

AIRSHIPS TO THE ARCTIC

SYMPOSIUM III



SUSTAINABLE NORTHERN TRANSPORTATION

HELD AT WINNIPEG, MANITOBA, MAY 31 - JUNE 2, 2005

Presented by:

The University of Manitoba
Transport Institute



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AIRSHIPS TO THE ARCTIC III
Sustainable Northern Transportation
PROCEEDINGS

Held in Winnipeg, MB
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DEDICATED TO NORMAN J. MAYER, AIRSHIP ENGINEER

Knowledge is the key intangible input in the production of all goods and services. For the airship industry the intangible is the accumulated body of aeronautical engineering knowledge. The unofficial Dean of Airship Engineering in North America is Norman J. Mayer. His professional career in the airship industry spans 60 years of service to the private sector and government. Norman Mayer began his employment with the Goodyear Zeppelin Company in airship design, research and flight test. He also served within government as a lighter-than-air specialist in the U.S. Navy and in NASA in advanced space structures and materials. In recent years Norman Mayer has served as a consultant contributing his knowledge to all the major airship companies.

His long career provides a link between the achievements of a prior generation of airship builders and the new wave of professional engineers that hope to create airships that can be used to provide sustainable transportation for the Canadian North. As a representative of his profession and all the scientists and inventors that have contributed to the development of airship technology, the proceedings of Airships to the Arctic III are dedicated to Norman J. Mayer.

Foreword

The Airships to the Arctic Symposia were created to provide a forum for the discussion of the supply of a new generation of airships and the demand for their services in northern and Arctic regions. The third Airships to the Arctic conference opened with a public lecture by Canada's foremost airship engineer and professor, Dr. Jim DeLaurier of the University of Toronto. Dr. DeLaurier's Project Ornithopter is a story of invention, science, learning and persistence that has put Canadian aerospace engineering at the forefront of this field. It is this body of engineering knowledge that is leading to a revival of the airship industry worldwide.

Sustainable transportation is the theme of the Airships to the Arctic III. Sustainability has several dimensions that touch upon environmental, social and economic issues. In the proceedings of this conference attention is directed to each of these aspects of sustainability.

Environmental sustainability is being affected by climate change in the Arctic. Warmer average temperatures are diminishing the ice cap on the Arctic Ocean, melting permafrost soils and testing the ability to operate winter ice roads. Most aspects of transportation are made more difficult with the exception of sea lifts that may have a longer shipping season to serve coastal communities. Transportation can also have negative impacts on the environment. In particular, great concern is being expressed regarding the impact that the construction of all-weather roads has on the wild-life and eco-systems of the Boreal Forest.

Social sustainability is a sliding scale that changes with improvements in the general standard of living. Most Canadians enjoy a standard of living that is common in the G8 countries. This is not the case for residents of the First Nations Indian reserves and other remote communities. The cost of transportation makes the basic food basket in remote communities 2.5 times more expensive than it is in the cities. Isolation leaves the remote communities with double digit unemployment levels, general dependence on welfare supports, second rate public services and bad health. Unbalanced diets and inactivity are linked to an incidence of Type 2 Diabetes that affects 25 percent of the First Nation populations. As the general standard of living in Canada has been rising, the social sustainability of northern communities has been stagnant or falling.

Economic sustainability requires access to viable commercial markets. Expensive transportation limits economic development and reinforces the inadequate income problem in the North. Fish and furs are the only backhaul products of the remote communities that can bear the cost of transportation. At the same time, the cost of providing services, such as health care, keeps rising. This situation can only be rectified by a revolutionary change in the cost and availability of transportation, such as is promised by a new generation of airships.

A new generation of cargo and passenger airships could address these problems and provide a more sustainable means of transport for the North. The demand for airships is diverse in scope and potentially very large. Applications discussed at this conference include the shipping needs of northern mining, the movement of oversized equipment and emergency response in remote areas. Logistics requirements can also be assessed from a market segment and a sectoral perspective. The transportation requirements for housing

construction are described for remote Indian Reservations. A broader approach is taken to the transportation needs of the State of Alaska. These presentations illustrate the range of demand for airships and identify applications that exist for 10 tonne, 20 tonne and larger cargo airships.

The last presentation of the first day provides a bridge to the supply requirements for the airship industry. Existing airships are not certified for operations in icing conditions and cold weather. For airships to be truly economic and sustainable in the North, they must have the capability to operate year round. Thompson Manitoba is a recognized location for cold weather testing of transportation equipment. A delegation from Thompson welcomed the airship industry to begin a dialogue for cold weather testing and certification at their community.

The supply side of the airship industry is represented by six different companies. Although progress has at times seemed painfully slow, these presentations indicate steps are being taken on several fronts to advance the technology. The Zeppelin company announced the stretched version of their successful NT series that will be available in late 2008/early 2009. The new model (NT14) will carry 19 passengers and will enjoy a larger operating envelop than the existing 12 passenger model (NT07). Zeppelin has also found a new and promising use for its airship in the geological survey market. 21st Century Airships reviewed their progress in high altitude airships and announced their intention for a “round the world flight” at 30,000 feet. This flight is planned for early 2006.

Pioneering efforts in rigid airships and hybrid aircraft were presented by DELCON, Ohio Airships and HAC. The commonality of these three airship projects is the focus on the cargo segment of the market. Each of these approaches is technically different. A diversity of designs is common in the early development of any technology and it is impossible to predict which approach will dominate the freight market. What is clear is that all three approaches are going to be tested and competition will sort out a leader.

The surveillance and communications markets were addressed by the American Blimp Company (ABC) and Techsphere. As security issues come to the fore, the endurance and cost advantages of airships become more attractive. ABC is focusing on the low altitude applications, while Techsphere is addressing the high altitude market. While these applications may not be as pertinent to sustainable transportation for the North, advances in any aspect of the airship industry will benefit all manufacturers.

It has been said that anything can be built that can be imagined, providing that you have the materials. Two technological advances that are propelling the building of airships are composite materials and UAV flight control systems. Composite materials can provide the strength to lightness ratio that enables airships to be constructed that are safe and efficient. UAV flight control systems create the opportunity to minimize the costs of long endurance operations and are crucial for high altitude operations. These presentations remind the conference of the intangible factor that is essential for the successful expansion of the airship industry: engineering knowledge. These technologies represent only two of the many components that make up an airship, but the level of sophistication described in these presentations suggests the capability inherent to build the next generation of airship technology.

The keynote speakers of the conference provided insights and depth to the conference. Dr. Heather Dean, Richard Van Treuren, Ken Young and Dave Murray added substance and thoughtful comments to the attendees. Also, the delegates were greeted by our elected politicians. His Honour, Mayor Bill Comaskey from the City of Thompson opened the public lecture, the Honourable Ron Lemieux, Manitoba Minister of Transportation and Government Services welcomed delegates to the first day of the conference, and the Honourable Jim Rondeau, Manitoba Minister of Industry, Economic Development and Mines welcomed delegates to the second day of the conference.

The third Airships to the Arctic Symposium would not have been possible without the support of many volunteers and the financial assistance of our sponsors. It is also important to note that all speakers contributed their time and travel expenses to make this conference possible. The list of sponsors and brief speaker biographies are presented at the end of the document. The planning and execution of the conference spanned 12 months and several members of the Transport Institute were involved. In particular, Sharon Cohen and Kathy Chmelnitzki were directly involved in the organization of the conference and preparation of the proceedings. Finally, we appreciate the patience and participation of the speakers to make these permanent proceedings possible.

Dr. Barry E. Prentice
Transport Institute
Professor, Supply Chain Management
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Airships to the Arctic III

Welcome

Mayor Bill Comaskey
City of Thompson

It is my pleasure to welcome you to the Airships to the Arctic public lecture and reception this evening. The City of Thompson is keenly interested in airship technology that would be beneficial to, not only our First Nations communities, but the mining and energy resource industries. The possibilities are endless.

A new generation of cargo carrying airships presents the only reasonable means of reducing greenhouse gasses as well as opening up our vast country for development without permanently damaging the terrain. I believe that Thompson would be an ideal location for airship testing. We are commonly referred to as the “Hub of the North.” Our origins stem back to 1956 when Inco Limited discovered an immense nickel-ore body. Since that time, our economy has diversified into areas such as Aboriginal organizations, construction, education, government services, health and transportation. We are also known as the home of winter weather testing. In fact, Ford has officially named Thompson their cold weather testing site for North America.

*In honour of **Norman J. Mayer**, Airship Engineer, Goodyear (retired)¹*

Greetings to all. Please accept my apologies for not attending. Demands on my time have prevented my participation. However I would like to offer a few comments that may be of interest to the conference.

¹ Presentation by Richard Van Treuren

During my lifetime I have seen airships rise and fall in acceptance and popularity. Rigid airships were a frequent sight in the sky when I grew up. The last of that era, the Hindenburg, would make its majestic way past my place of employment in New York on its way to Lakehurst.

When I began my professional career at the Goodyear Air Dock, the name painted on the side of it was Goodyear Zeppelin. A reminder of the company's efforts on rigid airships and its hopes for commercial applications. However, inside the building a new beginning along different lines was taking place as a team of engineers were busy designing an updated version of the K ship for the US Navy's anti-submarine warfare. Fortunately, I became part of the team and worked with a group of German engineers who had immigrated to become Goodyear's core of airship experts. The K ship proved itself in anti-submarine missions during WW2 effectively preventing attacks on coastal shipping when serving in convoy patrols.

The success of the airships in the war stimulated the navy to develop larger non-rigid types during the decade following the war. This effort allowed the incorporation of some advanced technologies such as improved materials, automatic pilots and pressure controls. The mission equipment was similarly improved with advanced radar, sonar and magnetic detection devices. The Navy discontinued the use of lighter-than-air in the 1960's thus creating another low point in the LTA history curve. A common thread in all this history is that during their period of highest interest and use, airships were the only practical solution for important needs.

Now other missions appear to establish unique roles for airships. One example is heavy lift point-to-point transport. This requirement may not be necessarily satisfied with the application of old technology, but rather by searching out new concepts and by applying advances in structures, materials and aerodynamics.

The financing of work to initiate and identify potentially successful designs will require government support since military, as well as civil applications, have been identified. At present, I happen to be part of a current effort on the subject.

Conferences such as this Airship to the Arctic Symposium are important to emphasize the need for solutions for transport and to maintain an interest in the subject. I wish the conference every success and appreciate the honour of being recognized.

Ornithopters: History and Future

Dr. Jim De Laurier

Professor

University of Toronto Institute for Aerospace and Project Ornithopter Inc.

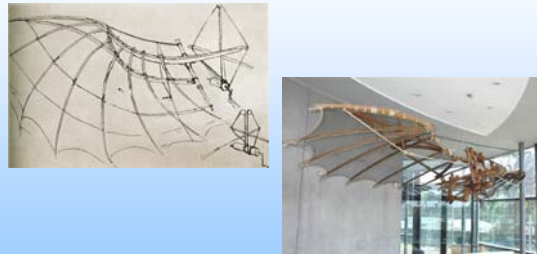
One thing about airships: if you fill them with Helium and you get your calculations right, they will fly. The challenges begin with issues such as flight dynamic analysis, controls, and stability. A lot of people do not understand that the flight dynamics of an airship are more complicated than a Boeing 747. You have bizarre things like apparent mass effects and so forth. The giant airships are like trying to move a cow by poking it with your finger. The notion of station keeping is a big challenge for an airship. The bottom line is that if you do your arc and median calculations the airship will lift.

An Ornithopter, however, is a different story. There is more challenge in getting it into the air. An Ornithopter has an open structure, and is built using appropriate materials for the loading placed on it. The space frame structure is metal, the vertical tail is wood, and carbon fibre is used on the front spar of the wing.

For aerospace engineers, weight is the enemy. Our whole careers are dedicated to developing structures that are stiff enough and strong enough but, most of all, light. For any properly designed airplane, the volume is about 98% air, which is why they are called airplanes. That is the lesson.

Figure 1

Da Vinci Ornithopter Concept, 1483



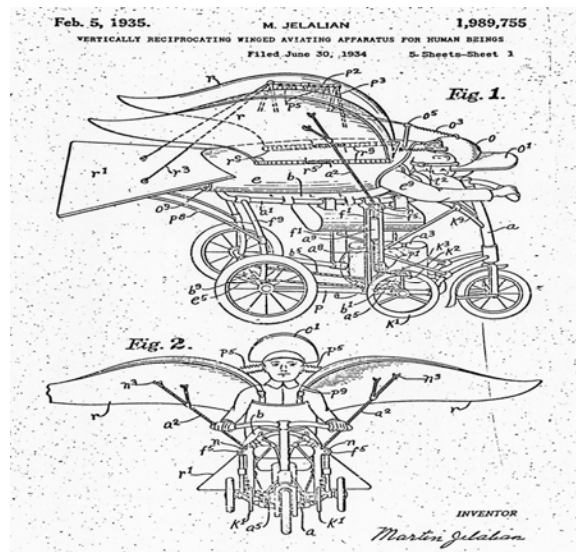
To discuss Ornithopters we start with Leonardo Da Vinci who made the first serious attempt to build a flapping wing aircraft. Modern flight analysis when applied to Da Vinci's aircraft would clearly show that this would not be capable of flight or stability. None-the-less, this shows really good thought. First this was a human-powered airplane. Da Vinci's system clearly showed that all the major muscle groups are being used to flap the wings, not just the arms and legs, but the torso also. Da Vinci clearly understood that you do not have to imitate a bird's wing with the feathers. This design is very much like a bat's wing. As far as I know, this is the worlds first successful Ornithopter. It is a rubber band powered model developed by Alphonse Pénand. He built this out of materials of the time, which are rattan and bamboo, and it was powered by a twisted rubber band. It flew successfully in 1874. People have successfully flown plastic replicas called 'Timbirds'. For model Ornithopters this solution has persisted. It is a viable solution for a flying model, but it does not offer a solution for a larger scale aircraft.

It has been heartening to me that serious researchers and aircraft designers have looked at flapping-wing flight throughout the years. One of these was Alexander Lipish, he designed the Delta wing aircraft, and was responsible for the design of the ME 163 rocket interceptor. In 1929, Alexander had a human powered Ornithopter built. It looks like a glider, but it was pretty much dedicated to being a Ornithopter. It was built from scratch of the materials of the time, which were light-weight fabric, and woods such as spruce.

In the time-honoured fashion of most professors, he got his students involved. The pilot was a student named Hans. The other students would tow Hans into the air then release him, and Hans would pump with his legs. This aircraft would not sustain flight but it would go further with wings flapping than without the wings flapping. He called it a powered glide. At any rate, Lipish was not disappointed because it was showing him that something positive was going on with his solution for flapping flight. Lipish in his article about this in the Journal of the Royal Aeronautical Society years later said that on a Friday, Hans came up to him and asked permission to go to the next village to visit his girlfriend that weekend. Lipish said you can do so if you can make this thing fly longer and further than it ever has before. Hans was really inspired and he did that and went to the village. You can say that this was justifiably the first hormone-powered Ornithopter.

In 1959, a researcher named Heartman built an Ornithopter with birdlike wings. He did not have the same aeronautical background as Lipish, but I admire his effort because he elucidates clearly what an Ornithopter is allowed to be. It does not have to be a lavish imitation of a bird. You address the issues that have to be addressed such as stability and control as best you can. Some proto-Ornithopters were towed into the air behind an automobile but again it was powered by glides and did not sustain flight.

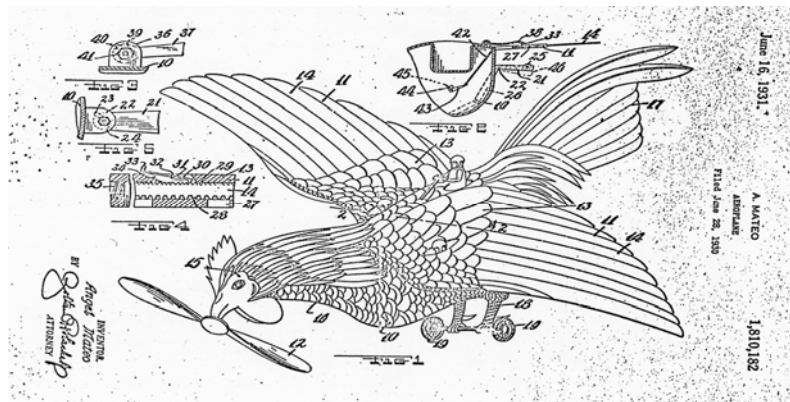
Figure 2



This is a patent drawing for a bird suit. Look closely. This seriously over designed under carriage actually travels with the pilot. You would think that at least this thing would be

dropped and the bird man would take off, but no. It has a little steam engine. For pitch control it had a very unique feature. I am glad he patented this because this could set a fashion statement, it is the Canard hat. The Canard is a moveable control surface. As you pitch your head up and down you can provide pitch control. I suppose if you are saying yes or hello to someone you would go into a phugoid oscillation. This is usually the kind of thing that you see in association with flapping flight, unfortunately.

Figure 3



Here is the chicken plane. This designer hedged his bets and has a propeller too! As opposed to the previous designs, there is a very inadequate under carriage here, but there are three people in the aircraft. I do not know what happened to that project.

My daughter, April is shown here holding her pet bat; the bat's name is Cassandra. It is a big brown bat that is native to Ontario. April had Cassandra for many, many years until Cassandra died of old age. What Cassandra is showing us here is that you do not need feathered wings for successful flight. A membrane wing can be every bit as efficient as a feathered wing.

Bats have an enormous size range from 2 meter span down to the size of a moth. It is a successful solution for flapping flight. The energetics of flapping are very good for a bat; there are bats that migrate. Even though they look a little mouse-like, they are not flying mice, they are not even close to it. They are very intelligent creatures with the intelligence of a ferret. They also live for a long time, 25-35 years. That is because they sleep most of the time. The only time they wake up is to eat and to reproduce. I told you they were smart!

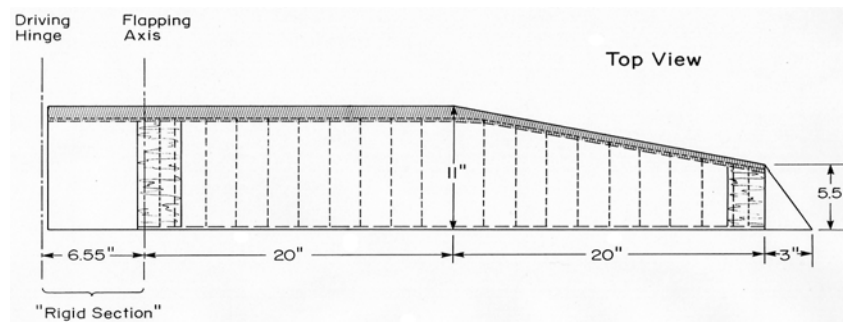
Unsteady Aerodynamics:

When you look at a bird or bat flying in a wind tunnel, there are a lot of things going on with the wing. There is twisting, fore and aft motion, and there is a tip flick. People write articles about this. The secret of bird flight is usually the title of the article. It is down right metaphysical. They are talking about the importance of this, that and the other things without any quantitative information behind it.

