of the areas which there has been a great deal of experience over the last 30 years, in designing such ground electrodes, and developing them for reasons of both efficiency of operation, and also health and safety. And, so, I have no reason to believe that there is, from our analysis, a reason to be concerned about this.

MR. MERONEK: Thank you, Dr. Bailey, those are my questions.

THE CHAIRMAN: Thank you, Mr. Meronek. Ms Craft, do you have any questions?

MS CRAFT: Mr. Chairman, CAC Manitoba will not be asking any questions of Dr. Bailey this morning.

THE CHAIRMAN: Thank you. I don't believe, Chief Genaille is here, Mr. Dawson, on behalf of Peguis.

MR. DAWSON: Thank you, Mr. Chairman, good morning, Dr. Bailey.

DR. BAILEY: Good morning.

MR. DAWSON: I would like to follow-up on a question asked by Mr. Gibbons. If I understand correctly, Mr. Gibbons asked you a question about the nature of the organizations that had produced some of the numbers on which your slide show relied, do you remember that question?

DR. BAILEY: Yes.

MR. DAWSON: In reply you made reference to a number of organizations and one of them was the Electric Power Research Institute; am I correct?

DR. BAILEY: That's correct.

MR. DAWSON: And you gave the example of the Electric Power Research Institute as one of the organizations that produces what I think would be, you would characterize as independent and unbiased information on which your report relies, would that be fair?

DR. BAILEY: It is one of the sources.

MR. DAWSON: But, it is a typical, when you give an example, when you, when you refer to an independent body, what you are meaning, is organizations like the Electric Research, or Electric

Power Research Institute, am I right?

DR. BAILEY: I think one thing you have to distinguish, in here is that the research that we cited in our reports, and that has been cited by national, and international reviews on this topic are those reports by investigators. They are not, to my knowledge, most of the research is conducted with funding from the Electric Power Research Institute, is conducted by scientists at universities, and, other research organizations, it is not carried out by the Institute itself.

MR. DAWSON: But the funding comes from that Institute, and that Institute, you are telling Mr. Gibbons, in your answer to him, was an independent body, do I have that correct?

DR. BAILEY: Yes is a research organization that is funded by the electric utilities, in order to make sure that research is conducted on all types of topics that would be of interest to their members.

MR. DAWSON: So, in fact --

DR. BAILEY: It is one of the organizations that has supported research, for instance, the United States Department of Energy has had research scientists retained in order to evaluate research conducted by other entities, whether these be

investigators, that are funded by the Electric Power Research Institute, or investigators that are funded by the National Institute of Health, or other agencies.

MR. DAWSON: We have wandered, let me get you back where I want to go. Electric Power Research Institute founded in 1973, am I correct?

DR. BAILEY: Sounds about right.

MR. DAWSON: Was founded after the United States Senate held hearings and found there was a deficiency of research, and development that supported the electric power industry; is that correct?

DR. BAILEY: I would assume so. I am not an expert on the Electric Power Research Institute history.

MR. DAWSON: That is fine, it is always okay to say you don't know. And you have already told me, that it receives its funding from American electric utility companies; is that right?

DR. BAILEY: That is correct. And, some agencies outside of the United States as well.

MR. DAWSON: Correct. According to its 2006 annual report it had a budget of funding of 294 million US dollars, sound about right?

DR. BAILEY: I have no reason to dispute that.

MR. DAWSON: Would you think it plausible, or accept that it got 65 million of those dollars from electric generating companies?

DR. BAILEY: Wouldn't surprise me.

MR. DAWSON: And 62 million dollars from electric power delivery companies?

DR. BAILEY: Again wouldn't surprise me.

MR. DAWSON: Roughly 40 percent of the budget of this Electric Power Research Institute comes from electric generation, and electric power delivery companies, if those numbers are, in fact, correct?

DR. BAILEY: Yes.

MR. DAWSON: No further questions, thank you, Mr. Chairman.

THE CHAIRMAN: Thank you, Mr. Dawson, neither Ms Whelan Enns or or Mr. Beddome, are here. We do allow an opportunity for members of the public to ask questions that are relevant to this presentation this morning. Are there any members of the public that wish to ask questions of Dr. Bailey? Yes, could you please come forward to the table at the front. Would you please introduce yourself, and,

then you are free to ask questions relevant to this presentation.

DR. BAILEY okay. Good morning. My name is George M. Ross, Pimicikamak Cree Nation Pimicikamak Territory. I don't know if my question is right on relevant to, but there are some I guess in, in the area, I am not going to be asking very lengthy questions, I am not going to be asking you know, too many, but I would, first one I would like to ask, I guess, on this presentation, it says right of way of 66 meters is that correct?

DR. BAILEY I believe so.

MR. ROSS: Do you have, do you have an idea, or have you ever, like do you have experience of ever chopping down a tree in a bush, or --

DR. BAILEY: Yes.

MR. ROSS: And in your drawings here, it says some of those towers are going to be 54, 56 meters high. Am I correct?

DR. BAILEY: Very tall. Yes.

MR. ROSS: Now, if you have a 66 meter right of way are you talking about the --

THE CHAIRMAN: Sir --

MR. ROSS: One side of the, or --

THE CHAIRMAN: Sir, Mr. Bailey is not an

expert on the design of this, of the project. He is here, speaking about electromagnetic waves, and effects from the Bipole, but he is not here to speak about the design of the Bipole. You will have other opportunities to ask questions of Hydro officials in that respect. But, Mr. -- that is not Mr. Bailey's expertise, Dr. Bailey.

MR. ROSS: Okay. I will ask another question.

THE CHAIRMAN: In respect to electromagnetic fields.

MR. ROSS: Yeah. There was a gentleman in here before me that asked some questions about, you know where the transmission lines are running right now, if there is any damage from the currents that are going through those transmission lines.

DR. BAILEY: Yes. He did ask questions about that.

MR. ROSS: Yeah. But, I am just using an example of No. 6 Highway on this Bipole I, and Bipole II lines. And you yourself know about prevailing winds, they flow mostly from the north west, to the south east, or from east, from west to east. Okay. There are, in that line, when you drive by that highway, there is considerable I guess change of

color of the forest growth on that east side of the immediate lines. Some of those trees, are like orange, rust brown, would that be, would that, would the result of those changed color of those trees, would that be the result of these transmission lines?

DR. BAILEY: I don't have specific information about the location where you were indicating. But studies have been done looking at high voltage DC transmission lines, up to 1100 kV. That is more than double the voltage associated with the proposed line. And, they have not found adverse effects on vegetation, growing in and around those lines. So, I can't say in this specific location, what factors may be responsible, whether it is, it is poor irrigation there, or pollution from the highway, or some other factor, ground compaction, perhaps, I don't have any basis to believe that it is related to the fields from the line.

MR. ROSS: I guess, if you driven alongside the transmission line, like if you notice, you know, there is some color change in, alongside the area, when you drive by it. I don't know if you notice it or not. Like, but it is mostly like, a lot of it is immediate down to the left of where the lines are

running on that east side of, like immediate east of the transmission line below.

DR. BAILEY: Well, as I said, I don't have a reason to believe that is related to transmission line, but you, at that location, you are telling me, that you are on a highway, and we know that automobiles, and trucks, give off a variety of pollutants which have damaging effects on plants, as well as humans.

MR. ROSS: I guess, here, I guess, I don't know, if it falls into my, you know, this -- I don't know, if it falls in here, I have another thing, that I would like to bring out. If it is.

THE CHAIRMAN: Well, if it is in respect of the electromagnetic fields, it is relevant. If not, you will have to wait until later in the week, when Hydro has officials, who will speak to the design of the project. If it is other questions, you will have to wait, sir, not today.

MR. ROSS: I guess, that is about, all right now. I can ask. Thank you.

THE CHAIRMAN: Thank you. Yes, please come forward.

MS JOHNSON: Mr. Chairman, while this lady is getting seated, I want to record that Dr. Bailey's

presentation, will be MH 44.

THE CHAIRMAN: Thank you, would you please introduce yourself and ask your question.

DR. BAILEY I am a farmer from the Interlake, and Bipole crosses our land.

THE CHAIRMAN: State your name?

MRS. HAMILTON: Judith Hamilton. And I think that my daughter's inoperable brain tumor is caused by the Hydro lines. And I read the studies of the medical college in the '60s, and I think it was Sweden, I have had a stroke, I don't remember everything. Two of my neighbors, have died from brain tumors. Like Hydro line passes two hundred feet from my, the front door of our house, it was put there after the house was built.

And on the other half of my section there is a, my late husband's cousin has airplanes, and, he is a big farmer. And, I am just small now. But, we also have a higher incidents of, I have noticed of 30 years ago, we have a beef cow, calf operation, I used to have 5000 chickens, and raise border collie dogs. But my son is working off the farm because he has an agricultural degree, and he is trying to farm, and, my other son is in Ottawa. Like, I am worried about the health of people's brains. And, we know

that cows are essential beings, too.

Like, they, our cattle, who are pastured right underneath the Hydro towers in the winter right now, they are away up north, on our land that we rent away up there. And they have a higher incidents of things like lump jaw, and this is what the vet noticed, and lumps in their body. Which could be sort of like brain cancer.

And the studies that were done in the '60's, that I read, I believe it was Sweden, they, they said, that, they believed the Hydro lines caused lumps in people's bodies and their brains. And I would like to know from Mr. Bailey if he has read those studies. I worked at the medical college as executive secretary to the Dean, Dr. Naimark, former president of the University, and in my spare time I would read studies?

DR. BAILEY: I have read the studies, and I am personally familiar with the authors of those studies. And those studies, for reference, were done around 400 kV AC power lines, not DC power lines. And they, the studies have been performed subsequently, and we do not have any indication beyond this reported association, in that study, and several others, that there is is a relationship

between the magnetic fields, from AC power lines, and brain cancer. In particular, in the early days, there were a couple studies that suggested there might be a strong relationship, in fact, the very first study of electric distribution lines, that is lines that run past people's residences by Nancy Wertheimer and Ed Leeper, had suggested a fairly strong association with childhood brain cancer.

So, when these in these studies, what the investigators have done is taken a group of children with brain cancer, and a group of children without brain cancer, and compared their exposures, to magnetic fields from primarily distribution lines. And they estimated that those children that lived closer to distribution lines, or that, there were distribution lines that had more conductors, or thicker wires, might have had a more exposure to magnetic fields, from this source. Subsequent studies have used more advanced ways of assessing exposure, and comparing exposure of these groups, and those studies, using more advanced methods, even more advanced than the study that had been done in Sweden, did not see these associations.

So, that, with regard to AC power lines, there have been these studies, and with regard to

brain cancer, those studies have not proved to show consistent effects. Also, there are investigators here in Canada, that have done studies looking particularly at this issue of brain cancer, and, so they have taken animals, that have been treated with chemicals that greatly increase their susceptibility to brain cancer, and they expose them to high levels of AC magnetic fields, and they did not find that the AC magnetic fields, promoted the development or growth of brain tumors in this animal model.

So, unfortunately, tumors of various types are quite common, in our population. About one third of us will develop some form of cancer, during our lifetime, if we live long enough. And, there are many different types, perhaps as many as two hundred different forms of cancer. And, so, the evidence suggests that there are a variety of factors that can account for the development of cancers in ourselves, and animals. But, I would point out that even dinosaurs had cancers, and we know that from historical record. And, that the very process of utilizing oxygen in the combustion of fuel in our bodies and our cells gives rise to processes, generation of free radicals, and other things that can damage proteins, enzymes, and genes, and we have

evolved through history, a very sophisticated system of enzymes, and, techniques, so that when damage, for instance, to DNA of cells, is detected that it is quickly repaired, and so on.

And, all of the research to date that is looked at electric, and magnetic fields, whether it is DC electric, or magnetic fields, or AC electric or magnetic fields has not found that these fields have the capability of enhancing, or producing such effects. So even though the cancer is a condition that we are all potentially susceptible to, we are looking at a wide variety of factors that might affect the risk of our developing this type of disease, but so far, it doesn't seem that electric magnetic fields are playing any role in this process. And they didn't repeat that study, I don't think, did they, actually, the one in Sweden way back.

MRS. HAMILTON: They have, there are studies that have very similar design, that have been done in Denmark, in the United States, and, in other countries. So there is, the other thing that we also look to, if you want to find out if a particular exposure affects disease rates, then the place you want to look, is to the most highly exposed population, you can find. On the idea that people

who have higher exposures, but for longer period of time, it might be more easy to detect an effective exposure in that population, than in the general population.

So, that is why we look at studies of workers, who have a higher exposures to electric and magnetic fields in their work. Studies have been done in Europe, in the United States, and in Canada looking at the incidents of cancer, mortality of cancers in workers, for instance at electric utilities. So the men who are at Hydro, and other companies, who are climbing poles, repairing lines, and so on, and overall these studies have not shown, that despite many years of exposure to higher than average fields, that there is any unique risk associated with exposures that they have to fields in their work. Although, there are other factors, that obviously affect their health potentially, and certainly accidents, and things like this, are things that they have concerns about.

MRS. HAMILTON: Thank you for that information. I have never been sure about it, and, I feel a little bit more satisfied. I still think that the Bipole III should go on the other side, the east side, but that is my opinion. Because, I think

it would be cheaper. Any way, thank you.

DR. BAILEY: I understand, thank you.

THE CHAIRMAN: Thank you very much. Are there any other questions from the public?

Thank you very much, Dr. Bailey, for your time today. I think we have exhausted the questioning, you have helped us understand this issue, and we thank you for that. And you are now excused.

DR. BAILEY: Thank you, sir.

THE CHAIRMAN: We will now break for lunch, we will come back in exactly one hour, at 1:15.