We hypothesize that there are two main motions that produce the thrust and lift that we want. There is the plunging motion and the pitching motion; these give rise to forces on the wing. These are the normal forces, which are kind of like lift, and there is a drag force due to friction and camber. The secret of our mechanical flight, is called leading edge suction. Not all flapping creatures have leading edge suction but our particular flapping device does. Another feature of our wing is aero-elastic tailoring. That term has been used for a variety of things, usually high speed jets. The way the wing is built is so that the spar is right at the leading edge. When you do that it means that the centers of pressure are behind that spar and when the wing flaps up and down those centers of pressure being behind the spar will twist the wing. The motion that we give to the wing is flapping. We impose flapping on the wing and the twisting comes about by the aero-elastic response of the wing as opposed to mechanically making the wing twist.

We like this construction because it is lighter and it comes very close to the way animals do it. But, you have to get the torsional stiffness of the spar just right. If the spar is too compliant, if it twists too easily, the wing will over twist and that takes energy out of the air and you do not fly. If you make it too stiff it means that there will be flow separation and again you will not fly. We had to develop a computer code and test it out in order to be able to calculate this because once you have built the wing there is not a lot that you can do about it. You are stuck with that torsional stiffness that you have designed into the wing. That is pretty important.

Figure 4



This rigid portion of the wing called the center panel. This is a graphical illustration of the wing. It is driven up and down by the mechanism. These hinge points are attached to the outer panels, which are free to rock on vertical links. As one part of the wing goes up, the other part goes down.

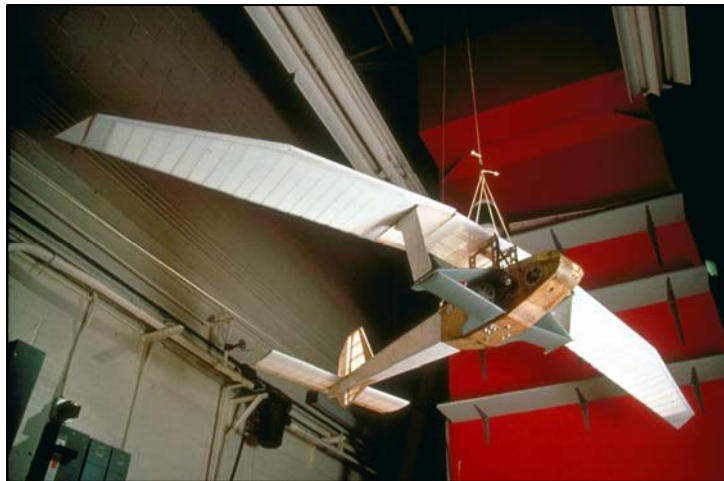
Test flights of the Ornithopter were conducted in Newton Robinson, a rural location north of Toronto and filmed by the National Film Board. The model flew with wings, flapping at about 3 1/2 cycles per second, twisting at about plus or minus twenty degrees at the tip.

With the successful flight of the model, felt that we had the key to building a full scale aircraft. The fuselage is aircraft grade aluminium, the vertical tail is wood, the horizontal tail is Kevlar and carbon fibre, sort of like the wing construction without the sheer flexing. This fuselage and tail was built for us by volunteers from the Recreational Air Craft Association. We did not use a moulded carbon fibre fuselage, because of time constraints, it cannot be modified, and it is very tough to repair. An open frame design does not have any of those limitations and it is very light.

Let me tell you a little bit about the construction of the wing spar. There is a sheer web which is 1/8 inch aircraft grade plywood and cap strips which are laminated carbon fibre. Now here is where carbon fibre makes sense. In a limited space where you need the strength and stiffness. The rib-lets are cut from aviation grade plywood and the wing is ordered with five layers of Kevlar.

Once the layers of Kevlar are down, the whole thing is vacuum bagged to press it down firmly. I have to say in all honesty that I believe this is one of the most complex wings in all of aviation history. Not from the number of pieces but from the nuances that you have to consider. There is even a pre-twist, the wing has a certain amount of pre-twist because if it is compliant under aerodynamic loads then it flattens out to the flatness that you want. There is a lot of subtlety in the operation of the wing.

Figure 5



This is the complete aircraft structure in 1996. The landing gear was pretty short and has been made longer in subsequent years. You can see the three panel design here, the centre section that does not shear flex and the outer portion that does.

The beating heart of the Ornithopter is the drive train and engine. The engine, donated to us by Hokan Colting, is a three cylinder radial engine, made in Germany that produces 24 horse power.

The drive train was designed and built by Gerry Harris. We did quite a parametric study on the drivetrain. We looked at gears, harmonic drives and belt and pulleys. It turned out that the lightest and most efficient system was chains and sprockets like the Wright brothers used. We used a four stage system of chains and sprockets. The engine has a high RPM rotary motion that has to be converted to a low frequency oscillating motion. We do this with a mechanism called a scotch yoke. In this instance the last stage involved a crank arm that is going around.

This is not the future of Ornithopters. The engine at 160 pounds is the weight of the pilot. In any future Ornithopter you are going to have to take the fuel and somehow turn it directly into oscillating motion. This is not the way to do it.

Our first test in 1996, demonstrated that we could go up and down the runway by flapping but we had some structural problems on the wing tips that we had to address that. That was the beginning. Next year will be our 10th anniversary of testing. We have been at this a lot longer than we thought.

The aircraft is registered with Transport Canada, and has a special certificate of airworthiness that allows us to do the testing that we have to do. The plane is called Ornithopter Model Number 1. Serial number 00001. One thing about the Ornithopter; since everything is hinged, it is easy to disassemble and put it back together.

Another trademark of Ornithopters is it is not a quiet aircraft. There is a lot of creaking and groaning going on in the structure. Some of the creaks and groans are normal. You have to know which are normal and which do not sound right.

Starting the flapper, we do not have an onboard battery, we have an external battery. It is a direct drive, there is no clutch. As soon as the engine starts, the wings start flapping.

Question

How many Ornithopters are there?

Dr. DeLaurier

You mean full scale? As far as we know this is the only one in Canada. There are a couple of teams that are trying to build an Ornithopter. One is at Guelph University and our former pilot is trying to build an Ornithopter of her own. I'm not aware of any others, but then you never know. Around the world? I've heard rumblings about a team in Germany and a team in France. The most serious efforts have been made in Russia, they have a long history of interest in mechanical flapping flight. There is a fellow by the name of Vladimir Toperov who had been working on Ornithopters and evidently had a human powered,

dragonfly design that did a powered glide after being towed into the air. It was still quite an accomplishment.

Question

Could you tell us about the efficiency of Ornithopters and their potential use?

Dr. DeLaurier

The propulsive efficiency is really good because the larger the actuator disc on a propeller the more efficiently it operates. With a flapping wing your effective actuator area is huge so propulsive efficiency is well above the 90% bracket. The disadvantage is of course the weight of the drive mechanism and the extra drag of the outrigger struts.

As far as what an advanced Ornithopter might look like, well, nothing like this. I could envision it as a very efficient, short take off and landing aircraft that is capable of high subsonic speeds. A lot simpler than a tilt rotator design.

People ask me what kind of practical application this could have? None whatsoever right now. We are doing it for the beauty of it, to make history. Think of all the things that have been done in aerospace history. No one yet has realized humanities most ancient dream of mechanical flapping wings. For immediate application, an air show and exhibition. Imagine what that would be like, you are there at the air show and here comes an Ornithopter flying past. It wouldn't have to do loops, it wouldn't have to blow smoke, would not have to fly in formation, just flying by would be unique. That would probably be the first money-making, practical application for an Ornithopter. In the early days of airplanes that was one of their main applications.

Question

Is the Ornithopter certified?

Dr. DeLaurier

It is a special certificate of air worthiness, it's not certified in the sense that I could fly all over the place. A special certificate of air worthiness limits me to take off from the

Bombardier runway, fly about one wing span height and then come back down on the runway. I am not allowed to do a circuit because we are in a populated area. I would not want to anyway. To make history, it is enough to do a Wright brother type flight

Question

Is the Ornithopter stable?

Dr. DeLaurier

The aircraft is designed to be inherently stable. Just like the model. The fellow who did the flying for the model was an experienced RC pilot. He said it was just a real sweetheart to fly. You would fix the controls, take your hands off and it would fly stable. We are doing that for the post field aircraft. The wings flap to a higher angle on the up angle than on the down angle so there is an average dihedral angle that gives it lateral stability.

Question

Have you considered applications for small robotic Ornithopters?

Dr. DeLaurier

We had been approached about that. One thing about when Mr. Bill flew, all small furry animals disappeared fast. It might be used for things like chasing away nuisance animals in an airport or that sort of thing. These research models are really complicated. They would not be something that you would mass-produce. If you wanted to stay model size like that, you would go with a fabric wing, a membrane wing like the Pénand Ornithopter. People who build model airplanes have approached me for plans for Mr. Bill, but it just would make no sense for them to do that. They would be better served, if they were flying a model, to have a simpler more robust although less efficient wing design.

Question

What are the performance specifications of the large Ornithopter?

Dr. DeLaurier

It is almost like a single design point airplane, kind of like the pioneer airplanes. The max speed, take off speed and cruise speed are really close to each other which is about 52 miles per hour. We have accelerated to 52 miles per hour on the runway. But then something would go clunk and we would stop. We can say justifiably that we hold the world's land speed record for Ornithopters.

Question

You have been working on the project for many years. Why has it taken so long to undertake another manned flight?

Dr. DeLaurier

Good question. Usually it is something breaking. The last time we were out was 2002, we were tearing down the runway, we've done all of our computer simulations, Jack had sat through simulations. He knows how to keep the nose down, keep the bouncing minimized and we are good to go. All of sudden, bang, something snaps. Turns out that there was a weld that was poorly done, the weld fractured on one of the support struts and it caused some extra damage. A lot of internal loading goes on in an Ornithopter. Also we discovered that the carbon fibre undercarriage was starting to delaminate. This was because we were designing it like a metal undercarriage with straight areas and corners. It turns out that the loads for a laminated, glued structure are really high at those corners. The latest Ornithopter has a bowlegged undercarriage and it took us a year to get that undercarriage built then another year to do the other repairs. Now we are back out in 2005. That is the trouble with an under funded project, something like that shuts you down. If we were NASA we would be out there the following week. There would be someone working day and night making something for us.

Question

Can the Ornithopter operate in windy conditions?

Dr. DeLaurier

It will not tolerate any cross winds because we do not have direct lateral control. It could tip or start bouncing on one wheel or possibly the leeward wing might make contact with the runway. Once we are in the air it is not a problem. It is a stable aircraft. It turns by means of what is called lateral directional control.

Question

Are there significant economies of scale in Ornithopters?

Dr. DeLaurier

The cube square law works great for airships. The bigger the air ship the higher the percentage of payload they can carry. But it works the other way for airplanes. This is why for example you would not see a rubber band model airplane the size of a Boeing 747. I would imagine that we could build a somewhat bigger Ornithopter, but I cannot imagine it being much larger than what we have. I will not put my name to that until I do the calculations, which I have not.

Editor's Note:

Subsequent to this introduction, two films were shown that are available on the following website.

www.ornithopter.info

Airships to the Arctic III Day One:

Welcome

**Honourable Ron Lemieux
Minister, Manitoba
Department of Transportation and Government Services**

Good morning ladies and gentleman. I am pleased to be here to officially open the Airships to the Arctic II Symposium. Premier Gary Doer sends his best wishes and regards to each of you. I am especially pleased to welcome to Winnipeg Dr. Bernd Sträter, President and CEO of Zeppelin who has travelled here from Germany. I would like to acknowledge the organizers of this symposium for putting together a very interesting agenda. I commend Dr. Barry Prentice for his dedication and diligence for planning this conference, as well as the previous two.

The mid-continent location and multi-modal transportation links have established Manitoba as a transportation hub by providing unlimited trade opportunities for regional, national, continental and global economies. Manitoba boasts one of the most diverse and stable provincial economies in Canada. The transportation industry is a significant contributor to Canada's and Manitoba's economies. Winnipeg is becoming a hub for low cost airlines and air cargo operations. Three of Canada's largest employers in Canada's for-hire trucking industry are headquartered here in Winnipeg.

Both class 1 railways and significant rail and intermodal operations in the province, and one of Canada's largest short line railroad operators, is headquartered here in Winnipeg. In 1998, the latest year in which we have complete and total information on transport activity represented, over 5 percent of total province employment, over 7 percent of provincial labour income. Furthermore, transportation equipment manufacturing accounted for 13 percent of exports, second only to agricultural goods. Manitoba is a net exporter of transportation goods and services. In 1998 we were only 4 % of Canada's population, but

accounted for over 6 % of the national transportation sector Gross Domestic Product. We also accounted for almost 6 % of sector employment and 8 % of the sector income. The contribution of the air mode to the provincial economy was also the subject of a study done by the University of Manitoba's Transport Institute. Results show the annual economic impact of aviation consists of \$585,000,000 in GDP, over 9000 person years of employment and more than \$370,000,000 in labour income. This does not include the aerospace sector. The aerospace sector grosses more than 1 billion dollars annually and employs more than 4500 people. We hope to see future growth in this area. Growth could potentially come from manufacturing of airships.

I find the discussions and challenges of using airships intriguing as an alternative to the costly and infrastructurally intense modes of road, rail and conventional air transportation. Northern remote issues are pertinent to Manitoba, to the provincial government and to my department. We spend about 25% of our transportation infrastructure budget on roads and infrastructure in northern Manitoba. To provide year round connectivity to communities which have no all weather roads, the province owns and operates 24 airports in northern Manitoba.

Airships are not new, but for most of us they are unusual in the modern world. A review of the history of the airship shows their popularity in the early 1900's and their eventual decline as fixed wing aircraft became faster and increasingly more reliable. After World War II, surplus airplanes became the standard choice for shipping and passenger transport. Since that time airships have been viewed by most people as a slow and dangerous means of transport.

Technological breakthroughs, composite materials and 100 years of accumulated scientific knowledge, have led to a new generation of helium gas airships that use light weight fabrics, to provide superior structural strength. There is great potential for the use of this emerging airship technology, particularly in the northern and remote areas. Airships could have the capability to move indivisible and oversized freight components. They could transport overweight cargo directly to remote locations for northern mega projects. This would eliminate the need to disassemble machinery at origin and reassemble at their destination.

The development of passenger airships could open new eco-tourism opportunities as well as offer remote communities affordable year-round cargo and passenger service. Potential applications of airship technology include communications, defence, border security, remote monitoring and emergency response. In addition, airships are environmentally friendly, unobtrusive, quiet and emit smaller amounts of greenhouse gasses.

Governments around the world are being challenged to provide leadership and develop a more sustainable transportation future. We in Manitoba recognize that these challenges will become increasingly difficult if we do not take sufficient action now to improve our local and global environmental conditions. We also recognize that there are economic opportunities in moving forward with sustainable transportation.

Manitoba could become a global crossroads for airship operations. An airship company located in Manitoba would find all the skilled trades and expertise in our existing aerospace industry. If not, our existing education and training infrastructure could be adapted to accommodate these requirements including airship pilots and engineer training.

We are pleased to support this symposium. On behalf of Gary Doer, the Premier of Manitoba, and the Government of Manitoba, we wish you well in your deliberations. As mentioned before, the “giggle factor” time is over. We look forward to proceeding and moving forward with this technology. We also look forward to the day when airships travel in remote communities around Manitoba and throughout Canada.

Session One:
Environmental Change and Arctic Research

Session Moderator
Dr. Terry Dick
University of Manitoba
NSERC Northern Research Chair

If you are wondering why a zoologist is interested in airships, one of my colleagues has said it is because some of them (airships) look like fish and I work on fish. In fact those are the ones that I like the best. The reason for my interest is that I work all over the Arctic. I see a lot of economic development, and the need for environmental monitoring long term. I see winter roads and bridges being built that are deteriorating in the summer and in the winter they are being used less and less (due to climate change). There has to be another option to the transportation system in the north. Airship technology is one of them.

You may ask “How can Canada afford to invest in the research and development of airships for the Arctic?” In 2003, we had 2 billion dollars worth of mining production in the arctic. There are two new diamonds mines starting production. There was over one billion dollars worth of oil and gas exploration by 2003, and there will be a lot more expenditures on oil and gas development in the next few years.

The Premier of Nunavut has commented: “We have diamonds, gold, oil and gas in the north. What I am concerned about is that we are not putting much back into the north in terms of all the royalties that are being generated.” There are a lot of sources of money that could be used to leave a legacy after the mines are closed and the oil and gas is gone. Half of the Kyoto mitigation money has not been spent. The billions of dollars that have been allocated, have not been spent. PetroCan was sold for 2.6 billion dollars. There is a lot of money out there, a lot of resources to use, to at least test new and innovative airships technologies in the north, and give these communities an opportunity to evaluate an alternate form of transportation. My comments also apply to northern Manitoba and the

northern part of other provinces as well. We have the resources; we do not need new money. We can do it if we have the desire and the federal government actually takes an initiative in this area.

Session One:

Research in the Arctic

Dr. David Hik
Canada Research Chair in Northern Ecology
University of Alberta and
Executive Director, Canadian Secretariat for International Polar Year 2007-8
Speaker

By any measure, Canada is a northern country, anchored at the North Pole. Whether defined in terms of geography, climate, culture, or political boundaries, the North is an integral part of Canadian national identity and a strategic component of the country's future.

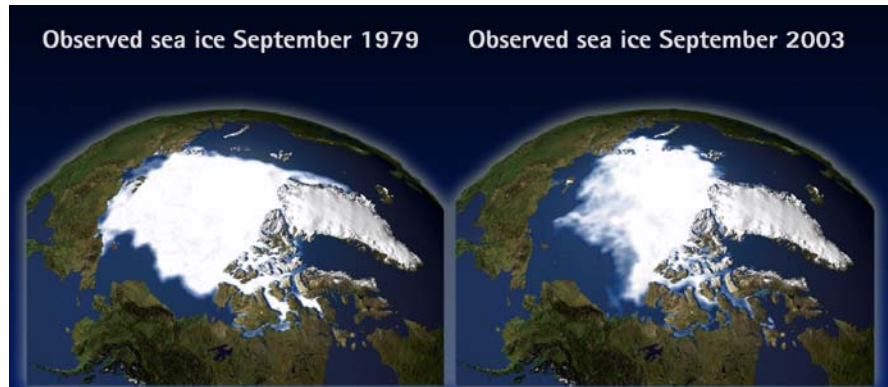
“When I look at Canada, I see a country capped by ‘North’: perhaps only ‘North’ holds our disparate regions together.” (Novelist Rudy Wiebe, in “The Elusive Meaning of ‘North’, Canadian Geographic, January/February 1996, p. 83)

The Canadian North, and indeed the entire circumpolar region, is a sensitive environment, facing rapid and unprecedented social, economic, biophysical, and environmental changes. Several long-term, persistent, and pervasive changes are affecting northern environments simultaneously. Global climate change, ozone depletion, long-distance transport of contaminants, and rapid economic development have placed undue stress on terrestrial, freshwater and marine ecosystems, on the physical environment that is dominated by frozen ground, ice and low temperatures, and on the social and cultural fabric of northern communities.

Many dramatic changes are documented in the Arctic Climate Impact Assessment, released in November 2004 (www.taiga.net/acia). One of the most obvious examples of change in the Arctic is the rapid reduction of sea ice cover. For example, over a 20-year period sea ice extent has decreased by almost 25%. The models from the Arctic Climate Impact Assessment suggest that there would be a further 50% loss by the middle of this century.

This will have many implications for organisms that depend on ice including people and their traditional lifestyles.

Figure 1



Similarly, climate warming will also mean changes, both positive and negative, in our ability to access resources and in particular the substantial potential petroleum reserves in the Arctic. For example, world demand for energy has increased interest in Canada's northern oil and gas fields, with the prospect of a pipeline snaking down the Mackenzie River becoming closer to reality. However, the engineering and technology required to construct this corridor will also require new perspectives to adapt to a rapidly warming climate.

Much of the research that contributes to our understanding of northern Canada has only been supported intermittently. There is a long history of scientific activity in northern Canada, but it has largely been driven by external events rather than interests defined within the country. The government of Canada has recently signaled that science and research are an important part of its commitment to the North. For example, in his response to the Speech from the Throne at the opening of the 38th Parliament in October 2004, the prime minister noted that "the government of Canada is committed to supporting science and research in the North, both on our own and in collaboration with our circumpolar partners". In December 2004, the prime minister and premiers of the Northwest Territories, Yukon, and Nunavut released a framework for the first-ever jointly developed Northern Strategy (www.northernstrategy.ca), which made reference to issues concerning governance, economic development, the environment, community health and culture, and security and

sovereignty. All of these objectives would be supported by investments in science, research, and knowledge. Enhanced research capacity will allow Canada to become a leader in northern science and technology, improve understanding of the North, and contribute to the social, economic and environmental well-being of Northerners and the country as a whole.

The International Polar Year (IPY) is a major event that will occur in 2007-2009. IPY will contribute to the advancement of polar knowledge, research and technology and establish a new foundation and legacy for future decades of work. It is being organized internationally and has been endorsed by a large number of polar and Arctic organizations, including the Arctic Council, the International Arctic Science Committee, and the International Council of Scientific Unions. The motivation for the upcoming IPY is the concern and acknowledgement that the planet is changing, and that large-scale scientific activities require international co-operations, beyond the reach of individual nations.

The International Polar Year has a long history and is the model for all big, international, co-operative science activities. In the 1870's an Austrian naval officer, Karl Weyprecht, observed that groups were measuring things using different methods in an uncoordinated fashion. He proposed that nations undertake coordinated expeditions, "with instruments precisely alike, governed by precisely the same instructions, and for a period of one year at least, to record a series of the utmost possible synchronous observations." The legacy of those observations provided a 'snap-shot' that can be compared with other periods to understand how physical and biological processes have changed over time. A poster has been produced by NOAA summarizing some of these changes (www.arctic.noaa.gov/aro/ipy-1/index.htm).

In 1882-1883 there were 12 sites that were occupied for a full year across the Arctic region. Three of them were in Canada: an American base on Ellesmere Island, a German base on Baffin Island, and a British-Canadian station at Fort Rae near Yellowknife. Since Canadian scientific capacity was still in its infancy, and the expedition to Fort Rae, was organized and partially paid for by the Royal Society of London, at the request of the British government, the Canadian government provided \$4000 towards the costs of establishing this observation station.

Canada was able to provide substantially more technical and logistical support for the second IPY in 1932 – 33, despite the financial difficulties of the Depression. Planning for the second IPY was coordinated by the Meteorological Service of Canada, and three major stations were maintained, at Chesterfield Inlet (west coast of Hudson Bay), at Coppermine (Kugluktuk), and at Cape Hopes Advance in Quebec. Auroral and magnetic observations were also made at Meanook in north-central Alberta.

The proposal for a third Polar Year in the early 1950s soon expanded to include the entire planet—the International Geophysical Year (IGY) in 1957 – 58. In Canada, the overall coordination and significant funding were provided by the National Research Council. A commitment was made to significantly expand research efforts in established fields, particularly studies of the aurora and ionosphere, weather patterns, cosmic rays, and glaciology. More importantly, IGY left a legacy of trained scientists, research infrastructure, international cooperation, and heightened public awareness in Canada and around the world that sustained northern research for many years.

Interestingly, airships have not been prominent in Arctic research, although they were used to try to get to the North Pole in the early 1900's. There were a few successful attempts, but most of them were pretty disastrous (for example the crash of the *Italia* in 1928). However, airship technology has evolved significantly over the past century, and there are compelling reasons to expect a greater role for airships in Arctic research and for providing services across Arctic regions..



Since the IGY 50 years ago, scientific interest in the polar regions has continued to grow and now includes all fields of scholarship. Priorities for further study have recently been reviewed by the Arctic Council. Two sobering reports released in November 2004, the Arctic Climate Impact Assessment (ACIA) and the Arctic Human Development Report

(AHDR), identified specific concerns and offered recommendations for future action. The International Polar Year 2007 – 08 provides an opportunity to act on these recommendations in a coherent and organized way.

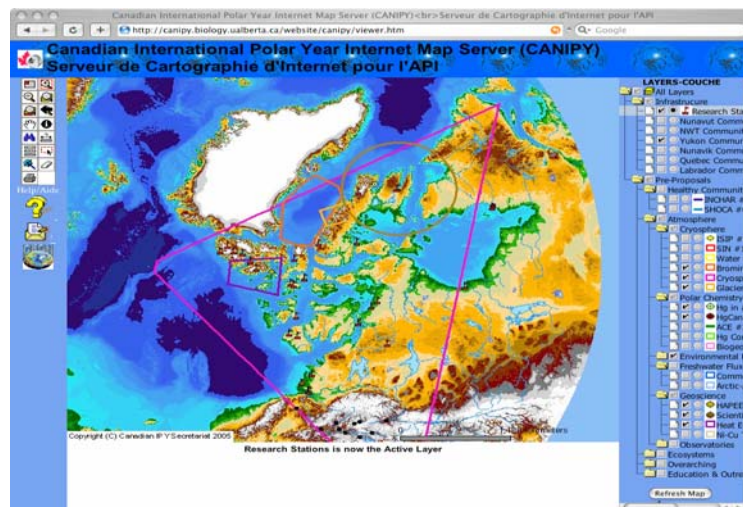
The IPY program in Canada is supported by 15 different federal departments and agencies, as well as various territorial and provincial governments, aboriginal governments and organizations, universities and colleges, the private sector, and non-governmental organizations. That program includes a focus on climate change impacts and adaptations and the sustainability of healthy northern communities. There are also a number of overarching activities focused on build infrastructure and providing logistics support, data management, education, training, communications and out reach, and the application of new technologies to support long term observation and observation networks. Canadian efforts have been made to make sure that the residents of the Arctic are directly involved in identifying priorities for International Polar Year research activities and will be part of the next generation of scientists, engineers and logistics experts and researchers.

The development of the Canadian and international IPY programs has been a bottom up process so far. Individuals and groups have submitted proposals over the last year, and are in the process of co-ordinating and building networks of international programs. Additional information about the Canadian and international programs can be found at www.ipy.org; www.ipy-api.ca; and www.ualberta.ca/~ipy. The process for building a Canadian IPY program has been open, transparent, and non-competitive to encourage as many individuals and groups as possible to submit concepts or pre-proposals (www.ipy-api.ca). In Canada, these pre-proposals will be further developed into a smaller number of collaborative networks in several areas, as diverse as terrestrial and marine ecology, variability and change in the Canadian cryosphere, remote sensing, and healthy communities, among others. In all cases, collaboration between federal research labs, university scientists, and northern researchers are being encouraged and facilitated. For example, in the area of northern public health, joint proposals are being developed with partners from Health Canada, university groups, the Territorial Public Health Associations, and national aboriginal groups. In

September 2005, the federal government announced that \$150 million in new funding would be provided to support Canadian participation in IPY.

Communication about IPY is facilitated by the Canadian IPY Secretariat using websites, newsletters, and workshops. Canada has been very active in involving northerners directly in setting priorities for the IPY program. More detailed information is available on a map server so that it is possible to look at the activities currently being planned and the availability of research facilities, in Canada and internationally.

Figure 2



Engaging people across Canada will help promote public interest and sustain that interest over the next generations. Many groups, such as the Youth Science Foundation Canada (a national organization that since 1962 has co-ordinated youth science fairs; www.ysf.ca) have endorsed IPY and challenged Canadian youth to become involved in polar research. IPY has tremendous potential to contribute to sustaining interest in Arctic and Polar research in the long term. It is likely that this burst of activity during 2007-2007 will provide an important context for the development of airships and new transportation technologies in polar and northern regions.

Session One:
The Arctic's Changing Climate

**Henry Hengeveld,
Emeritus Associate
Environment Canada
Speaker**

We have already seen a quick snapshot of changes that are happening in the Arctic, but I would like to explore these just a little further.

Many of us get exposed to the media accounts of what is happening to climate change. There you get the sense that there is a lot of controversy about the related science. However, when you talk to the science community about what is happening, there is a lot more agreement than the newspaper accounts might suggest. I would like to go through four key questions as to what that community suggests is happening to the climate in the Arctic and what may happen in the future. First, is the Arctic climate changing? We have seen a quick snapshot of that already. Second, if so, why? There are natural factors at play and there are also anthropogenic forces at play. We can begin to attribute the changes to these different forces. Third, what do we expect in the future? Finally, so what? Warmer climates in Canada do not really sound so bad.

On the monitoring side, there is a network of meteorological stations around the world that have been there for well over a century. Also, her Majesty's ships have been very busy over the years collecting sea surface temperatures, and on deck air temperatures. These can be carefully monitored, weighted by special averaging and so on to come up with a global pattern of how the temperature has changed over time.

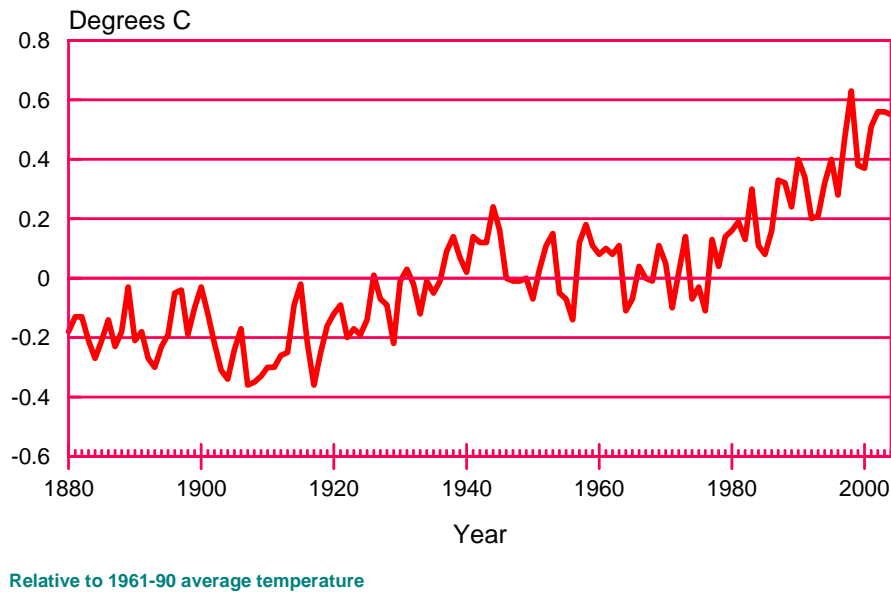


Figure 1. Globally averaged changes in surface temperatures, relative to the mean for 1961-1990.

The trend in average global surface temperature over the past century, shown in Figure 1, has an uncertainty of about plus or minus 0.2 degrees Celsius. The average temperature has increased 0.6 - now it is pushing about 0.7 degrees Celsius. The trend is not monotonic. It is noisy, like the waves and swells of the rising tide of the ocean. In addition to year-to-year variability, the trend experiences decadal variability related to oscillations and the sloshing back and forth of the ocean systems and so on, El Niño and El Niña, post Pacific decadal oscillations, etc. However, there are undeniable rises in temperatures that occurred in two key periods of time - the first around 1920-1940 and another in the last 30-40 years.

When we look at this a little closer to home we find that, while the global average is increasing, distribution is complex. Some areas are warming much more than the average, and others are actually cooling. This is partly because, as the climate has been changing, so has the circulation patterns. Wind changes mean that you get enhanced cold air from the

north in some areas and warmer air in other areas that add to or offset what is happening on the rising tide of global warming.

The western half of the Arctic has warmed very dramatically. On average, the temperature increase there is about 2 degrees, some areas even more. In the eastern Arctic, we see very little change and even some slight cooling. If we look at it on a hemisphere basis we find that the North Atlantic and the North Pacific have had areas of cooling, whereas Siberia and Northwest North America have had a dramatic warming. This suggests that a change in circulation has been a key factor.

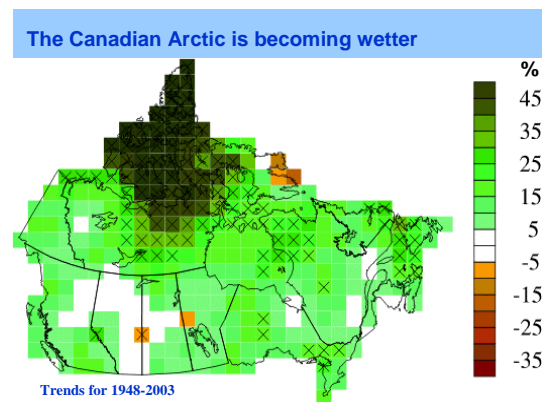


Figure 2. Observed changes in annual precipitation over the Canadian Arctic between 1948 and 2000, in percent.

As Figure 2 indicates, precipitation has increased and the Arctic has been getting wetter. The increases look impressive, since much of the high Arctic is about 50% wetter than before, but keep in mind that this is a desert area. In some areas, rain has increased from about 20 mm to about 30 mm. It is still a desert area, but for the ecosystem there, that can have a significant impact. In general it has been wetter.

Many of the other aspects of what we call the global earth system or coupled climate system are changing as well. In the cryosphere, we find that the temperate glaciers around the world are, in general, receding. In Scandinavia they are advancing partly because of precipitation from the North Atlantic, but most of the glaciers around the world are receding. Mount Kilimanjaro in Kenya for example has had glaciers for at least 10,000 years. They suggest that it may be another 20 years before the last of the ice disappears. The same trend is

found in Alaska and other places. Much of the melted water does end up in the ocean. This ice loss is not a huge amount compared to what is on the polar ice sheets, but it is a contributor to the sea level rise.

Decaying permafrost, in the western Arctic, has resulted in increased land instability. That is not new - it has always been happening - but there seems to be an increase in that happening. Certainly in Alaska we see a lot of that as well.

Sea levels have risen, on average, about 10-20 cm in the last century. It is hard to be exact because there are tectonic actions going on all the time. Therefore, the tide gauges have to be carefully adjusted to allow for that. Certainly sea levels are rising. Arctic sea ice is also melting, resulting in about 10-15% less sea ice than 30 years ago. In the central Arctic Ocean, the thickness of the ice, based on submarine measurements, is about 40% less than it was about 40 years ago.

Why is this happening?

We have the possibility of some natural causes for change. A key one is volcanic eruptions, which put dust into the air and reflect sunlight, resulting in a cooling influence. If there were fewer volcanic eruptions, then there would be less than average levels of dust in the air and it would cause a period of warming. On the solar side, we do know that sunspot cycles vary with time and that there has been an increase in their intensity over time. Over the first part of the 20th century, we have seen a rise of sun spot activity, suggesting that solar flaring has been contributing to warming as well. When we plug the combined volcanic dust and solar forcing trends into the climate simulations, we see that there should be some warming from these causes in the first part of that century. But there should have been cooling in the last part of the century. This suggests that the first period of warming may have been at least partially due to natural causes, but certainly not the second period. When we add the anthropogenic emissions of green house gases and mitigating or masking effects of aerosols, into the simulation, we find a very good agreement between simulated and observed climates. First, this tells us that the models are working reasonably well when they simulate the effect of all the different forcing factors. Second, most of the warming in the later part of

the century was anthropogenic. This is certainly the conclusion of the IPPC when they stated four years ago that most of the warming in the last 50 years is likely due to human activity.

The human fingerprint in these climate trends is quite apparent on a global scale. In the Arctic it is a little tougher to find, and in most smaller scale regions it is even more difficult. The increase in noisiness at the regional level makes it harder to pick out signals against the background noise. But in the Arctic you do also see evidence that there is a dramatic warming link with climate trends to the changes in Arctic oscillation, and that in turn appears to be linked to global warming.

How about the future trends?

This is more of a problem in the sense that there is a huge demographic component. It is hard to predict how the human population will grow, how the economies will grow, how the energy usage will change and what type of energy will be used 100 years from now. Some experts are willing to hazard a guess on how these different factors change and come up with plausible scenarios, with low to high brackets of where we might end up in the future. Add into that uncertainty of the sensitivity of the climate system to the forces of this kind, and we have a range of possibilities of where we might be 100 years from now in terms of climate.

When all the breaks are in our favour – that is, low population growth, low economic growth, increased use of renewable energy and low climate sensitivity - the warming by 2100 may only be 1.4 degrees Celsius. However even that seems to be unprecedented in the last 10,000 years – the time period when human civilization developed. At the other end of the range of projections, when everything goes against us - high population growth, high economic growth, high use of fossil fuels and so on - then you see a warming of about 5.8 degrees Celsius by 2100. Now, newer studies that add in the carbon cycle feedback (which is positive) suggests that it may be even higher. So that is really cause for concern, especially when we compare it to what Earth has experienced over the last 10,000 years.

The Arctic will warm more than the global average. This is consistent with past observations, and this is consistent with the physical principles of amplification. These models suggest that Arctic global warming is about double what it might be for the global average.

There are three factors that affect sea levels. First of all, as the oceans warm up, they expand. This is a physical property of water. This contributes to sea level rise. However, so do the melting of glaciers, particularly the changes in the polar ice sheets, and the related release of water that eventually flows into the oceans. The predictions for net effects on sea level rise over the next century are somewhere between 8 cm to 88 cm.