(HEARING RECESSED FOR LUNCH)

(Proceedings reconvened at 1:15 p.m.)

THE CHAIRMAN: Good afternoon, welcome back. We now return to Manitoba Hydro's presentation on the overall picture on the Environmental Impact Statement. We have a number of people on the stand. I'd ask the Commission secretary to affirm that they are going to be fully honest and frank with us. Ms. Johnson?

MS. JOHNSON: Will all four of you be testifying?

MS. MAYER: Mr. Matheson on the left will not be testifying so you can have the other three confirmed.

(Trevor Joyal, John Dyck, Pat McGarry: Sworn)

THE CHAIRMAN: Whoever is going to take the lead can proceed, please?

MR. JOYAL: Thank you, Mr. Chairman. My name is Trevor Joyal. Commissioners, participants and members of the public, I have been working with Manitoba Hydro for the past 11 months but have been on the Bipole III project for three and a half years now. I have a degree in Environmental Science from the University of Manitoba. And I'll be here to speak on behalf of Manitoba Hydro regarding the Environmental

Assessment Consultation Program, and I will refer to that as the EACP throughout the presentation.

So the approach that I'd like to take with this presentation is to outline the goals and the approach of the EACP, the involvement methods used, notification methods, materials that we presented, how we incorporated some of the feedback we received, and how ongoing participation is a valued piece of the EACP.

The overarching goals of the EACP were to provide timely and relevant information on the project, to provide opportunities to receive feedback from members of the public and stakeholders, and to incorporate feedback into project decision-making.

One method we used to continually evaluate our program for efficiency and success are the CEAA standards, which promote early notification, accessible information, shared knowledge, to be sensitive to community values, to provide reasonable timing, appropriate levels of participation, adaptive process, and transparent results. This can all be seen in section 5.0, table 1 of the EACP technical report.

The approach of the EACP was a four

round approach. The first round for project information; round two, to constraints and opportunities; round three, alternative routing options; and four, the preliminary preferred route presentation. The approach had a broad study area, and as it progressed throughout the process, it came to a more refined right-of-way. We used a variety of engagement mechanisms throughout the entire process. This is outlined in section 6 of the technical report.

So here is a schematic which shows the timelines and each round. As I stated, round one was to initiate dialogue on the project, to present the project description, to identify preliminary issues and concerns, and to inform the public of the process.

Round two, which occurred in 2009, was to describe the project and features, since round one, to describe the site selection and environmental assessment process and to obtain feedback from the public regarding opportunities and constraints within the large study area.

During round three we presented three alternative route corridors which measured three miles wide and we presented those to the public,

how they were determined, to identify some key issues and concerns for alternative routes and to obtain feedback from the public on these routes.

In 2010, July 2010, round four was initiated to present the preliminary preferred route, that was the 66 metre right-of-way, to review the alternative route evaluation findings, biophysical, socioeconomic criteria, and to obtain input on possible mitigation measures for the process. And this is figure 2.0 of the technical report and sections 5.2 and table 5.2-1 of the EIS itself.

So who participated? All members of the public were welcome to participate. We engaged directly with stakeholders and Aboriginal groups. Stakeholder involvement increased with the determination of the preliminary preferred route based on a more defined understanding of what the potential interests were, or potential impacts of those stakeholders or members of the public were. As well stakeholders were provided opportunity to participate at any time and were added to mailing lists when the project team was notified of their interest. You can see there is an appendix C of the technical report which is the

MSL, or the master stakeholder list, which outlines all individuals who participated in the EACP throughout all rounds.

Getting into methods of participation for the EACP, we held leadership meetings, council meetings, meetings with stakeholder and interested parties. We had the Manitoba Hydro website, community and regional open houses held across the study area and preliminary preferred route. We undertook what we had named the Landowner Information Centres for the project, toll free project information line, and the e-mail address. And these are all in section 6 of the technical report.

So in total, 244 meetings were held with community, municipal, First Nation leadership, stakeholder groups and Aboriginal organizations. These were done usually with a PowerPoint presentation given, based on what information was available during that round, a Q and A session which lasted anywhere from five minutes to an hour, and we always left all materials which were readily available to council members. And the meeting notes from all these meetings are provided in appendix F1 to F4 in the

technical report.

The Landowner Information Centres are something that we undertook during round 4 of the EACP, and we held 42 Landowner Information Centres along the preliminary preferred route or the PPR. These were done with notification, done to landowners within a half mile of the route only by direct mailing. This was to provide a venue for one-on-one discussions with landowners with the Manitoba Hydro representatives. These were not notified using other notification methods, which I will discuss later, but to keep it just to those within a half mile of the preliminary preferred route. During these Landowner Information Centres, routing suggestions were taken into consideration by the project team, and discussions include tower locations, the process, the timelines, the construction phases and the compensation. And this is outlined in section 5.3.3 of the EIS.

Community and regional open houses were held throughout the EACP, and 137 in total were held. The locations chosen for regional open houses were based on proximity to the alternative routes in round three, and to the preliminary

preferred route in round four. Community open houses were held within communities who would allow us to come in. At these open houses, mapping, story boards, tangibles and exhibits, presentations, were all utilized to present project information and location of the alternative study area or preliminary preferred route. As well, technical construction and environmental assessment staff were on hand to answer any questions. And you can see this in appendix B of the Environmental Assessment Consultation Report.

The project website has been active throughout the EACP, and always had an outline of the project description, process, and status of the EACP. Any materials that were presented, such as the newsletters from each round, the ground electrode, electric and magnetic field brochures, comment sheets, any reports that were presented, localized mapping, and location of regional open houses. As well as most of you may know, the complete EIS filing, including technical reports, was also placed on the website. And as new information comes in or anything else is subsequently filed, that is placed on the Bipole

III website on Manitoba Hydro.

The information line and e-mail address have been operational since July of 2010. Currently 300 calls had been received to date, and it is still operational today to answer questions about the project and where we are in the process. All of these, the e-mail, the website and the information line were listed on materials and notifications which were sent out, and on our notification from a broad perspective on newspapers and whatnot. Calls and e-mails are responded to in a timely manner. And it is staffed. If the staff is not there, a voice mail will take it and we will try to respond within 24 hours. Based on the individuals who call, responses have been provided in the morning, afternoon, evening and the weekend. And this is denoted in figure 5.0 of the technical report.

Moving into some methods of notification, we did use a variety of methods, including direct mailings, postcards, posters, radio, newspaper, and the website itself. Here on the right, just right here, is a postal code notification, which I'll speak of next, that outlined all the venues where we will be holding a

regional open house, and this was sent to postal codes within municipalities who were traversed by the preliminary preferred route, and these were all outlined in section 7.

So the direct mailings were used throughout each round. As an example, at the end of round 4, 4,210 direct letters were mailed out, and at the beginning as well, where we notified landowners of where we were in the process. These included landowners, half mile landowners, the general public that participated in previous rounds, rural municipalities, planning districts, leaseholders, outfitters, First Nations, stakeholders and government. Each one of these direct mailings contained a localized and study area mapping. It contained a newsletter of the round in question. And in the direct letter that was sent to landowners and half mile landowners, the letter contained parcels that were of interest to Manitoba Hydro for the preliminary preferred route, and associated 50,000 scale maps denoting that location in proximity to the preliminary preferred route. The website and the toll free information line or contact information were included in all of these mailings.

Postcards and posters were utilized throughout round three and four. Posters were placed in communities along the alternative routes, that was round three, and along the preliminary preferred route in round four. These were usually placed in places of high volumes such as post offices, grocery and convenience stores, the community billboards, and restaurants throughout these communities. As well, 19,000 postcards were distributed at the beginning of round four, which is that postcard I mentioned earlier. And it's an irregular 3-inch by 9-inch shape, and I want to draw attention to that, based on we wanted to ensure that anyone that pulled it out of their mailbox, it would actually be longer than envelopes, so they would see it. You can see the postcard distribution map which is figure 4.0 of the technical report.

We utilized radio and newspaper as a predominant source of notification, local and regional newspapers such as the Winnipeg Free Press, The Drum, the Opasquia Times, and local radio stations as well to notify the public of the activities Manitoba Hydro would have in their area. We always posted or announced the open

house locations two weeks prior to any open house in that area. These usually always include location, time, a brief description of the project, and was always based on the distribution or the location of the radio station itself. And here is an example from round two. So you have the project description and location of the regional open houses here.

Throughout the EACP, we utilized numerous different types of materials, which include newsletters, mapping, exhibits, presentations, slide shows, feedback forms, and reports. I'll draw your attention to this. This was utilized during round four where we had fly-over video of aerial photography that was based on the location of the open house. In this case this is the RM of Alonsa. We held an open house in Alonsa itself. This preliminary preferred route was overlaid over top of the aerial photography and flew from northern part down to southern part, and individuals could see the locations of farm yards, sites, communities and whatnot. And this was done by location by round. So this is just a snapshot. And all this is outlined in section 10 of the EACP.

Newsletters, they were created new each round, outlining the information that was presented. On the left is the round four preliminary preferred route. These were posted on the website. Always outlined the project need and the components associated with it, discussed what we heard in later rounds, round three and round four, of what we had received and what the responses were, always provided mapping of the preliminary preferred route or the alternatives that we were presenting, some concern identification, and where we were in the process and what the next steps would be. And all the newsletters are filed in appendix 5A of the EIS.

We also provided supplemental newsletters. As Dr. Bailey mentioned this morning, electric and magnetic fields were a concern that was present throughout all rounds of the environmental assessment process.

So during 2009, there was a creation of the alternating current and direct current brochures to outline the kind of material that was available and something to provide to participants to provide them a bit more understanding of the concern.

As we progressed in the process in 2010, a further concern regarding electric and magnetic field with regards to GPS and electronics, we did develop a new brochure to ensure that individuals had the information accessible for them. We also created one for the southern ground electrode, and this is denoted in section 10 of the technical report.

Feedback forms were utilized throughout each round, as well as the Landowner Information Centres or LIC's, as you see there. This allowed us to have individuals provide us with feedback and a documenting mechanism for that. We also had one for the ground electrode. Each feedback form wanted to reflect the goals that were outlined of each round, and they were always available on the website. The commentary in its raw form is in appendix E of the technical report.

Mapping and exhibits. Here in the back corner you'll see some of the exhibits that we did bring on the road with us to the regional open houses, piece of the conductor, tower models, the insulators, caribou collar. We also utilized localized mapping to large and lower scale.

Landowner map books, which is provided in information request 280, I believe, is the map book itself which we had, both topographic map and orthographic imagery, as well as the open photography to zoom right into where these landowners were located to discuss their land holdings themselves.

Slide shows and presentations were utilized as well throughout the EACP. Story boards were present at all open houses. We utilized Google Earth in areas where we had Internet access, which allowed us to impose a 3-D image of the preliminary preferred route over top of Google Earth, so individuals can see generally where that would play out on their landscape.

I have already mentioned the fly-over video which was made by location. And here on the left is actually me with an individual using Arc Reader software. What this was, it provided us with the aerial photography of the five miles wide. All landowners were in the database within the half mile. So if an individual came in to us, we could punch in either their name, quarter section, or other information, and we could pull it up directly, so we could look right at their

site, as well as doing any measurements that they wanted, how far would the line be from a grain silo or home, and provide that information to them right away. We always had a project need and process video, which played in a continual loop so people could get the general understanding of the need for the project.

And as well, construction was always a part that people were always interested in, so we had a construction slide show, I think it was over a hundred slides which continually ran a loop showing construction of the transmission line, predominantly in northern areas.

So we incorporated feedback throughout the EACP, throughout routing, how we modified our process, how we created material and modified material, having additional presentations, how we defined a preliminary preferred route to the final preferred route. And I will give another example of the Tourond routing adjustment, which is post the final preferred route.

So during routing, round three feedback was incorporated into the route selection matrix or the RSM, which my colleagues Mr. Dyck and Mr. McGarry will be speaking to. And their

feedback was incorporated as a piece to that and they will go into more detail.

During round three, diagonal routing through agricultural areas was a predominant concern, and we had deemed it necessary that we would not go diagonal across any agricultural land unless it was absolutely necessary. And certain areas where we are crossing the Assiniboine River and Red River, there is some diagonal, as well as PTH 1 on the east side of the city.

During round four we did place the preliminary preferred route on the half mile alignment, and invited those landowners on both sides to discuss whether or not impediment would be more so off the half mile, either north, south, or east or west, or leave it right on the half mile alignment. And from that, we did receive quite a bit of feedback from landowners throughout our Landowner Information Centre process.

As well as equipment considerations, one topic that was brought up was the width of machinery and how large it would become, was to offset it slightly infield to accommodate large machinery to go in and around the towers themselves.

And here you'll see some route preference from community and regional open houses. Group B was the predominant preference during round three, as you can see here in red. And this was the one that was predominantly taken, especially the central and northern parts of the study area. And these are outlined in figures 21 and 22 of the technical report.

So the process modification -- postcard notification, we ran a test during round three, with an open house that was requested that we attended in Rossburn, Manitoba, west of Riding Mountain, where we did a localized postcard notification to see how it would work. And we did have quite a large turnout, and utilized it for round four as a viable means to notify the members of the public of our activities.

Landowner compensation, we did go out in round three with a compensation brochure that noted 75 percent in section 1 of the compensation program for easement acquisition. And then moved it to 150 as we went out and spoke with landowners during round four.

The Landowner Information Centre process was not something that was on our radar at

the beginning of this process, but we did incorporate it into the process during round four, and it proved to provide us with very valuable feedback.