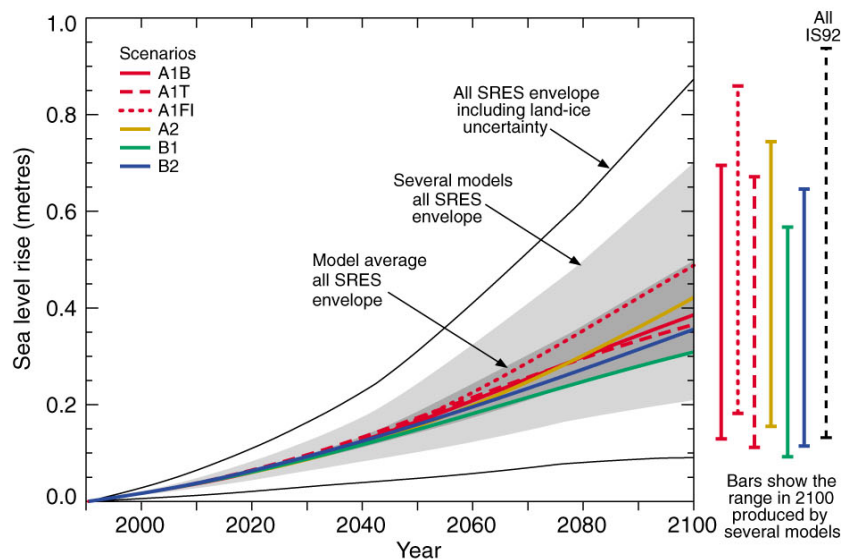


Figure 3. Projected changes in global sea levels rise for a range of plausible emission and climate change scenarios.

So what?

Well, the first thing we think of is sea ice in the Arctic. Much of the ice in the Arctic Archipelago will eventually disappear in late season. This is not always good news. Some of the Coast Guard people suggest that the fast ice in the islands is a bridge that prevents the heavy ice from the Arctic Ocean from entering. If we remove that fast ice there may be a period of time when the ice in the island may be far worse because of increased incursion of Arctic polar ice.

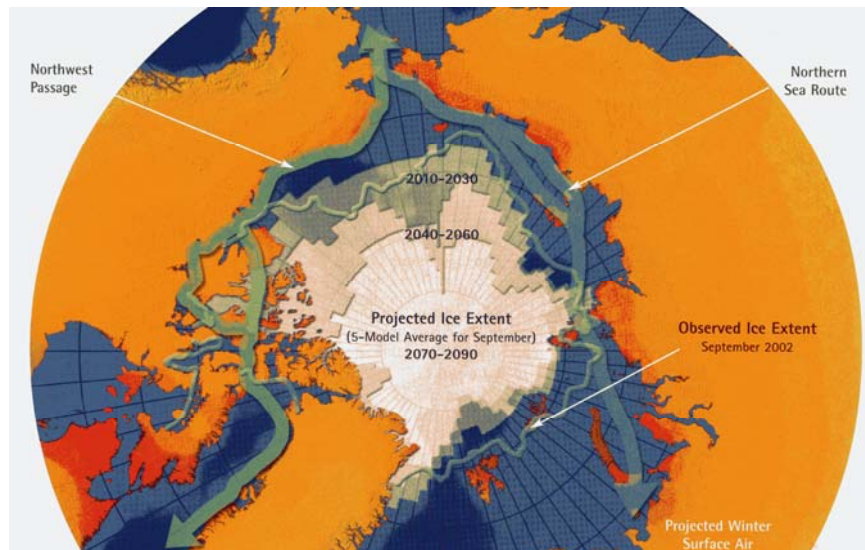


Figure 4. Projected September extent of Arctic sea ice cover, averaged over 5 model outputs, for different time periods of the 21st century.

Permafrost decay will increase land instability and pose a threat to infrastructure. Winter roads, and communities who rely on them for transport of heavy goods, will become critically affected. There is an issue of winter road safety and reliability in the future. To some extent we have already seen that in recent years.

In summary, the Arctic climate is changing and most people living there will affirm that. The human influence is apparent, the risk of concern due to future climate change is real and

significant. This is particularly true on a global scale, because of developing countries and their limited ability to adapt. Many see the Arctic as the canary in the mine in this case. Finally, the main concerns for Arctic transportation are changing sea ice, land stability and decrease in safety and reliability of winter roads.

Session One:

Northern Sea Lift

Narendra Mathur
Manager, Marine Safety
Transport Canada
Speaker

Transport Canada does not get involved in actually doing sealift operations. We develop and administer policies, regulations and services for the marine industry. Our mission is the protection of life, property and the environment.

Figure 1



Our region is the Prairie/Northern Region that is divided into shipping safety control zones numbered 1-16. Number 1 is the area of most severe ice condition, down to number 16 in the Hudson Bay with the least ice conditions.

Why is this required? Depending on the construction of the ships, some ships are able to navigate into those areas using the Fixed Zone Date Time System made under the Arctic Borders Pollution Prevention Act. Schedule V of the Arctic Waters Pollution Prevention Regulations gives this "Fixed Zone Date Time System". It starts with Type E to Type A and Arctic Class type 1 up to class 10. Class 10 typically can enter into Zone 1 and Type E to zone 16. It is a constraint for commercial ship operators. They have to focus on this system

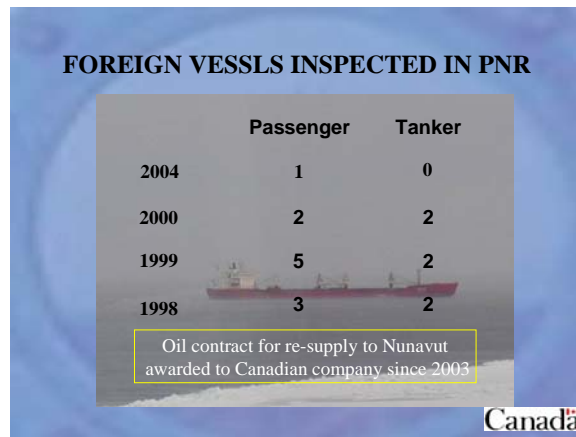
and then position their ships accordingly. If it does not fit into the category, they will not be allowed into that particular zone.

We recognize that global warming is taking place and that sea ice levels are changing. We recognize that the shipping season is lengthening so we have come up with an Arctic Ice Regime Shipping System (AIRSS). This is based on existing ice conditions as seen by the captain of the ship. It allows the master to assess conditions as seen from his ship for that particular time. Based on this system he can do a few calculations and come up with an ice numeral. The ice number has to be zero or positive. If it is negative, then he has to seek an alternative route, wait for the ice condition to improve, or seek icebreaker assistance. This gives a little more flexibility to commercial ship operators over the existing Fixed Zone Date Time System.

Our responsibilities in Transport Canada are research and development and ship inspections. By that I mean we approve plans for ships that are to be built, we monitor their fabrication throughout the construction stage, we certify them, and we issue them certificates. We control foreign shipping coming into Canada, through the Memorandum of Understanding (MOU's) that have been signed by Canada. One of them is the Paris MOU, dealing with ships coming on the Eastern seaboard of Canada and the Tokyo MOU, dealing with ships that come to the Pacific coast of Canada. We enforce the Canada Shipping Act, the Arctic Waters Prevention Act, and the Transportation of Dangerous Goods Act and a few other acts.

We also do pollution prevention and accident investigations. We inspect Tankers once a year or if they are coming into Canadian waters for the first time. Using our databases we run checks on all ships to ascertain where their history and decide if an inspection by Canada is warranted. We also go on board ships if they have been in accidents to conduct our own investigations

Figure 2



In 2004, the number of tankers entering into the Northern Region has been reduced because the oil contract for the northern communities has been awarded to Canadian companies. This has reduced the number of foreign ships entering into the Northern Region.

Figure 3

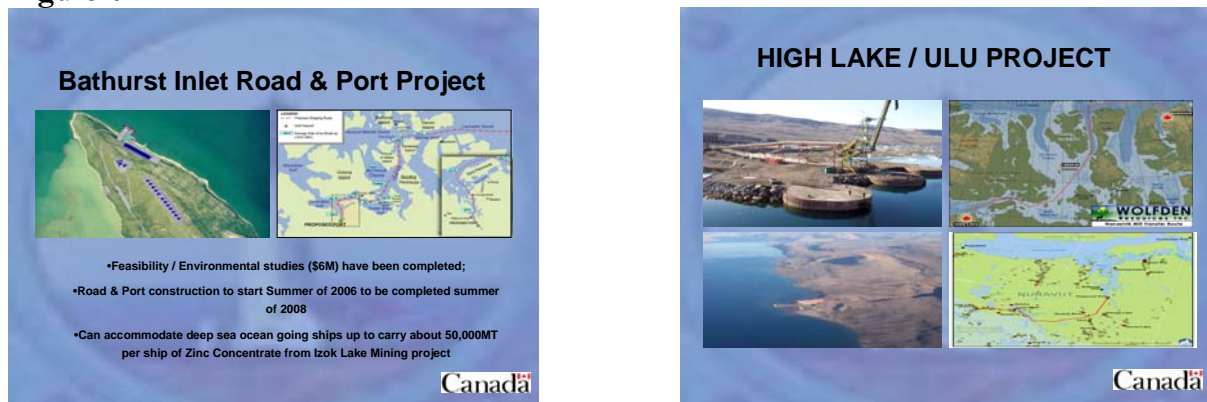


The number of inspections has been steadily increasing because we have taken on a lot of other small vessel programs. These are domestic vessels that we are inspecting. In 2003 and 2004, five sea-lift vessels repeatedly visited the Arctic. Two more vessels were added in 2004 and it is expected that this will continue in 2005.

Sealift operations are the tug and barge operations, and they go into various communities. The dry cargo movement has been in the region of 340,000 metric tonnes, the petroleum products have been in the region of 300,000 metric tonnes. Churchill handled 400,000 metric tonnes of cargo last year and is expected to increase this year. For the first time we are expected to get some import cargo coming in to Churchill from Russia.

The coast guard has the primary mandate of providing icebreaker service. Between 2004 and now the government of Nunavut has awarded a contract to a Canadian company to supply fuel using tankers rather than barges.

Figure 4



There have been some recent developments in the vicinity. There is the Bathurst Inlet Road and Port project, which is coming into commission this year. It can accommodate deep-sea ocean going ships up to 50,000 metric tonnes, which are used for carrying zinc concentrate. There are also the High Lake and Ulu projects. High Lake is a mine for gold, copper, zinc and silver and will be linked by a 60 km winter road to the dock at Grays Bay. Construction is expected to commence in 2007 and operations to commence by 2008. The Ulu project is a mining project for gold located south of High Lake and is owned by Wolfden resources who are reported to be constructing an 80 kilometer winter road from High Lake to Ulu.

Question to Henry Hengeveld

Can you advise whether the protocols that the federal government put in related to Kyoto will retard the global warming issues that you have outlined today and if not, is the government aware of the speeding train that is coming towards them?

Henry Hengeveld

It is not. The full implementation of the Kyoto protocol, which is only restricted to developed countries, will delay the rate of warming that you see by about a decade. The ultimate objective is to stabilize concentration in the atmosphere that is not dangerous to humans. Nobody knows exactly what that is, but estimates are that it's around 2-3 degrees warming, that is sort of the critical threshold. It would require a lot more, but in the negotiations, the developing countries said that historical emissions are from you people on the developed side and you guys are wealthy with your use of fossil fuels. You are not going to tell us now that we cannot develop because we cannot use fossil fuels, so give us time. You take the first step and then negotiate with us on how you can bring us in. The recognition that these other countries need to be brought in and that Kyoto is the very first stab, it is a critical one because it is the first time that we have tried to steer the ship around. By itself it will not do much. I think there is recognition that climate change is unavoidable, we cannot stop it, but we can hope to limit the magnitude and the rate.

Question to Henry Hengeveld

Could you clarify the impact on shipping if the long-term pack ice is moving into the Northwest Passage?

Henry Hengeveld

I will take first crack at this. It dates back to 30 years ago when I was with our ice branch and used to be involved with shipping. I remember the head of the ice server reminding us that a very good ice year when the fast ice in the Archipelago would break up and clear out would usually mean a very bad ice year the next year because that removes those barriers to allow

the much thicker Arctic ice into the area. I have also always thought that a clearing of the ice means that the Arctic opens up and that passage becomes possible.

Question to Narendra Mathur

I can see in the future using airships to transport some hazardous materials. What are your concerns with present methods and the possible future method.

Narendra Mathur

We do have the Transportation of Hazardous Goods Act in place, which we do enforce for the transportation of all dangerous goods by sea. Ships and any shipper who is wanting to ship any dangerous goods have to comply with that. We have a system in place in the Arctic where the shipper has to have his plans for shipping dangerous goods submitted to our office. It is their responsibility to contact us. I am a dangerous goods inspector for the marine world. Those reports come to me, and I look at them. If there is an approval needed, we would do that. For movements that are going north we have an arrangement with the Montreal and Quebec City ports. We have offices and dangerous goods inspectors there. The shippers submit their plans to the office, we look at and approve it and do the necessary corrections if need be and load the cargo on board correctly and then ship it to the north.

Question to David Hik

If IPY gets involved in the airship issue, how do you see it working in the Arctic between 2007-2009?

David Hik

There are two issues. One is the opportunity to develop the technology. There are other organizations and groups that might be interested in the longer term to use airships or develop the potential for airships monitoring wildlife populations, for search and rescue or for putting in instrumentation for geophysical survey. There are a number of possibilities that have not been explored fully yet.

Question to Henry Hengeveld

Has climate change had any impact on the wind patterns in the north, and if so, what would that be?

Henry Hengeveld

I do not think there are any really good studies that look at wind speeds and so on. There is an indication that there will be more storminess in the north, so the storm tracks that are quite often in the sub-Arctic or below will begin to push further north and you should begin to see an increase in the frequency of storms. In terms of wind episodes, yes.

In terms of prevailing winds, the north is pretty noisy when it comes to prevailing winds as it is. Any mean signal would probably be pretty small. At this point the real question is will the Arctic oscillation change its behaviour because that is the kind of decade length variable in the north that will cause periods of good ice years and periods of very bad ice years.

Question to Narendra Mathur

Given that some modern airships that are currently under development will be amphibious, will there be a dual requirement for certification from Marine Safety and Airs Safety or do you foresee an integration of the regulations, certification and inspection requirements?

Narendra Mathur

Normally when you are transporting hazardous cargo there are different regulations, different conditions which apply for the movement of dangerous goods by air as opposed to by sea. But we do coordinate our activities with them, so that should not be a problem.

Question to Henry Hengeveld

In any of your studies, have you considered the increased solar output over the past years and decades as a cause of global climate change instead of human activity?

Henry Hengeveld

Numerous studies have looked into this. About 10 years ago a couple of Danish people said that the change in the solar cycle length was closely correlated with climate behaviour.

When, in fact, we look at the paleo records, the primary driver of climate variability on millennium time scales and longer tends to be solar. On time scales of hundreds of thousands years, the Milankovich Effect, which relates to changes in the orbit of the earth around the sun, is most important - but there are also effects from changes in the solar output. In terms of the last 30 years the solar radiation variability has changed very little and cannot explain what has happened. Meanwhile, during this time, volcanic eruptions have been increasing, putting more dust in the atmosphere - which would cause a cooling effect. When you look at the combined natural forcings, we should have seen a decrease in global warming rather than an increase. I think that it has been acknowledged that solar forcing was a factor in the warming in the first part of the century, not in the last.

Session Two:

Roads in the Boreal Forest

Session Moderator
Graham Starmer
President
Manitoba Chamber of Commerce

Anna Baggio
Director, Conservation Land Use Planning
Wildlands League
Speaker

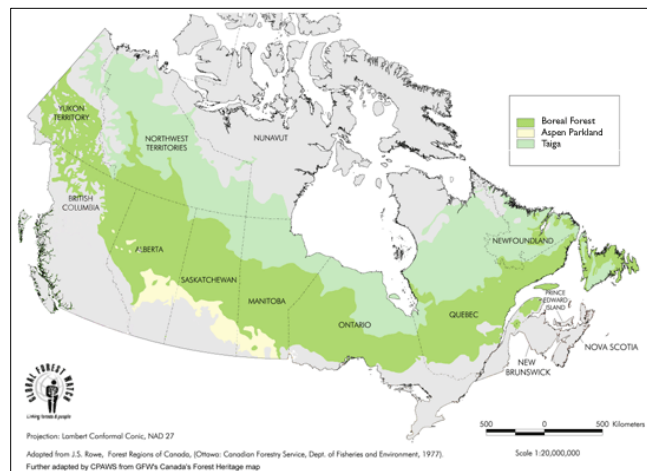
I am very excited to learn more about the opportunities that exist with airships as well as how we can build some alliances and ways of working together between business, the airship community and the environmental community. The roads in the Boreal forest have many impacts that are very well known. They are ecological, economic, social and cultural.

Our mission is to protect wilderness and also to look at the way that we use resources outside of protected areas to insure that they are sustainable for nature and communities. We focus on protected areas, but also on the lands outside of parks and protected areas. We are a charity, a not-for-profit organization, and we are the grassroots voice for wilderness in Ontario. We are one chapter of twelve across Canada and nationally we are known as the Canadian Parks and Wilderness Society. We have our own board of directors in Ontario and have two offices, located in Toronto and Thunder Bay.

We work in a cooperative fashion with all kinds of actors and players. We provide advice, technical support and information. We are not an animal rights group. We support hunting, fishing and resource extraction when done in a sustainable fashion and we are not political. We seek conservation solutions with all type of parties.

If you look at original forest cover from 1000 years ago, there was quite a lot of forest still intact. When you look at current forest cover, three areas pop out. Frontier forests are large, intact forests that have their full complement of species, which is very important for the protection of biodiversity. They are important for staving off the worst effects of climate change. Russia, the Amazon and the Canadian Boreal Forest are the three remaining intact forests left on the planet.

Figure 1



Canada's intact Boreal Forest overlaps quite nicely with Canada's Boreal region. It covers about half of the country and includes what we know as true boreal forest: Newfoundland all the way to the Yukon. It includes Taiga, which is a transition area between the forest and tundra: It also includes the transition zone from forest to prairies.

The boreal region of Canada is globally significant, and home to more than 600 First Nations communities. Our boreal forest region stores more fresh water in its lakes and wetlands than any other terrestrial system on earth. It is an important migratory sanctuary for birds. One to three billion land birds breed in the boreal region. Sparrows, warblers, and thrushes account for more than half.

Part of why we undertook this project is the tremendous pressures that are on the forest and also the communities that live in the forest. There is a lot of development in the southern

part of Canada and it is moving north. Most of southern Canada and the southern forest are heavily overlain with roads.

It is very well known in the scientific community, in government circles and in land management circles that roads are an issue. Where this falls down is in the public. The public is not as aware of the challenges that roads pose to our ecosystem and sometimes to our communities. We undertook this project to draw more attention to it. Roads are a problem because they fragment and isolate habitats, disrupt watersheds, create barriers for wildlife movements and contribute to increased mortality for species. Proper road planning is critical because of lands, waters and exploitation such as hunting which need to be considered.

What happens when we do not plan carefully for roads?

Figure 2

Remote forest with fly in or winter road access only.



This illustration shows a remote forest with fly in or winter road access. There are remote tourism opportunities, caribou habitat, large intact forest, a First Nation community area, a trappers cabin with trap lines etc. When a primary road is built, it includes bridges. There are still large areas of intact forest, but also gravel pits for road construction and the construction of water crossings.

Figure 3

Roads – and impacts – spread.



As more and more roads are built the impact spreads. Certain species that are sensitive to roads will actually move out of the area. Caribou as a species are sensitive to disturbances. Drive in access to lakes that were previously inaccessible increases the pressure on the resource or fish that were there. Logs are being hauled out and processed elsewhere.

Roads fundamentally change the forest.

Figure 4



For the next scenario, you see the roads have fundamentally changed the forest. There is an increase in vehicle use, increase in industrial development, and increase in traffic to access the lakes. These remote tourism operations are no longer viable, caribou are pushed out further away, trap lines are impacted, garbage dumps and a utility line are developed and exploration and mining activity take place.

Figure 5

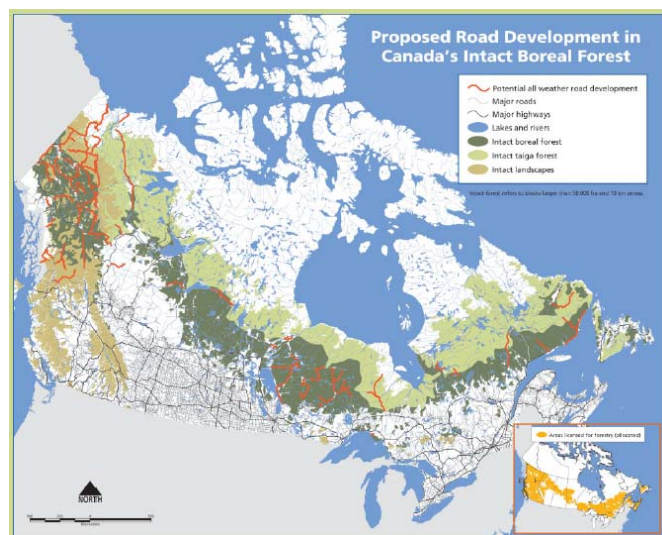
The forest becomes no longer suitable for some species and some businesses.



When you look at the last illustration you see that the forest no longer is hospitable to certain species. The forest has now been fundamentally changed and certain businesses are no longer viable in this situation. We have some garbage, an abandoned mining claim, road access for lakes, and some hunting camps.

This project regarding road development and Canada's intact Boreal Forest examined new proposed areas of development. Where are they situated and what are some of the likely new developments within the next 15 years. We produced a map based on industry sources.

Figure 6



One of the consequences of road development in the Boreal forest is with the Woodland caribou. The caribou have moved north, they have experienced a range collapse. This is not only due to roads but a number of factors such as industrial development, human settlement, etc. This is one species that we are very concerned about. The Caribou biologists are telling us that it is potentially extinction in slow motion. Woodland Caribou are very sensitive to changes in forest condition from a combination of many things. They are wide ranging and the main cause of their decline is the industrial development that increases access of predators and reduces food sources and habitat.

In Ontario about 50% of the Caribou range has been lost. Across Canada, the figure is similar. If we continue to build in intact areas as we have done in the south, we will lose this species in 100 years or less. This is a history lesson, a signal that our past practises have been unsustainable as well as a forecast of trends to continue.

We are not opposed to road building, but we believe that there are things that can be done to improve the way roads are created so that we have areas where there are roads and areas where there are no roads.

We have eight recommendations to designate areas that should remain road-less.

1. When we are looking at where we want to punch a road network through, we should also at the same time figure out what values we want to keep on the land base and what areas should remain remote.
2. We should curtail road building and motorized access in parks and protected areas. In the southern part of our country, the areas that are remote are our protected areas. We need to keep those areas for the reasons that they were designated in the first place.
3. Make a road plan an essential part of broader land use planning. This is critical. Right now the approach tends to be a limited road corridor analysis. We encourage people to look at road planning in the big picture in conjunction with logging, mining and other uses of the land base.

4. Wherever possible use existing roads.
5. Planning routes to reduce impacts. Avoiding building a road through Caribou habitat could be one way to meet this recommendation.
6. Limited access. Once roads are built it is very difficult to control how they are used. Take this into account when considering the construction of roads.
7. Use the best practices in construction.
8. Decommission roads that are no longer useful. It is very difficult to have roads removed.

Question to Anna Baggio

When you are trying to service some of our First Nations communities, their expectations are related to a southern way of life, as far as electricity and other needs. To do this, sometimes you need to put in a road or put in electricity. How do you deal with that dynamic even though when you plan these things you create problems.

Anna Baggio

The urgency for economic development for First Nations is well known as is the urgency to protect traditional values and ways of life and culture. One we think that can help achieve this is by instituting land use planning before development, especially in intact areas. This will allow communities to plan for their traditional territories by looking at all the values of the land as well as all the economic potential of the land. Communities can have a greater say in where they would like to see a road and where they would not like to see a road. Where communities did not have a say, roads were built through important spiritual sites, known as Thunderbird Nests, or winter roads were constructed through Caribou calving grounds. By working cooperatively with First Nations on road location, you can negotiate better impact and benefit agreements. You can then insure long-term viability for communities as well as long-term sustainability for ecosystems. Right now many of these roads are built largely to access resources, sometimes with considerations for communities and sometimes not.

Question to Anna Baggio

Comparing rail to roads, do you have some thoughts as to rail into these areas?

Anna Baggio

It does not seem to be considered in Ontario in the areas that I have been looking at. In terms of rail construction, if you look at it strictly from a construction standpoint, it is another linear disturbance, which is cutting a line through a forest, so it would have some similar ecological impacts as a road. But there would be less of the pressures if there were no roads built alongside of it.

Session Two:

Northern Food Costs

Brian Gudmundson
Manitoba Aboriginal and Northern Affairs
Commission on the Cost of Food
Speaker

As many of you are aware, northern food costs are much higher than in the south. Choices are often limited in the north, therefore, nutrition often suffers. The consequences of poor diets have bad outcomes. We see that far too often. In 2002 an examination of food prices in the north was initiated by the Healthy Child Committee of Cabinet. The review was complete in December 2002. The report focused upon nutritious foods such as milk, milk products, fresh fruits, vegetables, meats, whole grains and staples. It came up with a variety of prioritized strategies in terms of what is possible and out of that, the Healthy Foods Initiative has become a reality.

Winter roads are becoming less viable, and less predictable with global warming. Skeptics say that global warming is only a theory. Winter road users will tell you otherwise. These delays result in delayed project start-ups, and delayed access to essential materials. The only other option is to fly the goods in by fixed wing aircraft at an extra cost. Also, the extra storage means extra cost. When you are looking at foods, that means adding extra costs for heating, for warm storage for the food for the 12-month period, if the items can be stored. Perishable foods do not fall under this category.

The health status of individuals in the north suffers because of food. The diabetes rate for First Nations people is about 5 times that of the Canadian average. Diets of high sugar and high carbohydrates contribute to this process. Effects of diabetes include premature death, limb amputations, blindness, and kidney failure. This impacts virtually every First Nation and Métis communities in the north.

High costs of food limit choices in the north. Disposable incomes of northern residents are lower and they pay more than all southerners for all basic elements of living. Higher freight costs are a reality of the reliance on fixed wing aircraft. During a recent season, the impact of reduced freighting by winter roads meant an additional 15 million dollars was needed to bring in the essential goods to the remote northern Canada communities. This was largely funded by Indian and Northern Affairs of Canada, the agency that is responsible for the First Nation communities throughout Canada.

Improved freight movement is a two-way street. Lower prices for northern residents would impact food costs and other essentials. Lower freight costs would also open up new possibilities for cottage industries in the north providing the ability to be able to ship their exports to southern markets. Given that unemployment on a number of the reserves is in the area of 75%, disposable income for some families is extremely limited.

An improved standard of living would have a double impact on residents in northern Manitoba. Most food items (including all of the basics; milk, fruit, meats, vegetables, junk foods, snack foods, and pop) are imported into the north. The costs of such foods are very high. The shelf life of these foods is also a major factor in potential storage. As a result availability and quality of perishables are poor in the north. The challenge of supplying foods ratchets up the food prices in the north.

Figure 1

Northern Food Cost Comparison		
	St. Theresa Point	Winnipeg
• Milk 4 Litres	\$ 12.19	\$ 3.48
• Tomatoes	\$ 3.80 lb	\$ 1.99 lb
• Bananas	\$ 2.31 lb	\$ 0.59 lb
• Apples, Macintosh	\$ 2.94 lb	\$ 1.29 lb
• Head Lettuce	\$ 2.69 each	\$ 1.49 each
• Bread 60%	\$ 2.49 each	\$ 0.99 each
• Ground Beef	\$ 9.19 Kilo	\$ 4.29 Kilo
• Red Potatoes	\$ 1.60 lb	\$ 0.79 lb
• Cheerios	\$ 8.45 box	\$ 3.50 box
• Coke 2 Litres	\$ 7.99	\$ 2.09
• Coffee	\$ 11.89 Kilo	\$ 6.99 Kilo
<hr/>		
Total Basket	\$ 65.54	\$ 27.49
	138 % more	base amount

To illustrate the food cost differentiation I have developed the cost for Winnipeg and St. Teresa Point, which is fly-in only. People often ask about milk, why is it so expensive? It is heavy to ship, and has a short shelf life. Four litres of milks costs over \$12.00 in St. Teresa Point compared to \$3.48 in Winnipeg. The costs of all foods are higher in the north: tomatoes, \$3.80/lb; bananas \$2.31/lb; apples almost \$3.00/lb; head lettuce (if you can get it) \$2.69 ea; bread, say 60% whole wheat, is around \$2.50; ground beef over \$9.00 a kilo; red potatoes \$1.60/lb; a box of Cheerios \$8.45; a 2L of Coke almost \$8.00; coffee \$11.89 for 1 kilo. If you look at the bottom line, the impact on the food budget is 138% more than Winnipeg. St. Teresa Point is comparable with other remote, northern communities where I have checked as well.

Manitoba's goal is to improve a northern community's ability to access healthy, nutritious foods. Manitoba has initiated a new program to assist remote, northern communities. It is called the Manitoba Healthy Foods Initiative. The Initiative provides a greater focus on self-sufficiency with an improved local production and distribution of local foods. Community and economic development will support this end. A consultant has begun to work with northern communities to improve the local production and create an understanding on how to make alternative choices for foods through both buying and growing nutritious foods. The food chart indicated a balanced approach to food consumption as opposed to those who think that a balanced diet in the north means fast foods, instant foods, frozen foods and chocolate. The intent of balanced food is to build on the Canadian Food Guide. It still has to be interpreted for families to say, "what does it mean to put food on the table?" Health Canada is working on putting out a food guide to that end.

In terms of where we are now, there has been an identification of local community-based projects looking for what works. Some of these efforts have already begun. Exploring the means of addressing long-term self-sufficiency is part of this goal. This means an educational thrust is needed to help northern residents pay more attention to nutritional components of regular family diets. The aim is to assist community projects, improving local access to nutritious foods, for example, local berry picking.

We have begun to build a community capacity through training and mentoring. We have begun to provide long-term sustainability to local projects. Currently, there are more than a dozen projects for remote northern communities in addition to some other regional broad northern supports.

Issues that remain to be answered are varied. Immediately one turns their mind to junk foods. As freight costs may be reduced with airships, how will better consumer choices be made for selection of nutritious foods? Can the popularity of junk foods be reduced? If the prices of fruits and vegetables are reduced will the cost of pop and sugar-laden junk food be reduced equally? What will be the role of elders and traditional healers in teaching the importance of eating healthy foods to combat diabetes, cancer and other illness? Can some of the traditional ways be restored? Can traditional diets, less sugar, less carbs be brought back? There is growing evidence that this can curb diabetes. Jay Wortman, Regional Director, FNIHB, Health Canada in British Columbia who works for Health Canada in British Columbia has lectured on this very topic. He has documented several cases of individuals with diabetes who by adopting traditional aboriginal diets have in fact been able to minimize the effects of diabetes and get off insulin on a permanent basis. He is working further to develop this research.

How can southern folks understand the poverty in the north and what it is like to live in the isolated communities apart from the rest of society? Northern communities have threats to water supplies, which loom large for many remote, northern communities. Water supplies should be safe.

How long can winter roads be considered to be dependable? Many times the optimum conditions for winter roads do not exist. Global warming can only make matters worse. Is there a reliable future for winter roads to guarantee food security to the north? Many doubt this. How can shipping help northern food and other supplies be made more affordable as northern freight has evolved from cat trains in the 1940's to modern winter roads with 18 wheelers in the 1970's. The next step of evolution is the airship. This could guarantee more affordable food in the north, shipped 52 weeks of the year as opposed to the 12-16 weeks availability of winter roads.

How soon this may happen for residents of the north is an outstanding question. The challenge to this group is to find the answers. The needs of northern residents are clear and the population base continues to grow.

Question to Brian Gudmundson

With the growing Healthy Foods initiative, we have been trying to provide some mentoring and education to First Nations people to grow their own products. Responses that we have received back are related to the difficulty of the short growing seasons and some of the problems that that incurs. It drives them towards having greenhouses which are pretty expensive and sometimes difficult to utilize. How are we going to deal with fresh vegetables or fruit?

Brian Gudmundson

The whole topic of reintroducing greenhouses to northern Manitoba has limited effects. It only provides a slightly longer growing season. A little more in the spring and a little more in the fall. This is why I stress the need for food importation to the north. This is going to remain with us. It is a reality for the communities in the north. The desire for the residents in the north is to have a standard of living comparable to that in the south. My response is that the effects of the greenhouse output may be fairly limited, that has to be recognized. We looked at the potential for increased harvesting of moose, fish and other potential food products in the north and those also have their limits in terms of sustainability.

The effort of examining the food prices and the food access was in consultation with northern communities as well as the public and private sector. The kinds of costs that we are finding that were increasing food prices in the north were freight costs, storage costs, and the lack of competition in the private sector. Putting those together puts extreme pressure on the food budgets for northern residents. Is there a magic solution? In the short term no, but I do see the potential for freight by airships.

Question to Brian Gudmundson

Have any models yet been generated with regard to the reduction of food costs given per ton/mile or a 52 week delivery scenario in terms of airships versus the ice road operation?

Brian Gudmundson

We do not have a precise model for that, but based on the past airships conferences held here in Winnipeg, I have heard it mentioned that the goal and the challenge to the airship industry is to be able to provide freight equal to the current costs of freight by eighteen wheelers from Winnipeg to Thompson. Thompson is an eight-hour drive north of Winnipeg. On a cost per ton basis the intent is to be the same, not more than that.

The frequency of an airship delivery would provide much more availability to northern residents, as it is currently extremely limited.

Session Two:
Developing a Renal Health Program:
Prevention and Treatment Closer to Home

Wendy Whalley, RN, BN, MPA
Island Lake Renal Health Program
Speaker

I work for the Northern Medical Unit, which was established by Dr. Jack Hildes in 1970. The mandate of the Northern Medical Unit, which is a department of the University of Manitoba, is to provide medical services to folks in remote communities who might not ordinarily receive those services. It is established on the triad of clinical service, education and research.

The program goal of the Northern Medical Unit is to enhance the health status of First Nations and Inuit community members. The NMU has a history of working in communities where others choose not to by providing primary health care physicians, nurse midwives and nurse practitioners who provide care in sometimes difficult circumstances. It then made sense that Manitoba Health would request that the Northern Medical Unit develop and manage a new Renal Health Program in a remote community. This is how we ended up developing a comprehensive renal care program in Garden Hill, Manitoba with a catchment area of all of the Island Lake communities.

There are 4 air access communities in Island Lake: Garden Hill, Red Sucker Lake, Wasagamach and St. Teresa Point. They have a total population of about 7,700, but the expectation is that will grow very quickly to 10,000 in the next few years. These communities have the highest documented prevalence of diabetes and other chronic disease in Manitoba, as well as the lowest life expectancy rates.

The renal health program that opened on January 10th of this year is comprised of two different components. The University felt that it was not enough to open a dialysis unit in a remote community, but primarily to look at why are these folks become sick and screen them early so that we might stop the progression of renal failure or at least delay the inevitable need for renal replacement therapy. Dialysis is essentially the last step for individuals with renal disease and our main goal has to be to prevent as many as possible from requiring this life-saving modality.

The first component to be developed was the dialysis treatment center which the communities very much wanted. They had so many of their family members, friends and neighbours that had been relocated to a dialysis unit here in Winnipeg or some other urban center in southern Manitoba. They wanted these folks to have the opportunity to return home. The second component of the Program is the Renal Health Outreach Program which is still under development and is seen by most as the most critical part of the program. Prevention, screening and treatment will be the goals of this part of the program. Kidney disease is insidious and many who have it, either as a complication of diabetes or some other disease, are not diagnosed until it is too late to treat. Fifty percent (50%) of Aboriginal patients starting dialysis do so on an emergency basis and these folks do not do well.

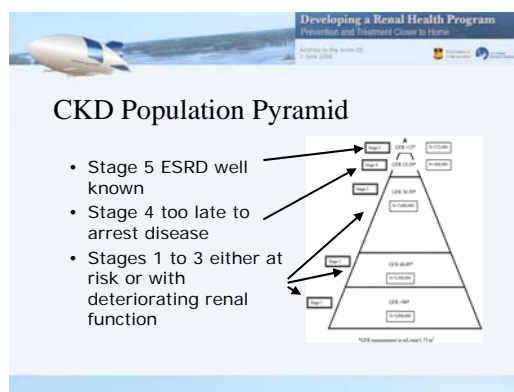
The Renal Health Outreach Program was developed to be delivered in conjunction with the dialysis program. It is suspected that there are numerous people in the Island Lake communities that are in some stage of renal disease that may eventually require dialysis. This program is designed to identify these individuals earlier and stop, or at least slow down, the progression of the disease so that they do not end up on dialysis.

Aboriginal Canadians have an increased incidence and prevalence of Chronic Kidney Disease which is only partly attributable to the high prevalence of diabetes among this population. There are other disease processes, present in Aboriginal communities, that can result in these folks getting renal disease as well. We know that the need for dialysis treatment has been increasing at a phenomenal rate over the last couple of decades and suspect that this will not change in the foreseeable future, both in the Aboriginal and non-Aboriginal communities.

Little is really known about the actual prevalence of chronic kidney disease in the Island Lake communities as there have not been any studies done on this specifically, but we do suspect that it is of epidemic proportion. Chronic kidney disease poses a public health challenge and needs to be addressed through a population health approach.

The outreach clinics will be nurse managed, occur at each community and will be governed by current clinical practice guidelines that include management of hypertension, hyperlipidemia, and diabetes. The program is algorithmically based which means that nurses will have clearly defined guidelines to follow when they see a patient with or at risk for renal disease. They will not only identify people who are at risk for renal disease, but people who have other complications of diabetes, such as cardiovascular disease and actually begin to treat these individuals as well as referring them to specialists or to the primary health care provider. Follow-up, which is an important part of any treatment regime, can occur in the community where the individual lives and will not require the patient to be transferred to an urban centre as often. We also plan for our program to be integrated with existing or proposed chronic disease risks factor screening and complication assessment initiatives that are already taking place in Manitoba such as the one developed and managed by Manitoba Health.

Figure 1



When we look at the population in terms of kidney disease, there are 5 stages. The stages are based on kidney function. We are looking at focusing our clinics on patients in the first 3 stages because by the time patients have reached stage 4, they are already looking at

choosing options for treatment. By stage 5 they are already on some form of renal replacement therapy.