During early rounds of the process, we did go to the planning district level, in the rural municipality area of Southern Manitoba to ensure that we captured all different aspects. And then as we progressed throughout the EACP, rural municipalities were contacted individually, while maintaining notification to planning districts for information, as well community open houses, which were predominantly done in Aboriginal communities, based on feedback that we received during round 1 from leadership meetings, that we should come in directly to the community and provide an open house, and it is something that continued on until the end of round four.

As well we created material and modified material. As I mentioned earlier, the electric and magnetic field brochures were generated throughout 2009 and 2010, because of the concern that was brought from the members of the public.

As well with GPS, we undertook a study

in relation to Bipole I and II and it was filed as a technical report in support of the EIS itself.

Modification was always received on how we were doing on the feedback forms, going from a kind of written submission to Manitoba Hydro in the feedback form, going with more of a check box, it was something that came back to us and we adjusted our process accordingly.

And as we progressed throughout the EACP, detailed mapping was always requested. As we got more and more to a 66 metre right-of-way, individuals wanted closer and closer mapping of that area, hence why we did the aerial photography within five miles, so any individual could see their home in relation to the preliminary preferred route.

We were always open to additional meetings and presentations, additional stakeholders who expressed interest in the project, or from community leadership. We did go into either the community or to meet with stakeholders to discuss the project once they noted an interest in the project themselves.

I alluded to the Rossburn open house, but this wasn't something that was on our initial

list in round three, and we provided two open houses, Brandon and Rossburn, which was at the request of the public, and we attended and hosted.

As well we did landowner site visits with project team and specialists, going to landowners' homes, based on their feedback, based on them wanting us to see the proximity of their home or their farming activities to gain a better understanding of their site specific concerns, and provided a lot of feedback to specialists and the project team.

The preliminary preferred route or PPR was adjusted from the feedback we received in round four and the Landowner Information Centres, 57 individual routing suggestions were provided to us by landowners, stakeholders, First Nations and community members. Those that were provided to us in these LIC's and round four meetings were considered by the project team. And this map on the left, you can see at figure 27 and 28 of the technical report.

So I provided you with some examples. I hope it comes out clear here, I have got a laser pointer, so I hope it works. Here is a route suggestion, or route realignment that was

suggested by landowners in the RM of Mountain, in and around the Mafeking and Birch River area. So here the purple line, which is just below the green line, was what we originally presented landowners with in the area. Landowners then actually came to talk to us and noted that the individual on the corner, where we intended to put an angle structure, was the highest point on his land, and it was a wet year that year. And all landowners on the northern part of this stretch actually informed us that they would welcome the line onto their property to avoid hitting that high point of that landowner's land, and we adjusted accordingly.

Here in the RM of Alonsa, just north of Alonsa, a landowner in this vicinity here came to a Landowner Information Centre, subsequently invited us to their home to see the land they owned and where the line was going. And the purple line, which is this one here, was running relatively close to the front of their view scape from their home, and suggested that we just make a slight deviation to put it in the wooded area on their property, but just a bit further back. And we accommodated that request based on what we had

here.

Here is another example with Tataskweyak Cree Nation. Here is just a couple of portions, but this faded line here is what we originally presented to the public at the onset of round four, and the solid green line is what came out as the final prepared route. This is at a quite larger scale, but this is to show the deviation that was taken based on the feedback and engagement with Tataskweyak Cree Nation.

Another routing adjustment that was made was this Tourond routing adjustment. Localized feedback was provided in an area of Tourond, which is just east of Ste. Agathe and east of the Red River. Our project team knew that the routing criteria was not adequately represented in the area. The preliminary preferred route cut through some quarter sections, not on a half mile or mile line, which was what we were really looking for, but actually went through kind of a quarter mile line, for lack of a better term. Therefore, we went back and noted that there was a potential alternative that could be pursued which would follow existing infrastructure, the Tourond terrain and Provincial

Trunk Highway 52, not bisect any quarter sections. So we had three and three, three day and three evening Landowner Information Centres in Ste. Agathe, notified directly to those landowners along both routes, the final preferred route and the preliminary route adjustment, to present that adjustment, to receive feedback from landowners on both segments. We also held municipal council meetings, and we presented our findings to Manitoba Conservation and Water Stewardship, February of 2012. This was the initial mailout that was utilized for landowners. Here is the red here, Ste. Agathe, Manitoba, Provincial Highway 52 is here, and 59 is this guy that runs here to Niverville. This is the original route. So as I said, it doesn't follow half mile or mile lines, but did note that there was a potential deviation that could be taken south, which goes into the RM of De Salaberry, following the Tourond drain, and then crossing over to follow Provincial Trunk Highway 52, and then following a half mile adjustment here.

Subsequently, from the participants, you can find -- this is just a quick summary of all participants, of the Tourond proposed route

adjustment report submitted February of 2012, of what participants said. Numerous land titles were represented by landowners here, accepting of the potential route adjustment, and no general preference provided. Here subsequently we determined that the potential routing adjustment should be deemed the final preferred route, and has gone into the final preferred route that you see today.

Ongoing engagement is something that we strive for in the EACP program. We are still engaging communities and stakeholders with regards to the environmental protection plans and access management plans that are being produced. As I mentioned earlier, the e-mail address and project phone line remain operational, and we are there to answer any questions about the process, the project, as well as the website is updated with new information as it becomes available.

As well, landowners right now in the south are being approached with regards to easement agreements, but it's not just easements agreements, landowners are providing suggestions as well on specific tower locations, or slight line modifications, which will be considered by

the project team once finalized.

So in summary, we did an extensive notification process throughout the EACP. We utilized a variety of engagement mechanisms to provide information and subsequently to receive feedback. Materials generated were well received by participants, and many individuals believe that provided them the information they needed to participate adequately in the process. And we did incorporate feedback into the route selection and the assessment.

And that concludes my presentation on the EACP.

THE CHAIRMAN: Thank you Mr. Joyal. Mr. McGarry, over to you.

MR. McGARRY: Thank you, Mr. Chairman.

MR. MADDEN: Some of the visuals, the font is very small so we can't read it. Are there copies of the presentations?

THE CHAIRMAN: There are. Have they been handed out to everybody?

MR. McGARRY: Thank you. I'll introduce myself and my colleagues here while we're doing here.

So my name is Pat McGarry. I'm an

employee of Manitoba Hydro. I have been involved in this project for the last approximately three and a half years on Bipole. I've been with Manitoba Hydro for the past five years. Before that I worked for the Canadian Environmental Assessment Agency for a couple of years, and for Prairie Farm Rehabilitation Administration for 12. All that experience was involved in the Environmental Impact Assessment.

My background is in biology and environmental science. I have a BSc in Zoology and a masters in Natural Resource management.

I'll ask my colleague, John Dyck, to introduce himself and then we'll proceed with the presentation.

MR. DYCK: Good afternoon, Mr. Chairman, Commissioners, participants and members of the public. My name is John Dyck. I'm the senior environmental consultant for Plus 4 Consulting.

In regards to this hearing, my fields of expertise include the forestry technical report and route selection. I am a graduate of the Northern Alberta Institute of Technology in 1982 and have my Manitoba arborist certification in

2004. I have also augmented my education with courses in ecosystem based management, innovative applications for natural resources management, special forest products, natural disturbance and forest management, climate change in Manitoba and the boreal forest, impacts and adaptations of climate change, and how to measure good forest management from an Aboriginal perspective.

My experience includes being district manager for Repap Manitoba, when they came into the province in '89, and the later as woodlands superintendent of Louisiana Pacific when they started operations in Manitoba. I was responsible for annual operating plans and forest management plans for the mountain forest section. Planning and implementation of national tropical forest inventory was one of my projects in Nigeria, Africa, and the preparation of a national forest management plan and plans at the state level.

I have had extensive experience in consultation with various levels of government, community leaders, stakeholders and First Nations and the public.

Since 1999 I have worked with Manitoba Hydro on numerous projects, including Glenboro,

Rugby to Harvey 230 kV transmission line in southwest Manitoba, the Landmark to east Selkirk natural gas pipeline, the Wuskwatim transmission and generation projects west of Thompson, the Keeyask transmission and generation projects in the Gillam area, the proposed Conawapa generation project on the lower Nelson River, and the proposed Bipole III transmission project that stretches from the lower Nelson River to Winnipeg.

I have assisted Manitoba Hydro in routing above linear developments and conducted forestry related affects assessments, community leadership, First Nation and stakeholder meetings, public consultations, and Landowner Information Centres that Mr. Joyal talked about.

One of my strengths has been over the course of my career to become very familiar with the extensive study area that this project covers. As a result, I was given the opportunity to serve as the biophysical study team coordinator for the team, and got involved in the routing process. I was also responsible for the characterization of the forestry values within the project study area and the predicted effect assessment of this project. Thank you.

MR. McGARRY: Mr. Chairman, Commissioners, madam secretary, participants members of the audience, we will now proceed with our presentation, which can be fairly lengthy. So, Mr. Chairman, if you wish to interrupt at some point for a break, we are certainly --

THE CHAIRMAN: We will.

MR. McGARRY: Thank you for being so accommodating on that.

First of all, I want to give you a brief overview of what we're going to talk about this afternoon. The criteria, or the list here is starting with objectives. We have objectives for carrying out route selection and site selection for the Bipole III project.

By the way, I think I forgot to mention my role in all of this is, I was a coordinator for Environmental Assessment for Manitoba Hydro's licensing and environmental assessment department.

So we're going to go through project components briefly again, just to reorient people to this because it is a fairly complex process, multiple components. Identify the study area, briefly describe Manitoba Hydro's site selection

and environmental assessment process, how the consultation integrated with the whole route selection process, what our routing criteria were, how we identified constraints and how they were mapped, look at some of the routing opportunities as well, and also how we identified alternative routes for consideration and then evaluation.

We also will go through the steps of the process. We have an initial preferred route, which is one outcome, followed by the preliminary preferred route, the PPR, which is included in the route selection matrix as the next section. We'll go through some of the route adjustments. We'll review the final preferred route. And then we'll move into the rest of the site components for converter stations, ground electrodes and accompanying lines, to review the site selection conductor for them as well, and end up with a summary. All in an hour and a half or so.

So our objectives were to site our project components with the least or minimal negative effect or adverse effect on people and the environment. We wanted to avoid major constraints. So a major part of site selection is avoidance of things that we know are of issue or

importance socially or environmentally. We have considered a number of factors there by component and in these categories, biophysical, socioeconomic, overall land use, and of course technical and cost criteria.

Included in that process was engagement of many people from government, Aboriginal groups, stakeholders and the general public, and landowners were certainly a major part of that stakeholder group.

So briefly, the project components, again, to reorient everyone is to look at a slightly bigger map which is now not on the screen. But anyway it shows the final preferred route from north to south, the Keewatinoow converter station up here at the northern end, the Riel down here east of Winnipeg. And there's a ground electrode connecting to each station. We'll talk about those. And collector lines, as Mr. Mazur described yesterday, to connect to the rest of our HVDC system in the north.

So the major components are two converter stations, the collector lines, the ground electrodes and their lines, and of course the HVDC line itself.

Now, Manitoba Hydro has used what we call a site selection and environmental assessment process for probably several decades, used it in many licensing processes in this province. It is a fairly straightforward approach because of the nature of the linear component site selection is a very important part of the process and starts right at the beginning. It begins with delineation and characterization of a broad study area. We need enough area to work in to look at alternatives. Then we move into identifying constraints and opportunities for routing. That's followed by identifying those routes and evaluating them for decision-making to get to the selection of a preferred route. That would be the fourth step here.

That preferred route is then subject of intensive environmental assessment, and inherent in all of that is the engagement of the public, stakeholders and Aboriginals at each stage of the process.

So the study area delineation, I am going to outline here in this map to the right here, you can see the final preferred route. But within it is this yellow band you have seen before

on other maps, and that represents the project study area. We wanted to make sure we had enough room to site a number of reasonable alternatives some as close as ten kilometres apart, some as far as 50 kilometres apart or more, but to allow us flexibility in routing to deal with terrain and many other issues.

We have some limitations on major water bodies. On the west side of the province, Lake Manitoba and Lake Winnipegosis presented a boundary for routing. And on the west we are limited by the Saskatchewan border, provincial boundary. Paramount in all of this was separation from Bipoles I and II, which on this map is at that blue line there going through the Interlake.

This yellow banded area here represents a fifth of the land base in Manitoba. It is a very large area, it's over 135,000 square kilometres which we are working with. It crosses five ecozones and seven ecoregions.

I'll just run through some of the constraints that were identified at the initial stage for preliminary selection or a selection of alternative routes. This is the first stage to identify things that we were going to try and

avoid, and things like parks, reserves, ecological reserves, designated protected areas, national parks and provincial wilderness parks, areas of special interest based on their priority area according to protected area initiative, which is part of Manitoba Conservation and Water Stewardship, other provincial parks, provincial forests, provincial wildlife management areas. We also identified conservation program/project sites for two organizations that had major interest in western Manitoba, the Habitat Heritage Corporation and the Manitoba Wildlife Federation. We are also looking for critical habitats to the degree they were known at the preliminary stage. One example is caribou calving areas for Woodland Caribou up north. We also looked at important bird habitats, major wetlands, waterfowl hotspots, based on some data provided to us by Ducks Unlimited.

Species at Risk, their areas of concern and rare plant species and communities were mapped from the knowledge we had, from the data we had. First Nation reserves and Treaty Land Entitlements were identified as constraints for route development. Existing towns, villages and settlements, municipal parks, recreation areas

and facilities, Federal lands, and these categories where they occurred, military or DND land. Potential agricultural operations were also mapped, row cropping, irrigation, organic farming. Another interest was the mining industry, mineral interests, aggregate deposits, quarries and pits, and some of the infrastructures down here, communication towers, facilities, airports, aerodromes and airfields. All of this information was gathered and mapped and contained in a data base to start the alternative route selection process.

Amongst all that was technical criteria, which we have to be cognizant of in developing this project. Large water bodies present an issue for routing as the normal -- or pardon me, the average span is somewhat less than 500 metres. So we are trying to avoid water bodies that would require us to span more than 500 metres at a time. Areas of steep terrain, obviously another routing constraint, and where there is poor foundation conditions such as widespread permafrost and deep peatland areas. We also wanted to minimize transmission line crossings because they require larger and heavier

structures and also present some issue for reliability. Proximity to Bipoles I and II was always in our mind, and trying to keep that separation from those facilities. Also on a technical basis, number of heavy angle structures and line length which obviously contribute to cost.

At the same time as we were looking at all these constraints, we were also looking for opportunities in routing, including using existing or abandoned transmission line rights-of-way, possibly paralleling, other linear rights-of-way, provincial highways, roads and railways, pasture lands, marginal agricultural lands would be a little more compatible with transmission line routing in agricultural areas, and unoccupied Crown lands as well.

As I mentioned then, as Mr. Joyal reviewed, our environmental assessment consultation program was fully integrated with route selection. We are using output from each round into the successive stage and alternative route selection and eventual final route selection. So it occurred in each stage, key stages of the project, and was incorporated into

the next decision-making point, which was going from constraints to alternative routes to eventual selection of a final route.

This is a schematic overview of the process. It's contained in the record in chapter 7. It's a brief overview of the major steps that were used to select the final preferred route for Bipole III transmission line. It began in the fall of 2008 with the dissemination of project information to stakeholders, public, Aboriginal. In 2009 they are moving into help us identify further issues and constraints for potential avoidance. We took all that information and made our first step in routing, and that was identifying the alternative routes.

That then became the subject of the next round in consultation, round three. So the alternative routes were delivered to the public and stakeholders and Aboriginal groups for review as part of round three, to collect input on our work to that point in time and to try and establish any preference there might be for a route or route segment. At the same time, our environmental team was conducting studies and evaluations on all of our route segments. And

that information combined then lead to selecting an initial preferred route in two steps, a first outcome and a second outcome, which I will explain in a minute.

So the third step was initial preferred route selection, followed by preliminary preferred route. Again, we went back out with that information for more consultation in round four, for the stakeholders, Aboriginal groups and the general public to review what we had done and indicate any further issues or concerns with our routing.

All that information was combined and then we selected a final preferred route in 2011.

MR. DYCK: So just stepping back a little bit from where Mr, McGarry left off, we want to talk a little bit about some of the pre-routing activities before the initial alternative routes were identified. The activities that occurred in round one and two, Mr. Joyal and Mr. McGarry already talked about, it started in 2008 and ran into 2009. It involved a lot of information collection, as you can imagine, of all of the constraints information that Mr. McGarry just went through.

That information came through from various programs and undertakings, but certainly also through the EACP. Meetings were held, open houses, and consultations with communities, and they were all solicited for information. Study area data such as the land base information was fairly readily available, and some of the constraints information was also fairly readily available, but some of it took a little bit more teasing and a little bit more searching to locate it and to acquire it. Multiple sources were contacted, and a petition for information, including governments, communities, municipalities, various organizations, Manitoba Hydro had a lot of internal information already because they are working on multiple projects all the time in various areas. First Nations provided information, landowners and the public. The information came in, in all formats, including tabular text such as documents and reports, spatial, usually in GIS format, sometimes in hard copy format, or map based information came available and we would, Manitoba Hydro would have it converted into digital products that then could be incorporated into the overall database. Oral

information, of course, came into being as well through the consultation program. It was documented, it was recorded, and it was brought into the program. Some of that also involved the ATK studies that were undertaken.

Gathering all of that information involves data management and becomes a fairly large task, and warehousing and cataloging that information, keeping track of it, quality control, and also adding value to some of that information, such as aerial photography where you undertake photo interpretation to glean information specifically on certain habitat types, rare communities and so on, out of that information, as well as housing areas and constraints. Field data was collected and brought into the database. A very project specific data portal was created by Manitoba Hydro called Orientis, and some of the value added information also includes what was called the land cover classification enhanced for Bipole. There is a product of the Canadian Force service data that was produced and made available. It's a national database that covers all of Canada. It's a land cover, which means it's the vegetative cover, basically, and some of the land

uses that are apparent on the landscape that's been produced. And it was the only database that we really knew of as a land cover data that's available for the province as a whole, and that would encompass all of our broad study area. Most of the other databases are usually regionally based and wouldn't have that broad uniform coverage for the entire study area.

To create the value added component to the LCCEB, forest resource inventory data was acquired from the province. Some of that information was merged with the land cover classification, including -- other data sets that were included were the Manitoba wetlands data, soil landscapes of Canada, fire history, forest harvest and renewal history, and other types of information. Climate was also brought into the equation.

We apologize, we are having a little bit of a problem. I can see the map on our screen but it doesn't want to transfer over to the projector for some reason.

MS. MAYER: Take a moment just to see if we can get it working, and if not, shall we just carry on? Will that be all right?

THE CHAIRMAN: Sure, take a couple of minutes.

MR. DYCK: Thank you.

MS. MAYER: Mr. Chairman, I think we are ready to go now. Thank you for the opportunity to fix that.

MR. McGARRY: Thank you, Mr. Chairman, my apologies for that technical delay, but just another reason to have redundancy in your system to improve reliability, which we are intent on doing. So I'll ask Mr. Dyck to continue here with this map.

MR. DYCK: So I was talking about the land cover classification enhanced for Bipole, and this is the example of that, the database covering the study area. We will be showing a number of maps that study the -- or that cover the study area. And one of the challenges that we have is try to display information on such a large study area is to -- if we show the whole study area on one screen, it's just too small, you can't see it. So you'll have to bear with us as we move across the study area and show you different portions of it.

You can see the differences in this

database, the land cover that it is depicting, the wooded, deciduous wooded area in olive green, and the agricultural zones more so in the dark orange, some of the sandier areas with forage crops and pasture and some wooded areas that you see south of Portage la Prairie, the wildlife management areas there. And then the purple areas, as you go further north, being representative of the wetlands. So you can see very quickly from that map that in the north and right through to central Manitoba on the west side, we have a considerable amount of wetlands.

We'll try to give you an overview now using that Orientis portal of some of the constraints data that we identified for the study area in advance to initial routing. It just needs -- so what we want to do is again start at the northern part of the study area and talk to you about the various constraints. Because there are so many constraints and so much data, we thought it prudent to group it into a couple of different groups. We have constraints one, constraints two, and a mining folder, and we'll just kind of turn them on as we go so you can see the types of data that are available.

In this particular northern location, there is Gillam there, the Keewatinoow converter station would be roughly located over here. This is the -- sorry, it would be located further north -- this is the Churchill wildlife management area, the Wapusk National Park, the Stephens Lake ESI, these are the ecozones, and an eco region line over here, that's the TCN First Nation lands. The red are the Treaty land entitlement areas.

If we can go to constraint number two? What you're seeing now again is the study area. The bright orange line at the north end, these are bird hotspot areas, data that was provided by Ducks Unlimited, another one over here. And then these are the various Barren Ground Caribou in the north, Beverly, the Coastal Caribou range over here, the Pen Island range over in this area. They are ranges, and then within that are the summer and winter core habitat areas. The winter being the blue and the summer being the orange-ish colour.

These are the mining interests in the north, with mineral exploration licences being depicted as these. The mining claims being in red hatch -- or high metal concentrations, sorry, and

mining claims being the smaller components. And this being high metal concentrations.

And if we turn them all on at once, we can start to see our study area gets quite busy. Even though we think that the north is vast and there's very little out there sometimes, we can very quickly see that it becomes very busy.

We will go through other portions of the study area in the same fashion. We'll drop the legend at this point. I can explain it to you, but we'll have a couple of locations that we'll look at just to get a flavour of what's on the landscape.

In this area here again, as constraint group number one, Grass River Provincial Park, the Clearwater Lake Provincial Park, the Tom Lamb WMA, the Saskeram WMA, First Nations lands, the Town of The Pas, and the TLE lands in the surrounding area. And then the hatched areas are ASA's, this would be the Summerberry proposed ASA, the Tom Lamb expansion ASA, and the Red Deer proposed WMA down here.

So if we turn on constraint number 2, we see the Woodland Caribou ranges and their core habitat within that, and the Reed Lake, the

Wabowden, the Wimapedi and the Wheadon ranges, and to the south of The Pas is the Bog range.

These are the mining constraints in the same area. Again, the study area runs through this way. This is the Thompson nickel belt, high metal concentrations identified, as are these areas here. You'll note that this cut-off line here, that's just basically -- there hasn't been a lot of data identified for the southern area there. The work has been conducted in the north so there's less information available to the south.

Again, you have mineral leases and the mining claims areas. And you can see very quickly how busy it gets in the Snow Lake country, and as well as to the Grass River area, to the west of the Grass River Provincial Park.

This has been an area that we've had a number of interrogatory questions on, and the reasons why we're going through Tom Lamb WMA, and you can very quickly see that we didn't have a lot of options in this area. It gets very congested, and we have to make some tough choices in some cases. What we have done is to avoid the provincial park and the First Nation lands, and we

can talk a little bit later about some of the routing in that area, but as you can see, it's a very busy environment.

Just a quick look at the southern area of Manitoba and the study area, again, a very busy environment. These little parcels that you see over here, those are Crown lands. Most of those are Crown leased land, classified as agricultural Crown land. And these are what are called the Ducks Unlimited project areas. Most cases they have various developments. If you know that part of the country, it's pothole country, the duck factory of Manitoba, so Ducks Unlimited is very active in that area. Also heavily farmed, very much agricultural Manitoba. And this would be the Spruce Woods Provincial Park and forest.

Turning on the soil capability features for that same area, it covers up some of the site specific and other features that are on the landscape. But it identifies the very high, intensively, or high capability soils in the agricultural zone. So that had to be taken into consideration as well. This would be representative of the Arden rich feature and these features here are community pastures.

Tools and processes that were used to identify alternative routes and route corridors, the GIS database, the data that we had acquired up to that point was obviously of great help to try and identify some routing opportunities, included all of the background infrastructure and land ownership information that was there as well.

Aerial photography was at hand and was used extensively for writing purposes. Aerial photography gives us the added advantage that we didn't see on the database, is where the houses are located, the yard sites, the buildings of various types, barn complexes and so on.

Consultation and input was sought from various groups and organizations, but also from Manitoba Conservation and Water Stewardship, who were instrumental in the regions, as well as in the Winnipeg offices, in providing information and outlining where constraints existed and what we should be looking for.

Field work was conducted, not as heavily in the north in the early stages of the study, but certainly later on. But in the south it started very early on with identifying the routing criteria and concerns, and then going into

the field and looking for opportunities for routing. Many of the constraints or the opportunities that they would be looking for was openings and avenues to put a route through in particularly heavily populated areas and in the farming communities.

Low level over flights were used to verify what was found or what was interrupted from data to make sure that what was in that data was actually true.

Generally speaking, in the north there was a little bit of a different approach just because it's -- even though you saw the data, there is some constraints, there was also a little courser approach right at the outset in terms of routing. An initial step was taken to do terrain analysis using soils data and surficial geology data to detect foundation conditions for the project, what was favourable and what was not.

Constraint avoidance of course was always in the forefront of our minds in that we very much were aware that any time we could avoid a constraint that was identified, that was the best option we had and the best opportunity we had for mitigating any concerns on the landscape. And

those, of course, included communities, among other things, communities, First Nation lands, including TLE properties, protected areas, mining, recreation and others.

Environmental considerations, as we already saw, Boreal Woodland Caribou, those being a listed species, was of great importance and concern, not only to ourselves and to Manitoba Hydro, but also to Manitoba Conservation and Water Stewardship.

Habitat quantity, quality and intactness, intactness being -- that's almost a similar measure of fragmentation, and fragmentation was a big component of our study in analyzing where the routes went and what was seen. There is various definitions and they apply differently in different types of habitat and different types of conditions of fragmentation. And I'll provide you a few of them. One is that it's a reduction in the total area of habitat. Another one is a decrease in interior edge ratio, isolation of one habitat fragment from other areas of habitat, breaking up of one patch of habitat into several smaller patches, decrease in the average size of each patch of habitat. And it is

sometimes measured as amount of linear disturbance on a unit basis, in other words, how many kilometres of linear disturbance there are within a square kilometre.

And those parameters or those types of calculations are more applicable in some areas than others, for example, in the north versus in the south.

Going into the southern part of the study area, the approach and rationale is very much similar, but the big difference is that there is the increased density of constraints, such as conflicting land uses, protected areas and intensive agriculture.

Environmental considerations in some instances are different. Bird staging areas there's more of, for waterfowl in particular, colonial nesting sites, habitat quantity. We come across habitat sites that are rare and that need to be protected. You want to minimize or eliminate any effects of the project on such environments if possible. And the fragmentation issues are somewhat different than they are in the north.

Socio-economic conditions are also

different in the south with there being a higher population density in terms of housing and the number of communities, the First Nation lands and infrastructure, as well as heritage and cultural sites.

Having put all the constraints information together, and one of the things that we also had was an opportunities group of information that would identify other linear features such as roads, transmission lines, railways and so on, that we could take advantage of or parallel along. And that was certainly one of the criteria for routing.