One of the challenges that we have encountered in developing this program is encouraging some to think ‘outside the box’ of the Local Center model. Presently, we are the only Local Center satellite dialysis unit in Canada that we know of that is not attached to a hospital. The entire hospital infrastructure present in other dialysis units had to be developed independently in the Island Lake Program, which was quite challenging.

There are also some jurisdictional uncertainties. We have been working closely with provincial, federal and local politicians and government groups to try and overcome some of these jurisdictional boundaries. Often times you hear, ‘That is not a Provincial responsibility but is a Federal responsibility.’ This can be frustrating when we are trying to deal with the health of these people. We need to all work together and it has been amazing the partnerships that have been formed based on this program.

Integration with existing community programs are sometimes challenging because we do not always know what programs are out there. We are trying to form partnerships with the groups we know about so that we all work together and form a cohesive team. If the communities see us as a team there will be increased buy-in and more participation. A major challenge that we have is recruitment and retention of staff to work in these programs. We have been very fortunate in that we have four nurses who have committed to staying two years in order to get this program up and running. Other challenges include housing for repatriation, water, sewerage and transportation. It has been difficult getting people back to their home community because there is sometimes no housing for them to go to. Getting housing materials up to the communities is difficult, expensive and it has, at times, limited our ability to bring people home.

Patient transportation has been a real challenge. We have had to be very innovative in the way we manage getting patients to their dialysis treatments. Presently, patients are transported by helicopter at \$1,800 a trip. We dialyse these patients three times a week, 52 weeks a year. We have to come up with ways of getting them to and from dialysis in all

kinds of weather, because these patients are coming from all four communities. We use the helicopters during freeze up and thaw because there just is not another way of getting them across the lake. When we have a winter road, which is often 'iffy', we will use a car, truck or a van. This year we had a very small window of opportunity with the winter road because it did not open until the end of February and was only open for about 6 weeks. It was not a good winter road because of the amount of snow that they had up north this year that limited the amount of freezing. Often times the patients would set off in a car, get halfway across the lake and the slush would stop them. Someone would have to go and get them, bring them back and then get a helicopter to get them over to us. In the summertime we use boats. Presently, we are trying to retrofit boats that are already up in the communities so that they are safe and secure for patients to travel on.

Waste management is another big challenge. We have three kinds of waste in our program: paper waste which we transport to the local landfill, plastic waste which is not biodegradable and cannot be put into the landfill, and human waste, which is also biohazardous. The only option we have for the plastic and human waste is to truck it out once a year on the winter road. We have contracted a firm with a licence to carry biohazardous waste for \$8,000.00/year to travel north, pick up the waste and take it to an licensed incinerator in the northern United States. There are very strict guidelines on managing biohazardous material and we are required to follow the rules. One includes keeping the waste material at a certain temperature. We had to purchase a walk-in cooler to store our waste material at a constant 4°C temperature. We also had to purchase a baler that would crush our plastic containers so they could be shipped to the incinerator as well.

Other challenges we have encountered are accessing supplies and equipment. We try to be as creative and cost effective as possible. Unfortunately, our options are either airfreight or winter road. The majority of our supplies and equipment were transported by airfreight because of the timing of the opening of this unit, so it was very expensive. We do have an opportunity to purchase a years worth of supplies and send them up on the winter road but we have run into problems with expiry dates, needs of new patients and other technological changes that result in orders being shipped more than once a year.. Our total cost this year so far for transportation of equipment and supplies has been \$30,000.00.

What do we do with the supplies when they get there? What do you do to make sure that these supplies are safe, dry and at the right temperature? We are very fortunate that we were blessed with a huge basement in the Renal Health building. We do try to order as much of our supplies as we can in January so that it can be transported on the winter road and stored in the basement.

The program has been a huge success in terms of the psychosocial effects on the patients who are very happy to be home. We hope to open our clinic soon, to be able to deal with some of the issues in the community that cause people to end up in renal failure. We know what has to be done. Sustainability of this program is key.

Question to Anna Baggio

It is important that the Boreal Forest is protected. We in the transportation industry end up trying to develop a system that will give us a better year-round access by road to these communities. Have you ever thought of coming together with other groups to make guidelines that could be presented to groups such as Transportation Manitoba and others that you have worked with in Ontario? The guidelines could lay out the guidelines and say can you work within them.

Anna Baggio

This is a very good idea in terms of outreach to transport ministries or the equivalent ministries across the province, including Indian Affairs because they have a part in building roads to remote communities. There is a role for not only environment groups but also for ministries that are concerned about species at risk, access to communities. I would be more than willing to be part of a dialogue of all the necessary parties coming together. Communities in the area would also need to be partners in that dialogue.

Question to Wendy Whalley

Approximately, what is the capacity on a dialysis unit? Is it much more than you would realistically have to contend with in a community of 10,000 people at Garden Hill? Or is there already a perceptible need for a second such unit on the horizon?

Wendy Whalley

This unit was always meant to be an interim unit. We have 6 stations that will allow us to do up to 36 patients. The plan in the future is that there will be a Regional Health Center for the four communities which will include a Dialysis Unit and the current unit will close. Based on previous history with other dialysis units, I doubt that this unit will ever close. Unfortunately, there will be enough people to fill, not only the unit that will be built in the health center, but ours as well.

Question to Wendy Whalley

Is any serious study or analysis being made to see whether this service lends itself to modularity so that some common sense possibility is canvassed about avoiding flying people by helicopter? In other words, if there is to be a second or third health unit, will they all be clustered in the same place?

Wendy Whalley

The dialysis unit is presently located in Garden Hill. The primary health center will be located between Wasagamach and St. Teresa Point so they will not be all located together. The Manitoba Renal Health Program, when they are deciding where to put dialysis units, does look at, “are there enough patients in the immediate area to support a dialysis program,” so that people do not have to travel. It is probably unrealistic economically to believe that there will be a dialysis unit in every community. They also need to look at the resources available that would support that unit, such as trained staff.

Question to Wendy Whalley

You mentioned that once a year the plastic residual waste is trucked out to the northern US. Is this being done for reasons of health safety or for reasons having to do with environmental considerations? If it is the later, has anyone done a net analysis to determine

the emissions on the gasoline or diesel that is involved in trucking out some X miles a year as opposed to proper encasement?

Wendy Whalley

When we looked at the plastic that had to be removed, and there is certainly a lot of it, we really took both of those issues into consideration. If we were to burn the waste in the community, we were told that there would be emissions that would not be safe to the members of the community. The cost of an incinerator that meets code is prohibitive and currently there are none in Manitoba. Because the product is non-biodegradable it would sit there forever. So there was no advantage in leaving it. We could have it trucked out more often, but what would we do with it when we trucked it out? The company that trucks out our biohazardous wastes offered to take our plastics and biohazardous waste to the same place and dispose of it in a safe, environmentally friendly manner.

Question to Brian Gudmundson

I have a very politically incorrect question to ask. As a parent with kids, if you look at choices in the house when you give the children a choice between apples or potato chips, most times the kids will choose potato chips. If we are encouraging people to make healthy food choices, then as a parent I would not have potato chips and pop in the house. So given the costs of freight, why are we shipping potato chips, coca-cola and junk food?

Brian Gudmundson

The government of Manitoba is not shipping these items. These are retail decisions: Northern Stores is a major player in this retail market. They have over the years, in the consultations that we did to develop this report, said that they would be glad to provide a variety of nutritious foods but they want to make sure it sells. The reason that they have pop and chips on the shelves is that they know that it sells. It is not curtailed or regulated by the government of Manitoba. It is simply a retail sales choice made between the consumer and the supplier.

Question to Wendy Whalley

Is your center working to help people manage their blood sugar so that they do not get to the point where they have to use a dialysis machine?

Wendy Whalley

Our mandate is really not diabetes as much as it is renal failure however you cannot look at renal failure without looking at diabetes, but there are other causes of renal failure. The biggest problem with diabetes is cardiovascular disease, which in turn causes renal failure. If we can get people who are diagnosed as diabetics early and provide education and some treatment for their high blood pressure, their high cholesterol and perhaps their rising blood sugars, then we will be able to prevent them from going onto dialysis.

There are other programs in these communities that deal specifically with diabetes. Doctor Heather Dean's program addresses kids with Type 2 diabetes. We want to be part of that team because we are all trying to achieve the same goal. If we are out doing a clinic somewhere and we find a child with an elevated blood sugar that no one knew was diabetic before, then we will refer them on to the nursing station or to the diabetic health specialist and we are going to follow them for renal disease. There is a team of us that can provide that kind of service.

Lunch Keynote Speaker

Dr. Heather Dean
Head, Section of Paediatric Endocrinology
Department of Paediatrics & Child Health
University of Manitoba

As an introduction to my presentation on Type 2 Diabetes in children, I would like to read an excerpt from the eulogy that I gave for my Father, Charles Murray Dean, in November of 2004.

“After the war, he worked for the Dominion Government Meteorological Service at the weather station in Churchill. In 1947, the honourable C.D. Howe announced the establishment of the first weather station on Elsmere Island at Eureka Sound, the most Northerly post in the world. Dad was one of three Canadians and three Americans hired on the team for this important project. The Toronto Star announced it as “six human polar bears plan to spend 18 month in territory where no humans have ever been.” The Saturday Evening Post described the project as “the little band of heroes in an outpost that had no equal for bleakness and isolation.” In a letter to a comrade, Dad objected to the author’s title of the “Awful Arctic”; he changed the title to the Awesome Arctic. His detailed journals, letters and photos of those two remarkable years of isolation in Eureka are our family treasures for current and future generations.

When he left Eureka in 1949 he left part of his soul there and always dreamed of returning to the Arctic. A favourite pasttime of his was Arctic literature. It had to be authentic, not a tour story written by an impostor. He scowled when he heard that Farley Mowat had published another book.

He did not talk often of those years in the Arctic when we were growing up. He preferred to keep the storytelling to quiet times of reflection with family. The official Eureka weather

records were lost in transit between Toronto and Winnipeg in 1949. My Dad's journals remain the only historical legacy of that project in the late 1940's. I was privileged to inherit all of my Dad's journals and books from his times in Eureka. My sisters did not understand my passion for why it was so important for me to understand what life was like in the North in the late 1940's."

As you see, I have a personal connection to the Arctic. Here is an iceberg. The iceberg analogy is important for us in Type 2 Diabetes, because 50% of people that have Type 2 Diabetes do not know that they have it. It is a very silent disease.

Type 1 diabetes is what we as paediatricians were trained to look after. It is what Bobby Clark has. It was previously called childhood onset, or juvenile diabetes. Type 2 diabetes is the form that is associated with obesity and life style. This is why it happens in many people in adult life. Winston Churchill, died at age 91. He was obese, he had a very stressful lifestyle but he did not develop diabetes, he did not have hypertension or renal failure. Thus, although obesity is a risk factor, genetics plays a large role.

Fifty percent of obese children will develop the metabolic syndrome, which is a composite of abnormal metabolism and insulin resistance. They have increased risk of Type 2 diabetes. People with the metabolic syndrome also develop the complications of diabetes and cardiovascular disease. So when we talk about the obesity epidemic causing diabetes, it is true, but not every obese person and not every obese child, as the Wall Street Journal likes to say, is going to get diabetes in the next 30 years.

Type 2 diabetes first appeared in children in the late 1980's. It did not previously occur in children. It is an adult disease. Why should children be getting Type 2 diabetes? It has now become a global phenomenon and we are trying desperately to understand it. It has only been 25 years and we have a long way to go. In 1990, I gave the first public lecture to the Canadian Paediatric Society in Calgary. In 1990, we also had the first international conference about Type 2 diabetes in aboriginal peoples. We published our first Manitoba case series in the Canadian Medical Association Journal in 1992. Shortly thereafter, there were a number of international conferences that were quite small. We had our very first full

conference on Type 2 diabetes in Tucson in 1996. Less than 10 years ago, the scientific community held the first full conference titled Type 2 Diabetes in Children, in the world. The Canadian Diabetes Association, the American Diabetes Association, the Center for Disease Control in Atlanta and the National Institute of Health in Bethesda all convened workshops in 1999 to highlight this new pediatric disease. Guidelines on how to differentiate Type 1 and Type 2 diabetes in children were needed quickly as well as strategies to make our whole community aware that Type 2 diabetes is now appearing in children.

We now have clinical practice guidelines on how to care for children. This is now a phenomenon that is recognized around the world. It has only been 25 years, but it is changing rapidly. Diabetes is changing because of the obesity epidemic. The way we treat it is changing rapidly. We are just now understanding the outcomes because the children who had Type 2 in the early 1980's are now in their late 30's. Manitoba is about 10 years ahead because we were the first to see Type 2 diabetes clinically. Initially all the new cases we saw were girls. We do not have an explanation for that, but now the gender ratio is 1:1 girls: boys.

Globally the rate of Type 2 diabetes in children is relatively small. The highest rates are seen in American Indian and other populations who have a higher risk for Type 2 diabetes in their adult population, including the Indo-Asian, Philippine, African-American, and Caribbean-American populations.

All of the figures for prevalence of Type 2 diabetes in children in Canada are in First Nations because the disease started in the First Nations. However if you look at the Paediatric diabetes clinics across the country, Nova Scotia 14%, Vancouver (all Punjabi and Indo-Asians), Edmonton 4%, Toronto 4%, Montreal 4.5%. Again it is ethnic minority groups living in those urban populations who are affected, not Caucasian children. In Manitoba, the percentage of children with Type 2 diabetes in the diabetes clinic is the highest in Canada at 28 %.

The indigenous populations around the world have a greater risk of Type 2 diabetes. The populations that have higher prevalence in adults are the ones that have the greatest risk in

children. In some populations such as Oji Cree children in Manitoba, the actual rate of Type 2 diabetes is greater than Type 1 diabetes per 100,000 children. The Japanese experience is unusual. In Oriental children it is very rare to have Type 1 diabetes. So they have higher rates of Type 2 diabetes in children.

Wendy Whalley talked earlier today about the end stage renal disease in Northern Manitoba. The earlier that you develop Type 2 diabetes, the earlier that you are going to develop complications with blindness, kidney failure, amputations and cardiovascular disease. The data on complications is from the Pima Indian population of Arizona, which is very similar to our Oji Cree here in Manitoba. The Pima Indians also have high rates of youth onset Type 2 diabetes. In Manitoba we have mortality and morbidity related to childhood onset diabetes at age 9, 10, 11, 12 instead of at age 50. Other challenges are related to poverty, social deprivation and isolation. Associated medical problems are congenital abnormalities, retinopathy and blindness, fatty liver leading to cirrhosis and cardiovascular disease that is exaggerated by smoking. Another problem is the transition to adult health care.

In 1988, we took our first youth with Type 2 diabetes to diabetes summer camp. Blood glucose levels decreased quickly in just twelve days in the camp environment. Think back to your own experiences at summer camp, you never sat down except to eat a meal or to sleep. You ran from your cabin to the dining hall, from the cabin to the swim dock, from the cabin to the boat dock, from the cabin to the arts and crafts shop. Camp has an exceedingly high physical activity level as well as a very controlled nutritional intake, a dramatic change in lifestyle that includes both nutrition as well as physical activity. The challenge for us is to take this success back to the home and the school environment. The First Nations communities are considering how they can replicate the camp environment in the community. As part of our treatment program, we plan outreach clinics in northern Manitoba and Northwestern Ontario. We have to understand the geography, economics and the attitudes of the community. We appear on the local media, we try to answer questions that people have, in order to correct misconceptions.

A few years ago there was a large anthropological study done by the University of Toronto in Sandy Lake, which is just across the Manitoba-Ontario border from the Island Lake

communities. Sandy Lake has a very high prevalence of Type 2 diabetes just like the Pima Indians in Arizona. In Sandy Lake they studied diet, exercise lifestyle, and genetics. They knew that as far back as 1985, their community had the highest prevalence of diabetes in the region. In 1985 there were only 12 people in the young adult age group, 18-25 years that had Type 2 diabetes. We now have 60 youth with Type 2 diabetes in the Sioux Lookout Zone that are under that age of 18. Toronto research teams identified in Sandy Lake a genetic factor that controls metabolism in the body. They found 8.7% of the population had one or two copies of this particular gene. The frequency was 21% in the adults with Type 2 diabetes, and 33 % in people who had early onset Type 2 diabetes.

We studied the youth with Type 2 diabetes and found that 30% of our kids have a copy of this gene. It lead us to believe that one reason that we observed Type 2 diabetes in youth in the early 1980's compared to the 1990's in the rest of the world is that 'heredity loads the cannon, but obesity and other factors pull the trigger.' These youth with this genetic factor already have an abnormality in insulin secretion and when they become obese, the gene causes them to develop diabetes earlier because they do not have the insulin secretory capacity to withstand the metabolic stress. So, they have a gene that did not cause them any problem in past generations and was likely a key to survival in harsh environmental conditions, but the obesity epidemic has really driven that process to diabetes. Obesity has also driven the same process in the rest of the world with children now getting Type 2 diabetes.

One of the major concerns of the First Nations, particularly in the Oji Cree communities, is the next generation. We are working very hard now with the affected young moms to prevent obesity and early onset of Type 2 diabetes in their children.

We see children from Big Trout Lake, which is a community very similar to Sandy Lake, St. Therese Point, and Garden Hill. We held a special clinic there in April of 2002. My Dad worked there for the Hudson's Bay Company before World War II as a fur trader. He came with us to Big Trout Lake in 2002 at 84 years of age. He wanted to find an elder in the community that could remember what it was like to be in Big Trout Lake in 1939. The elder was just thrilled to have him there. He remembers going to the Hudson's Bay store. There

were only 5 buildings in the community at that time. Everyone lived in tents or was transient and on the land. This elder remembered going to the Hudson's Bay store because my Dad always had a pocket full of mints. Spending those three days with him in Big Trout Lake was really important for me because it helped me to put the dramatic change in lifestyle in the community over the past 70 years into perspective. The community was once healthy and on the move. There have certainly been positive health changes in the past 70 years such as improved neonatal survival but the dramatic lifestyle changes in that short time in the community have tremendous relevance to why we are seeing Type 2 diabetes in children.

Question to Dr. Dean

Is this a new disease?

Dr. Heather Dean

We have evidence that this is a new disease. Type 2 diabetes in children did not occur until the early 1980s. We cannot ignore the genetics component. Type 2 diabetes is a very heterogeneous condition that starts with insulin resistance and eventually your pancreas is not able to produce enough insulin and your blood glucose levels increase. The genetics is not going to be the answer, it is not going to explain what has happened. It clearly has to do with a dramatic lifestyle change. It is not just diet. It is clearly a combination of dramatic change in diet and exercise.

Question to Dr. Dean

Why are the Japanese experiencing Type 2 diabetes in children?

Dr. Heather Dean

This is a very important question, the Japanese are working very hard to answer that question. The Japanese are also observing the same obesity epidemic. Obesity in children is happening worldwide. It is not just a phenomenon of industrialized countries.

Question to Dr. Dean

Would switching to diet drinks help reduce Type 2 Diabetes?