The three major alternative routes were developed, those being A, B and C. The A route being the most northerly in the north and the most westerly in the western part of the province, and the most southerly in the southern part of the province. B route was the opposite. It was the most southern in the north, the most northern in the south, and the most eastern in the western part of the province, in other words, being the closest to the lakes. And C route being, straddling kind of that middle ground in between where there was room to have a third

route. And then in addition to that we had numerous crossover segments where we could go from one to the other in opportunistic fashion to have multiple opportunities to look at options of migrating from one to the other.

The alternative routes then, the initial alternative routes were presented to the public in round three of consultation in the fall of 2009.

Some of the main features and comparisons that were drawn from the initial alternative routes, the overall length there being between the shortest and the longest about 200 kilometre difference between routes A and B. Overlap analysis was done for some features such as ASI's, and important bird areas and waterfowl locations. That being not necessarily a direct intersect, but the three mile wide corridor that we were using, or 4.8 kilometre wide corridor would also give us information of being in proximity to various features, including the features mentioned there, as well as parks, WMAs and so on.

Linked through Ducks Unlimited and Manitoba Habitat Heritage Corporation project

areas, there is quite a difference there in route A, and that's reflective of the pothole country in southwestern Manitoba, south of Riding Mountain National Park.

Major river and creek crossings, the main difference there in the far north and northwest Manitoba where route A and route B cross a couple more larger streams than route B would.

The agricultural land cover crossed and forested land cover crossed, these numbers come from the land cover classification enhanced for Bipole. It's a very course type of analysis that was done very early on, and it looks at the classifications as they are depicted in that database. For agriculture, for example, it includes cultivated land and annual crop land. It excludes forest crop and pasture lands. For the forested, it does cover coniferous, deciduous and mixed group cover types.

Those alternative routes were presented, as we already mentioned before, in the round three round of consultation in late 2009 and carried over into 2010.

That round of consultation, it took various forms, or it was brought out into the

public, it contained or it included the same types of venues that Mr. Joyal talked about. But it also included a lot of meetings with the regional offices of Manitoba Conservation and Water Stewardship, and it also -- the opportunity was there to provide the shape files of those alternative routes to the offices and to the participants and organizations, whoever had the capability to work with GIS files, to take that information and analyze it against their own values, and provide comment and information back to Manitoba Hydro that could be incorporated into a date base again. And it was another way of soliciting the various stakeholders to provide additional information, because they could very quickly see if there were any conflicts with their own data that they had.

And that interaction occurred with also the forest management licence holders in Northern Manitoba, Tolko, Louisiana Pacific in the Mountain forest section, as well as some of the smaller forest companies, Spruce Products Limited and the Mountain forest section company.

The mining company and the Mines branch had the same opportunity, they looked at

the various options as well and provided information back to Manitoba Hydro, as did Ducks Unlimited.

At this same time the study team went through a process of analysis and evaluation of the alternative routes using their own methods and the data that was in hand at the time, and that analysis was conducted on that 4.8 kilometre study area.

MR. McGARRY: Okay. We're going to switch speakers here again. I'm back, Pat McGarry, Manitoba Hydro.

I'm just going to work through alternative route evaluation process with a few slides, including the route selection matrix. So the first step in the process of evaluation, so we have now laid out our route segments, our route alternatives. We have shared them with the public. We are now in a position after round three to try and understand all that information and move into --

MR. MADDEN: Mr. Chair?

THE CHAIRMAN: Yes, Mr. Madden?

MR. MADDEN: I just have a question, I may have missed it, but in the bottleneck areas

you identified the Red Deer region, and I just thought that we kind of skipped over that area using the GIS map. Was that on purpose? Are we coming back to it?

MR. DYCK: No, it wasn't on purpose, it was a little bit of a quick move over the area but we'll cover it again. We're coming back to it.

MR. MADDEN: Okay.

MR. McGARRY: So, Mr. Chairman and Commissioners, we are now in the process at this point in time of trying to evaluate all of that information and come up with selection of PPR, we call it preliminary preferred route. The first in the process was to establish section boundaries. We had to divide the project study area into 13 sections to allow evaluation on a smaller area, because we couldn't evaluate all routes through the entire section of the -- from Keewatinoow to Riel in one step. There were 13 sections to make it more manageable. It also facilitated comparison between different segments at various conversion and diversion points, and routing, and I will show you that in a second here.

We also made allowances for the

independence of the sections. I'll show you here. First of all, the sections are numbered here, hopefully you can see that, section one, section two, section three, section four and so on, to 13 down at Riel. The alternative routes are shown here and they are colour schemed. The A route being the red, the purple being actually the C route, and B is in green. You'll notice some other smaller thinner lines that represent subsection routes, if constraints were found in a particular area, and to allow a crossover to other routes, depending on the outcome from the preceding section or the subsequent section. Each section was evaluated independently, so there was a possibility that those selections could end up not lining up. So there had to be an allowance for connection between sections. So that was the scheme used to begin the evaluation process.

There is 64 segments in all, different numbers between sections, but we'll work through that.

I'm going to describe to you shortly here the route selection matrix which was developed to assimilate multiple inputs from the route and segment process. It was a means of

documentation, and it reflects only one step in the process. A lot of emphasis being placed on this route selection matrix, it was a consolidation of a lot of material, principally to be able to demonstrate what had occurred. It was used in one point of the process in early 2010, and had a limited time effect, because we moved into other steps after that. But it reflected consideration of 28 criteria. It reflected input that we gathered from all our rounds of consultation, from Aboriginal communities, municipalities, stakeholders, public, and some ATK work as well. And keep in mind we're talking about the evaluation of, at this point in time, a 3-mile wide corridor. So we haven't got it down to a 66 metre right-of-way at this point in time. The 3-mile wide corridor is called the local study area.

I don't expect you to read this, Mr. Chairman or Commissioners, we will actually see a highlighted view of this. I am just using this as a place holder to show you the various components of this chart. When I speak of that route selection matrix, it is a chart really with a lot of information on it. And to be I guess

full in our explanation, I'm going to work through each piece of that chart in somewhat of a re-fashion, using an example.

Just to give you a quick overview without being actually able to see the material at this point, which I will show you shortly, the real matrix part of it with the multiple criteria is shown in the upper left here where we have identified four groupings of criteria. It's actually 23 criteria in here. I'll describe those shortly. It resulted in the numeric rating over here. We added in response from consultation, Aboriginal communities, municipalities and so on. And over here we had a section rating summary, which actually lead to a selection. Down on the lower left here is the map and the segments are numbered so you can follow where you are, what that segment is in relation to the row on the chart.

This other portion of the chart records all the segment comments from this area here and this area here. So that wherever there is a colour for poor in this case, or high, that red will result in a comment down here, as well as these dark reds, and I'll explain that shortly.

The last part of the chart is the section summary which provides the rationale for selection in that section.

I will bring up the actual chart and start to work through it. I'll start in the upper left with where the ratings were put into the chart. I'll move closer so I can actually read it. I'll move from left to right on this chart but we'll start here. As I mentioned, there are four components of criteria. So criteria were selected in four components. The biophysical component had a total of 10 criterias that were evaluated, from vegetation, forestry, birds, mammals, caribou and so on, through to amphibians and reptiles over here at number 10.

What was answered in to the matrix -- first of all, it's oriented here in the far left, the section number is section 8. And you should probably see the map first where the segments are recorded.

So this map gives you enough information to see where you are. This is section 8. The segments are labelled here, and here is C-21 and so on. This is A-15 over here. So we have the various groupings. This is somewhat of a

complicated map for the sections. One of the more complicated sections, we had multiple choices in here, multiple sections. There is the three main choices through here, which are A-15 which represented the A route, C-21 and C-22 which represented the C route, and B-21 and B-22 which represented the B route.

However you will see two additional segments in here, and they were interconnections principally to provide slightly more choice in this area due to various regional constraints and issues. What's also represented here is the green overlay which is the resultant selection which became the initial preferred route through the area.

So now going back to the chart, what's entered in here for each criteria, each criteria was independently evaluated by a number of specialists. So we had the botanist, a forester, a birds fellow, a biologist for mammals and caribou and so on. Each of these criteria were independently evaluated and by section, and independent by segment. So rows are segments. The values represent the level of constraint. So an H for instance means high, high level of

constraint, so that would be non desirable. So we are showing the level of a negativity, I suppose, for each of these areas, each segment. So that way a lot of work went into the specialist providing the input for their discipline for all segments in this section. So they were rated.

The hatch marks relate to an allowance for ATK information. We had been gathering Aboriginal traditional knowledge information through a process that we had begun with First Nations and NAC communities. Where we had information that indicated that there was serious concern about a particular segment in a particular area, it could push a rating. So this hatching had indicated where we pushed the rating to what would have been medium to high. So the ATK portion of the information was put directly in for each segment to recognize the value and importance of that information to alternate route selection. So moving to the right a bit here, we'll see the rest of the chart and the numeric scoring.

One more detail before I move on. There was a certain amount of weighting in this chart, but not by multiplication or use of coefficients. The weighting that was used in here

was that six disciplines or six criteria were allowed to score higher than others in the matrix. So where you see a very dark red and a VH, it means very high. These particular criteria had the opportunity to score higher than the others. And those were selected because we felt their importance for route selection, so they were given a bit of weight. So the ones that were given weight were birds, mammals, caribou, core communities and fragmentation, wildlife considerations, and culture and heritage, the six criteria that was given some weight.

Now, all this was scored to give us -- our first output in this process was to get a numeric scoring based on this scoring legend here. So where you see an L in the chart, it resulted in a score of zero, meaning that particular criteria for that segment did not contribute to the scoring in that segment.

Now, all these scores were assigned from, medium got one, high got three, and very high got five, were simply added across the row, and some here. So the initial output was a numeric score, but by design it wasn't the end of the process. The study team's involvement didn't

think it was sufficient to simply score and make a selection on that basis, especially without adding consultation and input.

So the next part of the chart, which is the next four criteria, and then we're up to 23 here, four more makes 27, you will see in some of the information in IR's response we talk about 28 criteria, where is the 28? The 28th criteria is that ATK input information that I mentioned before. Where you see hatching in the chart, that was actually the 28th criteria.

So for response, we recorded response information by these four criteria, Aboriginal communities, municipalities, stakeholder groups and the general public. It was simply rated as poor, good and fair for choice, based on the input from those groups. So in this case, that segment was A-15 I believe across the top row, all groups who responded thought that was a poor choice for routing in that area. And you can see the rest of the chart, how it's filled out there.

The third component in the chart here was to take all this information. Now we've got input on 28 criteria for each segment. You have to make a routing choice through this section.

I should also point out that the dark lines that separate some of the rows represent a grouping. So that these two segments make up one passage through the section. These two segments make up one passage through the section. And A-15, for instance, is independent. So one segment will get you through the section. That's why in the end you will see the scoring was grouped for two segments, and ultimate selection grouped for two because that was the passage through the section.

So this section, rating summary took all the inputs, and by committee and consensus each segment now is rated for these five overall criteria, biophysical, socioeconomic, land use, technical and stakeholder response. Each box got -- biophysical, it was either neutral with a dashed line, it was less of a choice, or a better choice being the check mark. It gave a quick visual representation of what appeared to be a good choice for that section.

In this case it also aligned with the scoring. So I'll just quickly look at the scoring. Numeric scoring resulted in scores of 20 and 19 for two of the B segments, versus some of

the higher scores for A-15, for instance, which is 44, which is a very high score. So three parts numeric scoring, the stakeholder input, and eventual consensus summary to result in a selection for that section.

So quickly, segment comments; so for every red box or hatch box or dark red box there is a corresponding comment to explain why that rating was given for that particular criteria. Land use here. And over here the same for agriculture, there is a response from ATK that raised the rating.

So what was reported here in red was the ATK information we had at the time to show its presence in the route selection.

The final part of the chart was the selection summary which presented the rationale for the selection in that particular section, and a summary of the stakeholder response. And the last part in here is, were there other considerations or opportunities, and that was also recorded.

So the chart was designed to give a fairly complete picture of what had gone into analyzing and making a selection. There is a lot

of information behind that. There is information for every single box that was brought to the table in establishing these ratings. There was almost 1700 boxes that were independently rated, so a substantial amount of work went into this, and it was done for 13 sections.

So let's go back to the rest of the presentation here. So what I just showed you there represents these portions of the schematic of route selection. We started with rating route segments, we selected initial preferred route, and we used round three input, stakeholder input. So that resulted in the first outcome, what you saw there in that chart, we ended up with a selection from an A, B, C selection option. That wasn't the end of the story, because of the information we had received in round three there were certain areas and constraints we could not solve with the segments we had provided. So we then endeavored to add segments where we thought it was prudent to do so and evaluate them to get to the preliminary preferred route in the second outcome.

So I'll ask Mr. Dyck here to quickly review some of those, where we went from the initial preferred route selection, and some of the

segments we added before we actually got to the preferred route.

MR. DYCK: We have six tiles, which means six maps to cover the study area, to show you the initial adjustments, or the adjustments that were made to the initial preferred route as a result of the input that was obtained in round three consultation and the assessments done by various study teams and some of the additional information that they came up with.

The first one being in the far north, at the Keewatinoow converter station, that was fairly straightforward. It just so happened that at that point in time the site selection for the Keewatinoow converter station was finalized. And so obviously the end of the line had to meet the converter station. An adjustment was made from the last angle tower and the line brought into the Keewatinoow converter station.

Through the Stephens Lake ASI, information came available, both from Tataskweyak Cree Nation as well as from the mining association and the mining companies, there was some mining claims identified on the north side of Assean Lake, and both TCN and the mining industry and

mining association wanted more separation from those entities. So the line was moved north.

Through the Stephens Lake ASI, as you see there -- I just got ahead of myself there a little bit -- but a slight adjustment was made here in the Stephens Lake ASI to create some adjustments around the endearing features that were found in that area, to get into terrain types that would be of least disturbance to the endearing features that were found within that region. There was a lot of work done by the study team to identify and gain more information about the endearing features in that area. The protected areas initiative had provided us with rough shaped files of where the endearing features were. Further photo interpretation and field work identified them in detail, and some field sampling was done, and then the adjustment to the route were made based on that information and over flights.

I already talked about the TCN adjustment at Assean Lake.

In the Thompson nickel belt, the mining industry had become concerned about routing through the Thompson nickel belt area, and some

undertakings were examined there to make adjustments for them. P-1 and P-2 further south were identified going on the east side of Paint Lake, and taking advantage of some of the disturbance that's in this area, forestry activity is prevalent in this area as you'll see later in the presentation.

Going further south to The Pas area, there was an adjustment made for housing. A yard site that was identified very close to the alignment located right there, P-3. And very simply, we just ran the line further south to get away from a yard site right at the south end of Gross Island. And the Summerberry area, the alignment was shifted to the west slightly to parallel an existing transmission line in that area.

Going further south in the Swan Valley agricultural lands, the diagonal routing was a decision made by the study team, that in the agricultural zone the diagonal alignments would be taken out of those lands, and particularly in intensive agricultural areas. So that was the cause of the shift in this area here.

Further south in the West Lake WMA,

the initial routing had run the route through a conner of, the northeast corner of the West Lake WMA. That was shifted to exclude the routing through there and create separation from that WMA. Through the Portia/Alonsa area, as Mr. Joyal referred to before already, we made some adjustments there based on a housing concern there as well. Going further south into the Westbourne area, which would be further south yet, again we're getting into the heavy agricultural zone here, very intensive agricultural area here, and alignment changes were made to take that diagonal alignment out of there and route the transmission line adjacent to existing road allowances.

Similarly in the Rosendale, St. Claude area, this area through here, an adjustment was made on new information that came available regarding First Nation land locations and diagonal routing, as well as an issue on where the alignment was within a half mile line where we had all kinds of interference right on the half mile, including fences and shelter belts, where an adjustment was made to move that off of there and just into the field so that wouldn't impact those features.

In the Brunkild area a number of opportunities were looked at, actually two different segments that are represented here, and that was done to take advantage of existing infrastructure in that area, including major drainage ditches, transmission line and road allowances.

In the Niverville area, this is a very densely populated area, rural Manitoba, housing and barn complexes, and very difficult to find a path through that area, and some adjustments were made to fine tune that area through there.

And the area going north, initially we had a route identified through here. We found that there was some difficulty with that as well, with housing through that area. Additional opportunities were identified further east and 823.1 was selected as the preferred route. The issue primarily was very much centred around the same housing developments in that area.

MR. McGARRY: There is some mining interests that kept recurring in the process. And so just several of them, one there is an adjustment made near Assean Lake related to mining interests. Also at this point, as Mr. Dyck

mentioned, there is an adjustment made in section 5 for P-1 and P-2. Part of that was based on policies under the Provincial Planning Act relating to protection of that particular mineral interest at Thompson nickel belt.

Earlier today you heard from Dr. Bailey about some of the interference in geophysical exploration related to DC lines, and that was part of the discussion for sure that lead to P-1, P-2 selection in the PPR, which we showed you earlier.

So after all that review, we had now taken alternative routes, turned them into initial preferred route, added segments to deal with issues.

THE CHAIRMAN: Would this be an opportune time to take a break, or is there somewhere in the next few minutes?

MR. McGARRY: I think I might have three or four slides, which might be a perfect spot to break.

THE CHAIRMAN: Sure.

MR. McGARRY: So now we have a preliminary preferred route based on that information, which now became the subject in round

four in August 2010. So we got to the fourth round. Now we're showing to the public and stakeholders and the Aboriginal groups the entire length selection, and we consulted north and south with 20 additional open houses and many, many meetings to review what became the preliminary preferred route.

Just a recap on where we are again in the schematic, we took the preliminary preferred route. We're now round four. It's the last step before we get to consideration of that input into a final preferred route.

This might be a good place to stop actually, with your permission, we'll wait here.

THE CHAIRMAN: Okay. Thank you, Mr. McGarry. We'll take a 20 minute break as usual. So back here to start at 20 after 3:00.

(Recessed at 3:00 p.m.)

(Reconvened at 3:20 p.m.)

THE CHAIRMAN: It looks like everybody is back, so let's carry on. Mr. McGarry.

MR. McGARRY: Thank you, Mr. Chairman. I'd just like to start out, we have heard from several participants that they are perhaps frustrated and we certainly do not want to

frustrate them in showing the material on alternative routes and other route information that we had been showing today. It was with the intention of giving a fairly high level overview. We stopped in various locations along the way but it was certainly not our intent to be exclusive in any way in identifying or reviewing issues of interest to participants.

So there are some more slides coming up specifically related to the final preferred route that will be of interest to a number of participants.

Also, we can and will make available our interactive mapping system, Orientis. With the commission's permission it may be a useful tool during the cross-examination and we can bring it back for that as well to concentrate on issues and areas of interest.

So back to where we left off was the encapsulation of a lot of material resulting in a PPR, preliminary preferred route. We reviewed that during round 4. And then finally we are now at the point of making it final, selection of final preferred route selection.

So that round 4 ended up we had 57

requests and considerations for local level route changes from that process which were then reviewed. They are identified in chapter 7, appendix 7B. Of those 57, 23 adjustments were made to the preliminary preferred route. Some to follow existing infrastructure, adjustments along PR 280 for Tataskweyak Cree Nation and their RMA. Some, as has been pointed out in earlier material, separation from residences and buildings.

A decision at this point too was for agricultural reasons from Provincial Trunk Highway 16 to Riel station to move the 66 metre alignment for the route in field by some extra metres to allow for the seeding and herbicide equipment to move between the tower and the edge of the right-of-way. It seemed to be a fairly widespread desire of farmers in intensively cultivated areas. So we agreed to make that adjustment. So instead of being 33 metres from centre line to edge of road allowance, we moved that to 42 metres from centre line to edge of road allowance. That was a consideration.

There was also one consideration from a landowner relating to waterfowl and some tower placement considerations. I'm just going to

quickly show you what that looked like. The map which is part of the record and is in chapter 7, just mapped out those areas that were identified for consideration of a route adjustment from the preliminary preferred route stage. By way of example, TCN there is that adjustment. The colour coding there is the orange on that screen, was where a request was made but not granted. The darker box is where a request was made and it was enacted.

So let's go to an area down here, south of The Pas. We had a number of requests in this area. They are identified on the table. I'm not going to dwell on every number and the reason for that request. But just to give you an idea of the number, location and the adjustments that were made in response, keeping in mind the dark colours were the ones that were made. The table is far more informative as to the reason that was requested and the adjustments that were made.

A continuing process with the mining industry ensued during round 4 and after round 4. This continued concern of the interference of the DC lines with sensitive exploration lead us to again, after round 4, review the number of

different options. As you might recall, that we made some adjustments in the preliminary preferred route stage called P1 and P2 segments for that very reason. That still was inside the Thompson Nickel Belt and was of some concern to the mining industry.

So in the ensuing discussion, we developed another set of alternatives in that area shown here. The dark area is the official representation of the Thompson Nickel Belt as provided by the province. The green line here is the final preferred route. The light green line on top was the original preliminary preferred route.

We outlined a number of new options now to deal with this area. The purple line there is hard to see. It was the preliminary preferred route in that area. So now we had the four options back on the table to deal with routing in this particular area with this particular issue with mining interest. There is a number on the west side of Setting Lake, kind of grouped together as a group of segments with the one, it's prefix 1A, B, C and D, all near or west of Setting Lake. We continued to look at the preliminary

preferred route as an option. The third option is to go completely outside of the Thompson Nickel Belt and rejoin over here. The fourth option was to follow the road essentially through the Wabowden area and then rejoin the preliminary preferred route.

These options were reviewed again with the mining industry and the decision and study team at that time was we were not going to move the route, we were going to keep it on this line representing the preliminary preferred route.

So we offered at that time when we said we weren't going to move the route, a number of mitigations were proposed that Manitoba Hydro thought were reasonable. As Dr. Bailey mentioned this morning, one of which was do your surveys before we build the line. Other mathematical processing to deal with signals and geophysical equipment to filter out our DC line and so on. However, that was reviewed at the executive level and there was a decision to go with option three, which put the route outside of the Thompson Nickel Belt, as you can see in that previous map I was showing.

THE CHAIRMAN: Mr. McGarry, by

executive level, do you mean within Manitoba Hydro?

MR. McGARRY: Yes. And the deliberations that went on there, I have no idea.

THE CHAIRMAN: Thank you.

MR. McGARRY: So now I'm going to turn back to Mr. Dyck here to review the FPR and we will actually work through a fair bit of the route and there may be some information here that will be of interest to a number of participants.

MR. DYCK: Thank you, Mr. McGarry.

As Mr. McGarry indicated, we want to take various sections of the route and just kind of work through them, give you kind of a flavour for what's on the landscape through imagery, both vertical imagery and some oblique photographs as well.

So the first area that we're looking at is the Keewatinoow area right at the north end again, and we'll work our way south. This is the green line that you see there is the proposed final preferred route. These are the collector lines that you would see here. This is the Conawapa existing access road and the location of ground electrode site over here. The terrain

itself is quite flat and from the imagery itself, you would think there is a lot of streams there but in fact, it looks more like this where it's very flat and it's kind of a very wet environment with ribbons of spruce and isolated pockets of spruce in the vicinity. So it's a very kind of a nondescript type of countryside.

The route itself at this location is through the Churchill WMA. This is not avoidable at this point in time as you can see on the larger map up here. And as you have seen before, it's just the position of where Keewatinoow is and the WMA, that there is no way that we can avoid it at all.

It's dominated by black spruce, very sparse woodlands and interspersed with grass and low shrub vegetation. What we've done in the process, and this as it carries on through to the Stephens Lake ASI, is route the line through what you might call the top of the watersheds so that the crossings of streams are at the headwaters of the smaller streams in the areas and basically goes through at the divide of the watersheds to minimize the number of stream crossings.

This is another typical shot of the

northern area and what you are seeing there is Bipole II in the vicinity of Limestone. And you can see the footprint that it has after having been there now for 30 to 40 years.

Moving further to the west through the ASI and into the TCN RMA, Stephens Lake, the land and the streams and rivers and lakes become a little bit more defined than they are right around the Churchill WMA. Another feature in that area is frequent fires, as you see here, a landscape where you have a new and young growing forest, and the remnant results of frequent fires.

The same routing objectives I guess in this area were to minimize stream crossings again as well as we did in the WMA and kind of crossed over into the same region, crossing into the headwaters of where those streams originated. We also, as I mentioned earlier, minimized the effects on enduring features in the ASI and take advantage of existing access into the area along an existing transmission line that Manitoba Hydro has, and that's the line running to Churchill. That will intersect with Bipole III and provide access for construction crews into the area.

The route in the TCN RMA, as well I

should say, and I alluded to already and Mr. McGarry alluded to it, a couple of adjustments were made there to the route closest to PR 280. We also maintained a separation there from the reserve lands TLE parcels and Assean Lake as requested by TCN.

In the Partride Crop Lake area to PR 373, PR 373 is the Cross Lake road. This you see over here, Paint Lake is this over here. So the park is there, highway 6 and this area here where you see the light shade, light grey and white, that's forestry development. You see the forestry roads and the railway line running through here as well. HBR railroad, that runs over to Thompson. This is the proposed final preferred route and this is the Grass River crossing right there.

In this area, the routing takes advantage of extensive forestry development including the existing access roads which would be used for construction purposes. The soil conditions are good for tower foundations. It addresses the mining concerns as we talked about but it does compromise separation from Bipoles I and II which Manitoba Hydro has proposed mitigation for in strengthening the lines.

The next shot just gives you a quick look at some of the forestry development in that area and how it looks.

The next area is the Wabowden Boreal Woodland Caribou range area. Basically the extension from PR 373, the Cross Lake road, through to highway 6 and onto Hargrave Lake. The first image that you see there is the Fen Complex that is associated east of highway 6, this being highway 6 here, this being the preferred route. This would be the location on your map over right in there, right in that corner.

So this type of country, the fan again, the very light colouring that you see here are very open areas, very stunted tree growth, shrubbery and fen complexes as you see here. This is a good example of what you would find there. And there is an example of a newly constructed transmission line. I believe that's part of Wuskwatim in similar terrain. The next shot is that, that's closer to Hargrave Lake. And again, very similar type of environment where you have stunted tree growth. And the reason for taking advantage for routing through these areas, in particular in this area where there's caribou is

to minimize the amount of clearing that's required and the effects of the project to the habitat environment.

Manitoba is aware of the concern in this area by Manitoba Conservation, and have received a letter that's dated August 29th, 2012. And Manitoba Hydro has responded to Manitoba Conservation and is prepared to discuss the issue further and work with them to look at further mitigation measures in this area and other alternatives that might be available.

Manitoba Hydro has planned for and has proposed enhanced mitigation measures for routing through the Wabowden Boreal Woodland Caribou range including access management during construction and post-construction wildlife corridors and monitoring that would involve both our caribou monitoring, wolf monitoring and wolf movement monitoring and access concerns as well.

One of the reasons for routing through this type of environment or a second reason would be to limit access. The access particularly during the non frozen period, which would be spring, summer and fall, would be virtually impossible to move around in this type of country.