Dr. Heather Dean

That is a loaded question. Any sugar containing drink in excess will add excess calories. If teenagers are drinking 7 or 8 cans of sugar pop a day, this will contribute to weight gain. The difficulty is that our taste buds want more and more flavours, and sweetness. We should not say no or ban them, just limit intake.

Question to Dr. Dean

Are all carbohydrates a problem for Type 2 Diabetes?

Dr. Heather Dean

Potatoes are starches, they are complex carbohydrates. It is very different from simple sugar in fruit juice or pop. Complex carbohydrates are very important, in fact in the Pima Indians traditions, the three sisters are squash, beans and corn. Historically those are very important crops. Other complex carbohydrates such as carrots and potatoes are important components of our diets worldwide. The solution to obesity and Type 2 diabetes has to do with moderate intake and food preparation. A French fry is not a healthy potato, but a baked potato is. Complex carbohydrates are handled in a different way in the body than simple carbohydrates such as fruit.

The extra calories, especially outside of mealtime, are leading to extra calories that are fuelling the obesity epidemic in part.

Session Three:
Mining Logistics in the Arctic

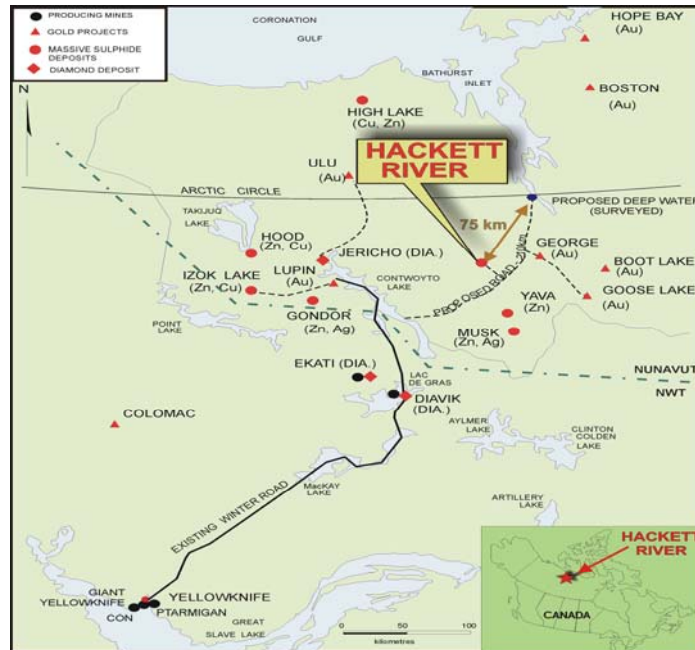
Session Moderator
Jim Thomson
President
Mercatus Ventures

Abraham Drost
President
Sabina Resources Ltd.
Speaker

Hackett River is a base mineral deposit in Nunavut that is located 75 kilometres south of the Arctic coastline. Sabina Resources exercised an option with Teck Cominco for 100% ownership of the poly-metallic Hackett River deposit. Teck Cominco is a partner in the venture, with the right to exercise earn-back provisions. Silver and zinc have excellent supply/demand fundamentals going forward. Sabina is planning an aggressive delineation program to bring the project to pre-feasibility in 2006. We presently have 2 drills on site.

Hackett River was a deposit before Sabina came along and reached an agreement with Teck. Teck's interest was obviously in having someone else spend the necessary funds to delineate the deposit further. Sabina have retained Wardrop Engineering out of Toronto to do a resource update on Hackett River by the third quarter of 2005. Speaking with individuals this morning, I understand that the development phase for heavy lift airship technology is somewhere later in this decade. Our ideal operational date to be in production is 2009. Sabina is a listed public company on the Toronto TSX venture exchange. It is a reasonably robust and well-financed junior company and with the partnership of Teck Cominco is well positioned to bring Hackett River to production.

Figure 1



The Arctic coastline is Canada's third coastline. Relative to the Atlantic and Pacific coastlines, it suffers a lack of basic infrastructure. Seventy-five kilometres from Hackett River is a proposed deep-water port that is called the Bathurst Port And Road (BIPAR) project. It is an infrastructure concept that has been around for about 10 years and is quite advanced in terms of its planning cycle. There has been some pre-feasibility work done and guidelines for an environmental assessment have been completed.

The BIPAR project would have an impact on the landscape, particularly the all-weather road. What we are finding out along with our colleagues, Wolfden Resources, who own the High Lake and Ulu deposits, is that an all-weather road is a monumental challenge. We are looking at Bathurst Port with interest nonetheless. We see it as a potential solution to the development of Hackett River.

Hackett River is a 20 million ton sulphide deposit (discovered in the 1950's). If it were down in southern Manitoba or Ontario it would have been mined out 20 years ago.

This portion of the Canadian Shield is extraordinarily well endowed with mineral resources. Infrastructure projects of this magnitude will lever an economy. The Inuit associations of Nunavut and the government of Nunavut are coming out with a new mineral policy that more or less recognises that mineral sector development is the future of Nunavut. With the Nunavut government and the Inuit Associations taking a strong stand in favour of mining, the timing is right to do something dramatic in this part of the Arctic. That is the context that I bring to you today.

Twenty five people currently occupy the camp, two diamond drilling crews, various geologists and camp support staff. The landscape is barren land just below the Arctic Circle. Barren-land Grizzlies coming into camp makes for an interesting ongoing challenge. Camp operations and drilling operations are more or less supported by helicopter and fixed wing aircraft.

Everyone has something to say about lawyers and their fees. In the North, it is the transportation companies, believe me. A round trip twin-otter flight from Yellowknife to the Hackett River camp is \$6,000-6,500.

Figure 2



What are the challenges that we face? We are somewhat landlocked, and want to get our concentrate to the coast. From the coast we can direct ships to the Pacific Rim. North

America is a mature economy, with some demand. The burgeoning demand for base metals going forward is Asia: China, India, and Japan. We see the timing as being very auspicious.

What are the technical challenges? We want to build a road but have some fundamental physiographic challenges to face, like tundra and semi-continuous permafrost issues. Winter ice roads are a possibility, but also have significant environmental challenges.

Over the life of the mine, we project the cost to build and operate a 75-kilometre winter road from Hackett River to Bathurst Inlet at a total project cost estimated at \$100 million. The winter road season can be somewhat limited. We are projecting 14-20 weeks, but this can vary dramatically from year to year.

During the summer shipping season, which is 6-10 weeks long, the port would be busy bringing fuel in and shipping concentrate out. There has been an analysis done on shipping fuel in from Hay River. What I like about bulk shipping by water or to a port facility is the reduced amount of handling. The more any sort of bulk commodity is handled the more expensive things become. We really are quite dependent on an ice-free shipping season that can be expanded on both ends by an ice breaker. The question is how to get from the mine to the coast. The conventional wisdom is winter road. There is still a permitting issue for winter roads, but it can be done.

Let us face it, transportation budgets will have to be significant. There is a fair bit to work with here from our perspective and we are open to suggestions. For the winter road context we need mine site storage and we need port site storage. Expanding the annual transportation time window from site to port beyond the winter road envelope (by using other technologies) could impact required storage capacity positively and reduce the cost of physical plant.

We are in the early days of development at Hackett River, but we are on a steady track. Airship research, mine operators and resource developers in the Arctic are in a similar time frame. There may be an opportunity here to work together. I would like to hear from people with respect to airship capital and operating costs in the context of Hackett River. I

am in regular communication with my colleagues at Inmet. The land-locked nature of the Izok Lake deposit is still a head scratcher for them. The synergy concept is alive and well and is a must in this harsh operating environment. There is a potential to develop quite a lively discussion with airship developers.

Question to Abraham Drost

Can you make a few comments on using airships as a platform for geophysical survey work?

Abraham Drost

I think that there is great potential for that. The technology would be of definite interest to contractors, as this is something we tend to contract out and not do in-house. With the elevation control and speed stability characteristics of an airship, this technology would lend itself to remote sensing and surveying that the industry relies on. There are a myriad of possibilities.

Session Three:

Oversized Freight Logistics

Les Recksiedler
HVDC Engineering Manager
Manitoba Hydro
Speaker

When I first tried to explain to my staff what HVDC has to do with airships, I was having a little bit of difficulty. I finally thought that I was getting some headway when one of the fellows said something about following hot air.

I am going to take you on a journey today that is about 5,000 miles/ 8,000 kilometres. We move a lot of different equipment in various different ways at Manitoba Hydro. We have people dedicated to moving the stuff. I have added airships to the presentation in hopes that in the future we will also be moving a lot of different items by airship. The items that I will concentrate on today are the very heavy and very large items. They will be a challenge for any mode of transportation.

I am not going to talk about delivery, customs, taxes, insurance, liability, contracts and things like that. My talk will be about the actual moving of the transformers themselves.

Some of you may not be familiar with transformers. They are very large and very heavy equipment. The ones that we move are similar to the size of your house. They weigh about 86,000-218,000 kilograms or 189,200-479,600 lbs. That is the weight that we have to ship with everything stripped off and all of the oil removed. Because they are oversized, we require special rail cars to ship them. Up until recently there were only three rail cars in North America that could ship these types of units. Recently they have added another six to inventory.

Figure 1



Transformers are very easy to damage. In 1986 we had a transformer that was coming in for repair from Henday Station. The train went in to pick up the transformer. The train crew left the switch stand unlocked. Some kids came along and played with the switch. Lo and behold when the train came out, the locomotive went down one track and the transformer went down the other. The transformer ended up in the middle of the muskeg, about 1/3 of a mile from any access road. We had to build a road to get the transformer off the rail car, allow the railway to rebuild the track, and move the car back onto the track. Luckily at that time we happened to be building Limestone Generating Station. We had a huge contractor up there who was able to come in and build the access road in about a day and a half with some huge pieces of equipment in the swamp.

Sometimes you do get lucky! The transformer was undamaged, it came off the rail car and settled into the muskeg at a very slow rate.

With transformers, our journey really starts in Stafford, England, which is about 2 hours north of London. The transformer is stripped down for shipping, and about half of the weight is removed. Things get interesting because roads in England are not very straight and they have roundabouts. When transporting the transformers, they have to remove the centre of the roundabout, shut down all of the traffic and go through the center. The loads are too large to actually go around the circle of the roundabout. This can only be done once a week on a Sunday when there are fewer drivers on the road.

They have two specially built trucks that were made specifically for moving these large transformers. They are very heavy and have added weight to allow for traction for the truck to pull them. Of course you have to get it to a port and to a ship. Many bridges in England are not capable of handling the weight of a transformer. So the transformer is transferred to a barge and then tugged over to where it can be loaded on to a ship. At Liverpool, the transformer is loaded onto the ACL vessel that makes a one-week round trip to Halifax and back to Liverpool. The transformers are loaded onto the ship last, and first off-loaded at Halifax. They are tied down with bracing cables to try and prevent movement. We try to get them in the center of the ship if possible.

After ship off loading, the transformer is loaded onto a rail car where it is locked and braced according to the American Association of Railroad guidelines.

Over the years, rail transport is probably where we have had the most problems with respect to damage of these transformers. We install three bumper recorders that measure the acceleration in three directions.

Figure 2



We employ a rider, who is an ex-rail employee. We find this to be very advantageous because he knows the railway system and all the problems along the way. The rider can talk to the shift change, the engineers and all the staff, and make sure they are aware of the load. The load is a dimensional load so it actually sticks out sideways off the sides of the railcar.

This causes a lot of problems. We are not the only people having problems shipping these large power devices. I am working with the IEEE, which is the International Electronic Electrical Engineers Association in developing a guideline for shipping large power transformers. It is going to have all the aspects of sea, barge, rail and road. I am helping write the section on rail transport.

When passing other transformers or other pieces of equipment, the train has to go slower because the unit tends to rock at higher speeds. When the train has very little space between the cars, and the unit starts rocking, it can cause a myriad of problems and can damage equipment and other units along the way. The transformer is sorted through the Symington classification yards at Winnipeg and forwarded to Gillam. From Gillam the unit is taken up to Henday Station.

We have had a number of problems over the years. One unit that was shipped up at Christmas time and was damaged. It was sent back a year later, and it was sent up again about a year after that. The transformer comes back next Christmas and gets damaged in transit again. Away we go again. It can be very frustrating with the high costs and the amount of time that is required to move the transformers.

One unit we received was suppose to have three bump recorders on it. Needless to say it only came with one that worked for about two days of the whole trip. We had no recording of what the trip was like. It was expensive to return the transformer all the way to England. We estimated the return cost to be well over half a million dollars. We decided to do some testing on site to see if it would be acceptable instead of shipping it all the way back. We tested it on site and placed it in service. It turned out to be a good move.

Accessories come to Halifax by sea and are loaded onto a truck and trucked to site. Trucks are more efficient and cost-effective than rail. A transformer when fully dressed has the bushings back on it, the coolers, the turrets, the conservator and is filled with oil. This doubles the weight of the transformer, the largest being 365,000 kilograms/803,000 lbs. We have been able to develop these now so that they can be moved into position fully dressed and full of oil should a transformer fail. However, we did have some challenges along the

way. The first time we tried to move one of these units the actual steel in the rail started to spall in front of us. We see a future here for air ships. We are going to be building a number of new generating stations in the future.

Session Three:

Airships in Wildland Fire Suppression

Hugh Freeman
Consultant
B.C. Forest Service (Retired)
Speaker

Wildland Fire Suppression is about the transportation of appropriate resources in a timely fashion. In Canada we average about 7,600 wild fires a year. We burn about 2.8 million hectares of forest land, wildlife habitat and often human habitat. Typically in Canada, fires cost a billion dollars a year to extinguish.

Figure 1



The number of fires is increasing annually primarily as a function of global warming which relates to dryer forest fuels. The impact of the fires is becoming more severe. Populations are moving closer to the forest land, because everybody wants their little niche out in the edge of the woods.

The severity of the fires is increasing as those forest fuels accumulate due to the fire suppression policy of agencies in Canada and the United States. The agencies are in a catch-22 situation because of Smokey Bear. Smokey Bear was one of the most successful advertising campaigns ever. He convinced people in North America that fire is bad. I am here to tell you that Smokey is wrong; fire is not bad. The reality is that fires are a natural

part of the ecosystem and that typically low intensity fires have covered most of northern North America for millions of years. Fires reduce the fuel loading.

The fire suppression policies in place now extinguish all fires. As a result, the fuel accumulates and when we do get fires, they burn more intensely and they burn faster.

Most of the agencies responsible for fire control in Canada do not fight all their fires in all the areas. Their suppression policy is ultimately based on values at risk. The values at risk in a priority sequence are typically people, infrastructure and property, forest and wildlife.

Every province and territory in Canada has a wildfire control program. In BC, they spent 350 million dollars on wildland fire control. Multiply that by 10 provinces, and 2 territories and we are talking a billion dollars in Canada alone. The United States spends in the neighbourhood of \$4 or 5 billion dollars a year.

Successful wildfire controls have similar goals. The basic mission is to control all the fires within the first 24 hours because that is when they are small and that is when they are controllable by:

- A. Rapid detection by having lookout towers, lightning detection system, air patrols, public reporting,

- B. Aggressive initial attack.

The first lines of attack on fires are typically small initial attack crews that range from 3-5 people that travel either by road or helicopter, depending upon the fire danger. Most agencies agree that it is physically impossible to spend too much money on the initial attack. Initial attack is what you do on that first day to control a fire. In days 2,3 and 4 costs increase exponentially. If you take a circle and double the diameter then you have doubled the perimeter. The perimeter is the measure of work that it takes to extinguish a fire.

Figure 2



Typically across Canada, agencies have about a 95% success rate. Five percent of those fires resist initial attack and they become large. These fires represent about 70% of the annual cost of fire suppression in Canada. Part of the reason that costs accumulate so quickly is that airplanes are used. A Martin Mars airplane (there are two of them in western Canada) packs close to 8,000 gallons of water, and costs \$35,000 an hour plus fuel. Ultimately, they are seldom used except when the politicians get pressured to use them. It is not a contract airplane. It is an ocular thing for the public, it is a big airplane, it is very slow, very cumbersome and really does not do a very good job for us.

The other aircraft that get used are helicopters. The S64 for example, will pack close to 10,000 gallons of water. It costs about \$10,000.00 an hour plus another \$8,000.00 an hour in fuel. You can see how those costs start to accumulate, day two, day three, very quickly.

The 5% of fires in which initial attacks fail, typically fail due to extreme fire behaviour. Sometimes it is a function of the sheer magnitude and number of fires. In some areas it is not abnormal to get 160 or 200 new fires overnight when lightning was not in the forecast. In that case, agencies often get overwhelmed. They can only deal with so many fires. They cannot afford to have all the resources to look after that many fires in that short a period of time. Typically it is more from extreme fire behaviour. The amount of effort that it takes to control a wildland fire is in direct proportion to the perimeter. As a fire gets bigger it really takes more effort.

Under normal summer conditions in an open lodge pole pine stand, mid-province Alberta or Saskatchewan, rates of spread without any wind can be upwards of 10 or 12 meters a minute. This is pretty quick. You can see the importance of the initial attack and the need to get equipment to the line fast. The lag time in detection or initial attack can be very costly.

I was asked to give a hand on a fire in 1999 in Salmon Arm. We measured rates of spread at 90 meters a minute. It crossed from one side of the valley to the other and went to the top of Mount Ida in 7.5 minutes. That was about 1.3 miles.

What causes extreme fire behaviour? There are three components in fire behaviour that contribute. One is the weather, the second is the fuels that the fire is burning in, the third is the topography. From a weather perspective, there are three factors that impact fire. One is

temperature. Obviously the higher the temperature the more the fuels preheat. When humidity is low, it aids in the drying of the forest fuels and the wind increases preheating and spreads sparks ahead of the fire. There is a critical point in the weather that is very important for fire control people. This is the point where the temperature and the humidity meet. Where the temperature is higher than the humidity you can expect rates of spread that may go to 15 and 20 meters a minute. Also, when you introduce the wind, it increases the spread of fire exponentially.

Figure 3



The second component of fire behaviour is the factors that influence the behaviours of fuels and their size. An example is the size of the needles and the branches. For fire to burn, it is a function of surface area, the more air for the surface area the faster it is going to burn. The arrangement of the fuels also comes into play. The issue is continuity. Is it a continuous type of fuel, or does it come to a wet spot? Then that is the end of the fuels.

The third component is topography, which influences fire behaviour in three ways. Slope, because the heat from the fire at the bottom of the slope is preheating the fuels at the top not only by radiation, but also by convection. Secondly, the elevation or position that the fire is on the mountain. Is it on the bottom or on the top? Finally, the aspect; north, south, east or west. As we all know the north aspect is damper than it is on the south and west aspect.

Of the \$700,000,000 that is spent on escaped fires, where the initial attack was not successful, 40% of the suppression costs are attributed to aircraft. The aircraft potential

from an airship perspective is a \$300 million market. All these fire suppression activities happen in a relatively short time period from May to September. There is no use for those air resources during the balance of the year. Therefore the planes are all contracted. Very few agencies own their own airplanes with the exception of Manitoba and Saskatchewan who own a fleet of skimmer aircraft.