The Tom Lamb WMA, I'll give you an overview as well. What we see here is Clearwater Lake, Forman Lake, Frog Creek, that's the border of the WMA. The routing comes across very much an open area, as you saw in the open pictures already. The fen complexes gets into a forested environment but takes advantage of routing that already exists here. The Wuskwatim transmission line, the road that goes to Cormorant and the railroad that runs along this area that goes back out into the open environment and cuts across all of this area here to the Saskatchewan River, that's all part of the Tom Lamb WMA. Of course, other side of the highway and the railway alignment is the Clearwater Lake Provincial Park.

So this area again, it's not avoidable in terms of routing. Limited clearing will be involved in constructing the transmission line in this area and it minimizes the effects to the Saskatchewan River delta.

The examples that I have here is again an example out of the Wuskwatim transmission line in an environment very similar to what you see in the Tom Lamb WMA. And another shot that shows even less dense and the type of environment.

Next is the Ralls Island area. This is a continuation from the last slide where we saw the map or the overview of the area. Ralls Island would be right in this area here south of Tom Lamb.

MR. MOTHERAL: Can you point on the bigger map every time you have a slide here?

MR. DYCK: Yes, and remind me if I forget. This area would be right here.

The Ralls Island is a feature that's actually formed by this channel which breaks off from the Saskatchewan River and runs through. It's not really a true creek but it is called Ralls Creek. And the Saskatchewan River running around the outside making that what they call Ralls Island.

The routing comes through the marginal farm lands in this area, very much forage crop and pasture lands in that area. The adjustment that we made to the route in this area goes right through here where there's a residence there. Initially we had pushed that route through or tried to align it through there, and instead they run it further south of that residence.

The Bog Boreal Woodland Caribou range

and proposed Summerberry and Red Deer WMAs extend south of The Pas in this area here, south of The Pas all the way to the Red Deer River. So it's this stretch in between here.

The type of environment that we're going through there, particularly in the central portion of the area, it looks somewhat like this. This is what they call the plumber's marsh area, typical of that area, a patterned fen environment. Again, limited clearing. And some of those islands that you might see there are known or become what's known as calving habitat for caribou, not necessarily in all areas but in certain areas that have been identified in the technical report. And you'll have a presentation on that further into the hearings.

Also in the vicinity here are the Lake Winnipegosis salt flats and ecological reserve and an extension of that. Those are located in the northern part of Lake Winnipegosis here, just south of the overflowing river. Those are on the east side of highway 10, the routing is on the west side of highway 10. It's well-protected. There's additional mitigative measures that are being prescribed in this area which include winter

construction to minimize any disturbance in the area and predetermined access points and routes into the construction site to ensure that there's no effect to the salt flats and the associated salt water springs that are in the area that feed the ecological reserve.

The Red Deer River area specifically. This is an area that again has been of concern to Manitoba Conservation and Manitoba Hydro is aware of their concern. The issue that is associated with the cottage developments that exist right here along the Red Deer River. The land adjoining the river to the west of the highway and all the way to Red Deer Lake is under TLE selection. And we have the cottage subdivision. We have an existing transmission line running through here, a 230 kV line. And this little area right here is Wayside Park, provincial park. So there's limitations in where we can route through this area.

If I could just get you to bring up that slide. This gives you an overview of the same area, this being the Bog Woodland Caribou Range area, Red Deer Lake in this area. The river is right through here. You can see the

constriction right at the highway and these are also quarry leases which are also identified along the border of Saskatchewan. These are more Limestone related quarries over here whereas these are identifications of coal deposits.

The TLE lands are extensive in this area by Sapotaweyak Cree Nation. And this is the Porcupine Provincial Forest and further TLE selections in this area as well.

So as I mentioned, there is very limited opportunities to route through here. The separation between the cottage here and the closest point to the right-of-way is 500 metres. So we feel there's good separation there.

Manitoba Conservation has identified that there is some concern about bird nests in the area. Grebe nests have been identified along the Dawson Bay shoreline. That was during bird surveys two years ago. We're not so sure that they are there anymore as they are mobile and changing water levels will push them or move them from time to time.

There is a bald eagle nest in the vicinity of the line but it's about 225 metres removed from the line itself.

Blue heron have been identified in the area and the potential is high that there is a colony in the area. But none has been identified.

Again Manitoba Hydro worked with Manitoba Conservation to come to a solution in routing in through this area.

The Moose Meadows area, game hunting area 14, again an area of concern by Manitoba Conservation and Manitoba Hydro. The area has been raised as a concern area for Pine Creek as well as the Manitoban Metis Federation as being important for moose. Just to give you an overview of the area, this is the Steep Rock River in the north of the Steep Rock Wildlife Management area just to the north, highway 10 and the Community of Mafeking. That's an existing transmission line through there.

The routing cuts through what is primarily a black spruce and tamarack dominated fen in this area over to the agricultural lands east of Bellsite.

The area of course over to this side is the Porcupine Provincial Forest.

Sorry, I should identify that there. That is the Porcupine Provincial Forest. So that

section of route is from Mafeking right there just to Bellsite right there, just north of the agricultural land.

The Swan-Pelican traditional berry picking area has been identified of importance through the ATK process and consultations at Pine Creek and Duck Bay as well. It's a very well-known berry picking area in all of the Swan Valley I would say. I've lived there. I have picked berries there myself. And I have often seen people selling berries during berry season along the highway. So I know the area quite well.

It was burnt in 1964 abouts. And when I first moved to the Swan Valley, I did some work in that area. And then I ended up having to fight a fire there in '89 which burnt everything to the ground that we had done. But that's the nature of being in forest management.

What you are seeing is rigid swell topography with remnant beaches, sand beaches from former Lake Agassiz. And obviously the sand environment is conducive to Jack Pine growth and blueberries love the same type of environment.

The community of Cowan, highway 10 running through here and the abandoned railway

line, the community of Briggs Spur and you can see the numerous trails that are run off into this area where people access the area to get in there, bring quads in and pick berries and so on.

This type of terrain, it's part of the Swan-Pelican provincial forest and the area extends considerably further north to Swan-Pelican lakes which is about 35 kilometres north of here. And it's accessed from multiple locations including the Kettle Hills Road from the north, northwest. That area is right there and it extends to the Swan-Pelican lakes.

Going a little bit further south, we are highway 20. If you can see it there, which would be right about there, that highway goes from Cowan to Pine Creek. The area south of there is what's known as game hunting area 19A. Again, an area of concern by Manitoba Conservation and Pine Creek as well. They provided some information of traditional timber harvesting areas in that vicinity, and of course have also provided information at this hearing about concerns over the watersheds in that area.

The route cuts through an area, some of which is open Crown land. Other land there is

leased, Crown land leased to various ranching operations including a bison ranch operation that's run in the area, Pine River Ranches Limited. Again Manitoba Hydro worked with Manitoba Conservation and Water Stewardship to address their concerns in that area.

Concern has been expressed in the routing through the region west of Lake Manitoba, some of that or quite a bit of it being Woodlands. Much of that land or some of that land is Crown-owned land. It's largely leased to ranchers in the area. It's being used as pasture lands. It's a combination of wooded lands, ridges and swales, open grasslands and wetlands and the grasslands are hayed in the fall season when it's dry.

Some examples of that type of terrain are this type of environment, and this type of environment where some of it obviously has been disturbed, some of it's being farmed. You will see farm fields here and cut lines meaning that it is fenced. This would be a representation of grasslands and wet grasslands as you would see in this image here. These are grassy sloughs that are largely wet environment. And you would see

that same kind of environment throughout that countryside.

That type of habitat is what we would call structurally diverse. So you have everything from some grass to shrub environment, alders and willow in particular to your wooded ridges.

The routing in this area has been well-received by the landowners in particular during the landowner consultation process. Routing in this area avoids some of the negative effects that will be associated with more intensive agricultural areas further to the west. Some of the concerns relating to waterfowl in the area can be addressed through mitigation.

Issues of access are largely addressed with the ranching environment, private lands interspersed with the leased lands and the fencing that's in the area.

Next we'll look at an area from PTH 16, highway 16, to approximately the Assiniboine River. This is an area of intensive agricultural practices. I just want to warn you that I have flipped the orientation of the image sideways just so you get a better screen shot of it. This being north over here in this particular image, that's

the south end of Lake Manitoba, this is highway 1, Portage is up this way.

As you can see here, it's not so visible on this image, but the land changes dramatically and land use pattern changes dramatically as you cross Highway 16 going south into very intensive agricultural land. The highway is almost like a direct dividing line there. This area is largely very open in terms of housing. But as you get close to highway 1 and south of highway 1, it becomes considerably denser. We have avoided a lot of the pivot irrigation systems that are in place here. When you see these little round circles here, those are a sure sign of a pivot irrigation point. There is quite a few in this area. They are not always as visible as those ones in particular. There is also additional consideration in that area for additional potential irrigation lands in this area as the soils are relatively sandy.

This is the Assiniboine River crossing. We would be right down in right here on the map. That's the alignment you saw in the previous slide. Coming down, this is a wildlife management unit right here and another one right

here. That's the Whitemud watershed WMAs. There's numerous parcels. There was a request in to create more separation from these WMAs but the opportunities are very limited in this area for routing. It's pretty much impossible to do anything differently here.

You can see additional pivot irrigation operation here. We also know that there is irrigation going on in this field and Manitoba Hydro has worked with the landowner in that area to try and come up with a solution to the problem there.

So we have minimized the diagonal alignment north of here as we come south through here. And then we cross over into some of the sandier sites again. It's kind of a remnant patch of land that's similar to the Spruce Woods area further west. And we'll see that in our next slide.

So the Assiniboine River to PR 305. There's some land use opportunities here in terms of the land uses that are there, mostly pasture and forage crop raising. This is an overview of that area come off the Assiniboine River and start heading east. And this is a blowup view of that

area. This is largely Oak forest in the sandy environment. And we are routing along the road allowance here. And this is what you see in white here is exposed sand. Those are sand dune complexes that are some of the dried up land prairie sites that have been identified by our specialists that represent a rare habitat type for some of the species. Although we have not been able to locate the species such as the skink that is listed in this particular environment, the potential for it exists and mitigation measures are being prescribed to deal with those particular issues.

Another example just a little bit further south in the same complex, well this is a picture just of a typical sand dune complex in the area where the sand dunes are vegetated and stabilized.

Another example of that where we are here on the half mile line and then shift the route over just briefly onto the quarter mile section here. Sorry, this is the mile line and shifting it onto the half mile line to avoid that sand complex there as well as housing issues.

From PR 305 to the Red River, we are

getting into a very intensive agricultural area again. You can see the area that we just looked at over here. That's the sandy soil area with forage crops and pasture lands. And then they transition over into the clay belt of Southern Manitoba and the Red River Valley and the patchwork of agricultural fields.

The routing maintains separation from houses, barns and farm buildings. We have minimized the diagonal alignments as much as possible. The diagonal alignment that you see here is parallel to an existing transmission line. We have minimized splitting of management units as much as possible. It takes advantage of existing linear features including road allowances, the transmission line that I just mentioned as well as major drainage ditches in the area.

At the Red River crossing, the alignment follows the river lots. As you see here, we come off the section grid system onto the river lot systems and you see how they are aligned here. And we have oriented the alignment of the transmission line in the same fashion to minimize the effects of operating on those fields. And then we go back onto the section grid alignment as

we get east of the river.

From the Red River to Riel's converter station, again a very intensive agricultural area with high density housing. We have maximized separation from houses, barns and farms as much as possible, farm buildings I should say, but a very dense environment.

We have minimized the diagonal alignment again and take advantage of existing linear features.

As Mr. Joyal indicated before in the bottom here, we are on road allowance and a major drainage ditch highway 52. And then other road allowances as we go up this stretch in here is on approximately a quarter mile alignment but there is no opportunity there to find any other way through there. It's a very difficult area to route through. As we get back through and cross over highway 1, these are river lots again that are along I believe it's the Seine River that it's oriented with. And then back onto a drainage ditch over here and an existing transmission line that also follows the same drainage ditch. And then we're on Manitoba Hydro property and adjoining the existing D602F line as it goes into

the Riel converter station beside Deacons Corner.

MR. McGARRY: Now we're going to shift speakers again. I'll finish up by reviewing the other components of Bipole III and we'll briefly go through site selection. And I promise, Mr. Chairman, to keep it within that five o'clock deadline. It shouldn't actually take that long.

Just by way of summary following on Mr. Dyck's presentation, the FPR was released with stakeholders in late November 2011 just prior to it being submitted with the EIS December 1, 2011. The approximate length, 1,384 kilometres, 928 kilometres on Crown land, 456 on private and 371 on forested land. So a brief summary of the statistics for the final preferred route.

One thing that happened after, well I guess during the finalization of the EIS, was the Tourond adjustment. Mr. Joyal went over it. I won't spend much time on it. Part of this integration was consultation and route selection. The route selection area didn't meet all of our criteria at the time and we were aware of that in terms of splitting farm units.

Review of that area and other agricultural areas did seem to us like a

reasonable alternative, very late in the process obviously. And we decided to take that to the stakeholders and review it. The feedback we got supported making the adjustments, so we did. And we submitted that after the EIS. That was part of our report filed February 21, 2012 with Manitoba Conservation for that adjustment.

You have seen this map before but that is what became the final preferred route. The last map you saw was the preliminary preferred. So the final preferred route turned south of this corner just for orientation is Highway 59 south, Community of Niverville is in here, Tourond junction there. And where we had originally planned to go and where we ended up with that adjustment to move down south and along 52 and then up a half mile to rejoin the original PPR.

Now the component site selection, a lot of it was technically based initially to find suitable sites because of the technical requirements for a converter station in the north. Ten alternative sites were initially identified and all were within five and a half kilometres of the proposed Conawapa generating site which is currently an investigation camp only. An

optimized selection was selected, partly based on drainage and substrate and it's within the Fox Lake RMA. They were consulted on this process of selecting a site for that converter site.

This is a map of where those options were looked at. The Nelson River here, the Lower Nelson where we have brought the final preferred route into here and here is the Keewatinoow converter station site selected. These are the options, 1A, 1B and so on through to 4 and 4A. And eventually section 4 here was a combination of 4A and 4B to site the Keewatinoow station.

This is the Conawapa access road so it's near the end of the road, within a few kilometres from the end of the road here beside Nelson River.

To build the converter station construction camp will be required and two alternative sites were initially identified and evaluated. There is little difference between those sites environmentally. The preferred site was close to the converter station site. And that was selected initially to be the northern construction work camp site. But subsequent review in early 2012 lead to the selection of the

original existing Conawapa investigation site, and I'll show you that on a map shortly. And what precipitated that was a change in design of the camp using a stackable work camp unit reduced the space requirements. It allowed one to take what are normally one level work camps and make them three level work camps, reducing the footprint, in this case by almost 20 hectares.

So the original plan is to build a work camp here. Here is the proposed Keewatinoow converter station site. Construction camp is to be in this area here down the road, the Conawapa access road. And there still is a plan to build a lagoon and start-up camp here. Through investigation, it was realized that with a modification design work camp, we didn't need a site anymore. And the entire work camp and start-up camps can be built here next to the lagoon site. And that will service the workers for constructing Keewatinoow. So removal of this area reduced the footprint for the site.

Collector lines and construction power lines are required. There's five 230 kV lines. I think Dr. Bailey might have reviewed some of this. There is five lines that need to be built, four

from Henday to Keewatinoow, one from Long Spruce to Keewatinoow, plus we needed construction of power lines, a 138 kV line. So a new right-of-way was assessed that was based primarily on technical and functional feasibility to route through that area, and considering NERC reliability standards related to line separation.

The right-of-way has been investigated for these various biophysical components and others, including the First Nation lands, TLE land use and heritage and cultural resources. The field studies and evaluations did not identify any particular concern with that routing.

So this is the main routing here. Here is Keewatinoow station you saw in the earlier slide. The Nelson River down here. We have Limestone Generating Station here and the major connection point for 230 kV AC line is from Limestone or Henday converter station in a straight line here and then back down into Keewatinoow station. There is one additional line that goes to Long Spruce, that blue line going this way. And the dashed line is a 138 kilovolt construction power line and its termination in a small switchyard right here.

It's been mentioned the northern ground electrodes are required for each converter station. Initially the sites were technically driven for geophysical properties related to ground conductivity and ground potential rise. Thirteen sites were originally considered for technical, biophysical and socioeconomic perspectives.

There are some bird sensitivities, riparian areas, and there were some reviewed. Aquatics, amphibians, reptiles. Vegetation identified an S3 level plant of conservation concern the snow willow, two sites. Mammals identified coastal caribou as infrequent users of the area. And the site closest to existing access was preferred consistent with land use. I'll show you that in a minute.

Heritage resources identified provincially registered archeological sites at two of them, eight and nine. But the best geophysical characteristics were at 4, 6, 7 and NES6 was chosen, NES being Northern Electrode Site 6. So there was an array of the sites that were in the main Keewatinoow Limestone areas. Some others were also looked at originally for technical

feasibility. These are the ones that were looked at by the biophysical and socioeconomic study team.

This is the site that was chosen, adjacent to the Conawapa Road NES 6 for orientation. Henday, your Limestone is down here, Nelson River again, and this is the Conawapa access road. And you might recognize the rail line heading to Churchill too as well. The community of Bird is just down over here.

Now to site ground electrode is one thing but you also have to establish a line to it, between it and the station. Two options were considered for the electrode line in the north. An existing right-of-way was cleared in the 1980s but never used or to parallel the Conawapa access road. And the existing right-of-way was chosen to link the two components, converter station and the ground electrode.

Again, just quickly showing that. There is the Keewatinoow site, Nelson River, Limestone, the Community of Bird is on this map for Fox Lake Cree Nation. And the electrode site and its connecting low voltage electrode line.

The Riel converter station itself is

supposed to be located at the existing Riel station. Manitoba Hydro property owned in the RM of Springfield. The site, as previously explained, is under development. Part of the site is under development now for Riel sectionalization which is a separate project and licensed separately. The actual converter station for Bipole III has not started any form of construction.

Station site here east of Winnipeg, Mr. Dyck I think pointed out too, this is near Deacons Corner. And you'll see the line coming into the Riel site.

Southern ground electrode needed to be nearby us within 50 kilometres. Seven sites were initially evaluated. Each site is a square mile in area, evaluated for biophysical and socioeconomic criteria. Through that process, there is a preference established for site one. And for biophysical perspectives, it's in an open cropped agricultural land. Site one had some land use issues with it in terms of ownership and housing. And adjacent site 1C was identified immediately west of that site which had very low interference effects. And in terms of the

technical criteria, it also took care of housing and land ownership issues related to site 1. And that selection is consulted with the R.M. of Springfield, landowners. And we did have a public open house in Anola in March of 2011.

Site 1C was selected. Here are the sites investigated, Riel over here, City of Winnipeg, the preferred route. Sites over here to the east. Most of them east of Anola, that's Highway 15. Site 1 just north and west of Anola right there. A little closer view, here is highway 15, Community of Anola and the Beausejour road, which number I can't remember, 302. Several of the sites investigated over here to the east. Here is site 1 here and then the preferred site 1C adjacent to it, just south of Hazelridge.

And as further north, we needed a line to connect the two components, a low voltage line between the southern ground electrode and the Riel station.

Initially we looked at a number of locations but we narrowed it down to once we decided on a pole structure and dimension, it was known that now we can route this potential electrode line, mainly on existing road

rights-of-way and using the Cooks Creek diversion right-of-way. So there is no requirement to acquire additional private land to route this line which we thought was probably a good solution because of the large private land holdings in the area.

So the route that was selected, and this came after EIS submission and it was the subject of another report that was submitted to Manitoba Conservation in February of 2012. You see the purple line here between the Riel converter station, following existing roads of rights-of-way, turning on to the Cooks Creek diversion right-of-way and following that all the way east, again going back to road rights-of-way and to the preferred ground electrode site.

So we don't believe we need any private land to make this routing because these are single pole structures, approximately 40 feet high and fairly innocuous and looked like common distribution lines in a rural environment.

So after that, Mr. Chairman, we have taken up a fair bit of time this afternoon to go through the whole site selection process. That is our presentation. In summary, it's been a very

comprehensive time-consuming multi-stage process. We have spent almost three and a half years on it. It's been heavily integrated with the public consultation EACP program. We got to select the final route in that period which we think is a reasonable solution to routing for the project study area. There is intensive evaluation of alternatives and we did record that in the route selection matrix and other materials that lead to that final preferred route selection.

Keep in mind, it is a balanced selection process and we tried to balance all those interests. The multiple interests going from north to south across five ecoregions, as you can imagine, was a difficult task. There's no question. But in the end, I think we did a reasonable job in balancing all those interests in selecting a route that does minimize potential effects on people in the environment.

So with that, Mr. Chairman, we retire our presentation and turn it back to you.

THE CHAIRMAN: Thank you, Mr. McGarry and others on the panel this afternoon.

Tomorrow we have two more presentations in the morning from Manitoba Hydro,

one on the north and another one on construction of the project. We anticipate that those will finish in the morning and in the afternoon we will begin cross-examination and questioning of various hydro officials on the data presented yesterday, today and tomorrow morning.

Now what I am going to propose is that we're not going to have a mass cross-examination that when you come up to cross-examine, you cover all five segments but we'll do it in the five segments that have been presented. So the first up for cross-examination tomorrow afternoon will be yesterday afternoon's presentation, the project overview. That will be followed by the consultation site selection, et cetera. That will keep a little bit of coherence to the cross-examination process.

I don't know, Mr. Bedford or Ms. Johnson, do you have any further business that we need to address this afternoon?

MR. BEDFORD: No.

THE CHAIRMAN: Thank you. Mr. Madden?

MR. MADDEN: I just wanted clarification. So we'll begin with these panels that we heard today as opposed to going back?

THE CHAIRMAN: Tomorrow afternoon when the cross-examination starts, I understand that Hydro may have all of their officials up at the front at the same time. But as I said, we're not going to have cross-examination on all five presentations. We'll take them in turn. So the first one to be cross-examined tomorrow afternoon is yesterday's presentation which was a site overview, Mr. Tymofichuk et al. So that will be followed by the consultation process that we heard about earlier this afternoon, the site selection, et cetera. That will take place over the next two and a half days, so tomorrow afternoon, Thursday and most of Friday.

MR. MADDEN: Right. My only concern is I would like to have transcripts to put back to people just seeking clarification.

THE CHAIRMAN: Well, as I noted yesterday, we make best efforts to have transcripts posted by the following day. And we will do our best to do that, but we can't guarantee it.

MR. MADDEN: Right. And the Aboriginal consultation panel? Is that tomorrow as well? You just said construction in the north.

My understanding was there was --

THE CHAIRMAN: I'd have to look at the schedule but I think the Aboriginal consultation panel will come up when we return to Winnipeg sometime after October 29th.

MS. MAYOR: Mr. Chairman, perhaps I can assist. The presentation on the north will include the aboriginal consultation tomorrow morning.

THE CHAIRMAN: Oh okay, I stand corrected then. I wasn't aware what the north presentation is going to be.

MR. MADDEN: There are Aboriginal people in the south. So are we going to be able to question on that?

MS. MAYOR: Yes.

MR. MADDEN: Okay.

THE CHAIRMAN: And ultimately, Mr. Madden, when we get towards the end of this presentation, you will have an opportunity to ensure that all areas have been canvassed to a reasonable degree.

Mr. Mills.

MR. MILLS: Mr. Chairman, I am concerned that meshing the aboriginal consultation

with the north just doesn't truly represent the Aboriginal consultation value and purpose of this.

THE CHAIRMAN: Perhaps you should have just called it the North and Aboriginal Consultation.

MR. MILLS: Well our client is not in the north.

THE CHAIRMAN: I'm aware of that.

MS. MAYOR: Mr. Chairman, the presentations are in fact two separate presentations. There is one individual that will be speaking to the aboriginal consultation process. There's another individual that's speaking to the north. We have put them together because there is some overlap, but they are separate presentations and you'll be able to ask questions on Aboriginal consultation from the north down to the south.

MR. MILLS: Thank you.

THE CHAIRMAN: Thank you, Ms. Mayor. And again, I repeat what I just said to Mr. Madden, you will have ample opportunity to canvass, within reason, every issue that we need to canvass.

MR. MILLS: We felt it was worthy of

more time than a half of a half. Thank you.

THE CHAIRMAN: Ms. Craft?

MS. CRAFT: Thank you, Mr. Chair. I'm wondering if the order for the cross-examination is going to be the same order that was adopted for the opening statements?

THE CHAIRMAN: Yes.

MS. CRAFT: In which case, I have spoken to many of my friends. Mr. Williams is in cross-examination at the Public Utilities Board and will make best efforts to be here.

THE CHAIRMAN: I'm sorry, I couldn't hear you.

MS. CRAFT: Mr. Williams is in cross-examination at the Public Utilities Board. And I have spoken to some of my friends and we're hoping we'll have some leeway in terms of having him here to cross-examine.

THE CHAIRMAN: That's perfectly fine.

MS. CRAFT: Thank you.

THE CHAIRMAN: We have just sort of adopted that to have some coherence to the process. But if you want to make your own side deals, as long as you don't sneak it in twice, if you want to make arrangements to shift it around,

that's no problem.

MS. CRAFT: We thank you for that.

THE CHAIRMAN: Just let Ms. Johnson know, the commission secretary.

MS. CRAFT: In terms of exhibits, I'm also wondering if the exhibits will be posted, for example, the power point presentations that were delivered today, if they will be on the website and available? I know that they will be useful, in some cases, a useful tool for cross-examination if we are referring to marked exhibits.

THE CHAIRMAN: I wouldn't bet that they'd be on our website by tomorrow because we are all here. And as you probably know, we have a limited staff and our entire office is in this room most of the time.

MS. CRAFT: In that case, could I suggest for the next round of hearings at the end of October, that we have the power point presentations in electronic form. I wonder if the other participants noted that it is difficult to read some of the slides but it's also very difficult to read some of the paper slides as well. So if that's at all possible, we'd really appreciate it. And for those of us who are using

laptops and trying to be environmentally friendly, we could use our laptops to view those power point presentations and also have the opportunity to zoom in and see the content better.

THE CHAIRMAN: That's a very good suggestion. We'd like to save a tree or two. Manitoba Hydro has heard that suggestion and we'll just ask them to make best efforts to achieve that. No guarantees but best efforts.

MS. CRAFT: Thank you, Mr. Chair.

THE CHAIRMAN: Any other matters we need to deal with this afternoon?

MS. JOHNSON: Excuse me, Mr. Chairman, we have to put these presentations on record.

THE CHAIRMAN: Yes.

MS. JOHNSON: Mr. Joyal's presentation will be MH 045 and Mr. Dyck's and Mr. McGarry's will be 046.

(EXHIBIT MH 045: MR. JOYAL'S PRESENTATION)

(EXHIBIT MH 046: MR. DYCK'S AND MR. McGARRY'S PRESENTATION)

THE CHAIRMAN: Thank you. Well once again, we moved along very quickly and finished a little bit early. Hopefully we can keep this up

throughout the process, make life a little easier for all of us especially in these wonderfully comfortable chairs that we're sitting in all day.

So we will adjourn now and be back here tomorrow at 9:00 a.m.

(Proceedings adjourned at 4:20 p.m.)