What roles might airships play? I have done some modeling work because that is what I do. I measure air tanker efficiency for agencies. From an initial attack perspective trying to compete with a five-hundred kilometre per hour fixed wing airplane would be very difficult. But, when it comes to crew and tent transport, my sense is that there is potential for airships in this scenario as helicopters do not travel over 100 knots. Crews need to be transported in as close to a fire as possible.

When it comes to project fires there could be potential for some very interesting roles. Currently, on large fires, from a command and control perspective, the fire control people and the duty officers will typically have the fires flown to digitize them, map them, and to provide overviews. They will spend money on helicopters so the operations boss on the ground can see what is happening, see where the spreads are, the slopes, and see what continuous fuels are about, and to see where he can put his fire guards in. My sense is that there is some significant potential in the command and control aspect.

For crew transport it would be quite easy to compete with helicopters which costs \$3,000 per hour plus fuel. In terms of equipment transport, the agencies frequently end up on larger fires having to transport equipment into the fire by road. In the summer, it is very difficult to get helicopters especially if British Columbia has got a rash of fires going, and Alberta has some going. The Canadian fleet gravitates that way. The retardant and the suppressant haul on big fires could be a use for an airship.

I personally believe that there is a significant potential for airships and have become interested in the last couple of years. I am in the process of attempting to convince some of my counterparts in the agencies to get on board and have a look at this.

Question to Hugh Freeman

My question is about the local weather that is created by fires. What sort of area and altitude is typically bounded. Does it affect up to 15,000 feet, 20,000 feet?

Hugh Freeman

I spent a few years in a bird dog airplane and in helicopters leading air tankers. Typically, when a fire is creating its own weather, it is sucking in oxygen at the bottom and pushing out at the top; nothing works at the perimeter. I see where you are going with this and, yes, there would certainly be some issues with airships in the proximity of that kind of weather. I was intimating that water bombing would be a good role for airships. I meant for the airships to support the people in their roles of digging down to where it is hot, covering the fire with dirt. Not in a giant real weather pattern that would be hazardous to them. When you do have those kinds of fires and the line is drawing oxygen in just back of the line and you make your drops there, and the fire sucks it in up tight to the line, yes there would be limitations.

Question to Les Recksiedler

With respect to the transformers, I noticed that you were bracing the core inside. What sort of incline could they withstand, if they were being hauled aboard something that had an incline?

Les Recksiedler

I do not know the exact limits, but as long as they are braced properly I think about a 25-30 degree incline would be quite acceptable.

Question to Hugh Freeman

I am a helicopter and fixed wing aircraft pilot. The fact that airships are slower than fixed wing aircraft, with a higher concentration retardant and because of a slower drop, would it increase the effectiveness of building a line? There is still the turbulence factor when you start. Air ships are somewhat sensitive to turbulence as far as controllability.

Hugh Freeman

There is an ideal application rate for each fuel in fire retardant that would relate to how much volume you put on per meter given a typical width. Air tankers would typically drop at about 110 to 120 knots. The skimmers would be a little bit slower than that. Ultimately the tanks are designed so that you drop a litre per 10 square feet, which is the actual volume that has been scientifically done through fire behaviour. The tanks have been designed to drop the required amount based on the anticipated speed of the air craft. You can control the doors, how far they open, and how long they stay open. You could do the same thing with the airship.

Yes, turbulence would be an issue. Ultimately most of the work that the helicopters do is hot spotting.

Session Four: Alaska's Transportation Requirements

Session Moderator
Henry Lasslo
Executive Director
Iso-Polar Airship Inc

Dr. Oliver Hedgepeth
Chair, Logistics Department
University of Alaska Anchorage
Speaker

Alaskans think of ourselves as a big gas station. We are about 9½ hours from 95% of the industrialized world. Alaska business men and women in transportation like to use General Billy Mitchell's quote in 1935 about Alaska being a central place to reach out to Europe, Asia and North America.

Figure 1



We have about 250 airports in Alaska. A lot of the outer villages have a variety of airplanes and we use barges and ships when the ice will let us. We are 1/5 the size of the United States, a large area. If you place a map of Alaska on a map of the lower 48 you can see that we stretch right across the map. This puts Alaska into perspective for this conference.

I did an analysis of about 50 places that we travel to, in terms of miles and dollars. Europe, Hong Kong, and Houston are several thousand miles away. It will cost as much to go to Honolulu or Tokyo, as it does to travel 500 miles across Alaska. This is one of the problems that airship technology might be able to tackle and help solve.

We have various means air, rail, and overland of transportation. We have one road that leaves Alaska to the Alcan Highway. We only have 9 highways in all of Alaska. You cannot get lost if you come up and see us. Our airport is open 365 days of the year; it is a 24-hour a day operation. In the last 4 years it only closed for a few hours one day. We also have the busiest floatplane base in the world. We have around 200,000 floatplanes in a state with only 600,000 people. The city of Anchorage has 300,000 people; we are kind of a busy area.

Alaska has a moderate climate but it snows a lot. The only problem that I have ever encountered in flying out of Anchorage is when the pilot skidded off the runway. We have a lot of international carriers, 300 different kinds of planes that are coming and going. Air Canada, Alaska Air, China Air, the list goes on and on.

We have a good deep water port to serve the Pacific Rim and local railroad service. The Alcan highway is open all seasons although it was disrupted last year for about a week after a 9.0 earthquake. The earthquake tore up the highway, but went under one of the pipelines and did no damage.

Figure 2



There is a need for airships in Alaska. The cost of delivering that box by helicopter was \$8000. I do not know what was in the box, but that was the cost of delivery.

We held an economics workshop earlier this April for possible airship applications. We then had an economic round table with about 100 participants, which generated a positive response on hybrid aircraft and airship technology. Responses are still coming in, but 33 respondents represent areas such as military, aviation, marine highway, airport, seafood harvesters, executives and a few students. All the responses were positive except for one person who surveyed two people in the aviation industry who said that there is no need for airship technology; just stop asking questions. I sent a response back and said thank you for setting my data point since every one else is in support of this technology and say hello to the Governor for me. I think they will change their minds when they get my report on what is happening here at this conference. There were a lot of good comments. There are existing needs.

Personally, I am sold on this technology. But there are some things that we need to look at. Here are some of the things that people have said. The airships are slow, are not able to deploy military forces, need landing strips, and are subject to the weather. Alaska has some very severe weather. In Anchorage, the wind really does not blow, we live in a valley. On the hillside around us, it can be 100-120 miles an hour on certain days. There are some wind issues and some physics issues that we just need to understand. There are a lot of benefits, however. One, I received from the Carnival Cruise people saying that this sounds like an exciting way to make money. They love to make money. They like to go up to Alaska, put their passengers on a floatplane, fly out to a nice little cabin on a river and go fishing. Or take a helicopter and land on a glacier. It is a cool thing to do and it is exciting. There is a possibility of putting tourists onto an airship and taking them where the train cannot go.

I am doing a study on issues and questions this summer. I have a long list of questions and I will address each one of these because these are questions from people that are seriously thinking of putting money and time into this technology. Now, so far no one in Alaska is stepping up to the plate to say that they will buy or build an airship, but if it was there right now I have transporters. Billion dollar transporters who are willing to use airships right now. If you had one up there right now, they would use it in some niche areas at this time.

There are a lot of questions, such as the altitude range? Can airships only work in summer? Can airships capsize? I had an executive from UPS ask about helium exploding. I am a chemist so that was an interesting concept, but that was her question.

There are different kinds of issues that are laid here. What about Lloyds of London? Will they insure certain rigs? What happens if a rig falls while it is transporting a cargo? My answer is yes, there will be people that will insure these. Can we move fresh seafood from Florida to Alaska? This is an issue that I am working on with my peers in Florida. In the analysis we are looking at the heavy lift, speeds, endurance, flexibility, safety and reliability of the airship.

The politics of Alaska is razor thin, you are either on the right side or the wrong side. Right now, more people have responded with “This is a good concept.” There are issues of timing and weather, and different designs of containment. I have packaging and container designers around the country who are always trying to tell me how to package things better. Different cargo rates, different costs per project or cost per ton or cost compared to an AT72 and other planes. The cost of delivering gallons of water to fight fires. One of the most exciting things about this, is the ability to go point-to-point rather than load up, go to an airport, wait, load up, go to the next airport and wait.

In summary, there is an opportunity in Alaska and it is real. This is what I want to leave you with. The companies want to see results so we are doing research with the company’s backing. The task force will hold a transportation round table of which several people in this audience will be part. We are now gathering data with the help of several people from the audience. We will be doing a cost and operational effectiveness analysis and a technological forecast. We will write a report and publish the results. We are doing this to help make decisions for the Air Alaska Department of Transportation. DOT says it is in their books but they need some more information to go forward. They want to identify those gaps for airship technology. Alaska is very excited about this technology.

Session Four:
Transformative Changes in the First Nations Housing:
“Getting Ready to Support the Build”

Dale C. Booth
Special Advisor for Economic Policy
Private-Public Partnerships
Indian and Northern Affairs
Speaker

In First Nations communities the housing situation is in crisis. There is a growing backlog, a need for investment, and a need for better efficiencies. Many of our First Nations are in remote areas that make the transportation of material and personnel difficult, raising prices through the roof. There is continued government financial support to those communities in need.

The cost of transportation has tripled in our communities as it has in many other communities. Every dollar that is paid into the premium to move goods is a dollar that is taken away from the building of a house.

The project needs a better transportation and logistics system. What I want to raise with you today is what types of things you can do as an industry to help us. We have some emerging possible examples, using new approaches such as home ownership. We are getting First Nations groups working on initiatives that will get more new homes into First Nations communities. We are looking at supporting First Nations institutions to improve and develop tools to address the needs and opportunities, and we are looking at supporting First Nations government platforms.

What that means is that First Nations are going to want to control their type of housing, they are going to want to control the build and they are also going to want work with

partners that are going to help them keep more money in the community and invest more money into building houses.

The INAC housing division's purpose is to assist First Nations to create options for those that are willing and capable of affording their own housing and to assist First Nations to build healthy, sustainable communities through financial and technical assistance for community infrastructure. The action plan is to: 1) to increase the number of homes on serviced lots as well as renovations; 2) to seek increased investment in a solid support base of social housing to build at least 11,000 new homes on service lots; 3) to seek significant investments over five years to help First Nations attract investment and support market housing and affordable housing measures; 4) to increase investment from the private sector for First Nations and their members; 5) to work with AFN and other regional groups to develop housing authorities, institutions and a governance framework, and to insure consistent shelter policies to meet these obligations.

Many First Nations are in remote locations without road access. Many First Nations are located on or very close to lakes which I understand is a good thing for this industry because some of the landing areas would be either on lakes or close to lakes. Most First Nations have a significant housing backlog. In meeting that housing backlog in those remote communities, they are paying a premium on getting that much material into their communities using the traditional methods of transportation. We need to find a way where we can reduce that premium and that money gets reinvested into community housing and we get more bang for the buck.

The magnitude of the investment that the federal government is going to be making over the short term is changing every day. As a result of the recent budget, several billion dollars will go to various social needs, of which \$1.6 billion will go to social and affordable housing. One third of that, or \$550 million, is going to be directed to Aboriginal housing over the next two years. The majority of that is going to be going into social housing and into affordable housing initiatives.

Investments are coming that will support social housing and look at managing housing on a business type basis, and increasing investment of the private sector industries like yourselves. We want to move from 50 First Nations acting as our own developers to 500 First Nations acting as their own developers with all those requisite skills. In order for First Nations to do that, there has to be a cost-effective way of getting the material into their hands. We want to put into place the appropriate governance platforms that are going to help this type of massive build. Housing management capacity is built on the foundations of good housing management policies, practices and efficiencies, finding financial management and land management. This is the transformation that is being looked at.

In the financial management area they are looking at prudent, transparent ways of financially managing these builds. This means trying to find the industry that is going to help bring in material at a good cost effective price.

The transportation carrier that can move material into the most remote region at the lowest price is going to be targeted or sought after. The industry that can gain the confidence of the First Nations is the one that will be doing business with First Nations people. They want to develop good partnership arrangements with new industries that are coming in to help out with these builds. The industry that can maximize the employment opportunities of First Nations is the one that First Nations are going to want to work with.

I have outlined a need, and a general direction of where things are going. I want to stress that there are a lot of things that are being developed when we look at housing. A lot of them are in the areas of cost of material but there is not a lot of thought being put into the logistics of getting materials into remote areas. The places with the greatest need are in those remote areas that can only be reached by air. There are not any roads or railways. The only way these people are getting out of these communities is by air. If we can increase the amount of things that are going into these communities by air it is going to really help these First Nations communities.

Comment by Ken Young

The issue of housing is a very critical for our people. For quite some time the backlog has been increasing. The resources that are available for catching up have been moving backwards instead of forwards. Therefore, the housing in many of our communities is extremely poor and substandard. A lot of the problems that we have in regards to the development of housing relate to transportation costs. The transportation that our people use is mostly winter roads and the cost is very prohibitive. We cannot use airplanes. I was shocked the other day, they were talking about completing three houses and they had to fly in the material for each of those houses at a cost of about \$500,000. I could not believe that in 2005 people living in poverty have to spend that kind of money to build a home. I had to ask if it was true and it was true.

I am glad that I am here. I am listening with interest. The topic of transportation is tremendously important for First Nations people. I am debating about what to say tonight. I have two speeches. I think that I am going to deliver the one that explains what our organization does; what it is that it wants to do in light of what has developed over the past couple of days in Ottawa; tremendous developments for our people.

Dale Booth

I look around the room and I see some First Nations representatives here. This is the client group. Seek out the communities that are building. You will know them because they are the ones advertising for various goods. They are putting various things on record, they are getting contracts out there. They are a client group that if you can gain their respect and their trust, you can work with them and employ their people. It is a huge market. It is only a growth market. It is the only true growth market left in Canada.

If you can come forward with a cost-effective way of helping the First Nations leadership and move material into the remote communities so that they can build, you are going to be an industry that they will seek out.

Session Four:

Cold Weather Testing Centre

Bruce Krentz
General Manager
Thompson Community Development Corporation
and
Rick White
President
Thompson Community Development Corporation
Speakers

The Thompson Corporation is a community-developed organization dedicated to expanding the business base in Thompson. We strive to attract new business and to expand existing businesses in Thompson. The corporation is in a unique position in that the majority of our funding comes from INCO Manitoba Division, who is the largest employer in Thompson. They have dedicated 10 years of funding to assist with diversifying the economy so that in the event that they downscale or cease operation, Thompson will remain a vibrant community. Funding flows to a volunteer board via the City of Thompson. That board is made up of community volunteers with a focus on business.

Figure 1



Thompson is in the center of Canada, at the northern end of the Central North American Trade Corridor. We are accessible, but we are on the outer edge of cold weather, remote Canada. We believe that this positions us well for testing airships and for being a base of operations for airships when the industry takes off.

We are a northern service center especially for northern Manitoba and Nunavut. Seven-hundred-and-fifty-six kilometres from Winnipeg, and in our minds one and half hours by air. We have great connections in terms of road, rail and air. In terms of air connections, we are the Winnipeg Airport's tenth largest customer.

Winter weather testing currently centers around vehicles. Those vehicles range from SUV's to snowmobiles. What Thompson offers in terms of cold weather or winter weather testing, is accessibility, accessible real world conditions that mean different things to different industries. For vehicle manufacturers such as Ford, Chrysler, Land Rover, Jaguar, Hummer and Honda, we offer reliable cold weather and favourable snow conditions. For snowmobile manufacturers such as Arctic Cat and Polaris, we offer a long season for testing in the spring and fall when conditions would not allow them to test in southern locations.

We are well connected to the rest of North America and the rest of the world, allowing the transport of vehicles, materials and people quickly and cost-effectively. At present we are home to the Ford North American Extreme Weather Testing Facility. Ford has been testing in Thompson for over 10 years and have had a permanent facility at Thompson for 5 years. Every new model of Ford vehicle released in the past 5 years received its cold weather certification in Thompson.

Of any community with a large population south of the 60th parallel, Thompson has among the most consistent cold weather and the most days below freezing. Not good news if you are a gardener, but great if you are trying to test out batteries with the lowest day and night time temperatures through the winter. We have a long cold weather season allowing for testing, as early as November and as late as April.

Some more cold hard facts. The average January temperature is -20 degrees Celsius; the average minimum is -31 degrees Celsius overnight. If you have a Ford car that has to get down to -30 so that you can test how it is going to start, it is good. We have a 64-day frost-free period on average snow in the months of October through April. The snow is good news for snow testing for Ford and the snowmobile manufacturers.

The City of Thompson has worked closely with cold weather testers to make facilities available and to facilitate testing. Some examples are blocking off sections of road, making available land for a test track, and having use of city equipment and facilities when needed. They plan to do more this summer to assist Ford in building a winter track. The Thompson airport works with testers as well, making the runway available at night to testers by assisting with special customs clearance. The Thompson Regional Airport Authority are committed to testing and to the expansion, and are interested in cold weather testing. Mystery Mountain Winter Park has hosted a variety of testing events. The formation of the Thompson Corporation is a commitment by the city and businesses in Thompson to pursue and work with winter weather testers.

More cold hard facts. We might be on the edge of remote northern Canada but we have full digital voice and data services. We are connected to the world. A good paved highway, daily air service, rail connections to the south and extending all the way up to Hudson Bay and Churchill, daily bus and freight service and the airport has the ability to land aircraft as large as a Hercules. We have lots of amenities.

One of the results of cold weather testing is a boom in hotel rooms. The rooms that have been built in Thompson are set up to suit professionals. They have data connections and different services in the hotels to suit people that would be doing testing and not just people that are in town for a hockey tournament. We have a variety of restaurants, everything from sushi to slushies. We can take care of you. Excellent recreational facilities, good medical, lots of retail, and we even have Wal-Mart. Lots of arts and culture and obviously outdoor pursuits abound.

Some of the current testing uses the frozen lakes around Thompson. One of the tests that Ford does is snow ingestion. They take the cars out onto a lake that is covered in snow and drive it as far as they possibly can into the snow until it stops. Then the engineers get really excited, unlike you or me, they take the car apart, figure out where the snow went and try to do something about that. They also do a test where they follow a big truck around that kicks up snow and they see how the car ingests the snow and what happens with it. We have blocked off a road and iced half of it so that they can test how brakes work when one tire is

on the ice and one tire is on the solid pavement. They use the runway at the airport because it is clear of ice and snow all winter long. Snowmobile people use the ski hill, especially in the early fall when it is cold enough to make artificial snow. Ford has also made a test track with the artificial snow. There are lots of different and interesting things that are going on around Thompson.

The community and the City of Thompson are dedicated to making these things happen. We believe that airships will need a northern test location. Thompson is ideally suited for that thanks to our climate, accessibility, amenities and tester-friendly community. We also believe that we will be the hub for a large target market, whether it be the Aboriginal communities, Manitoba Hydro, or forest fire suppression. Pretty well anything that was discussed today had to deal with us. It affects all of us. We are ideally situated to handle all of this.

We would love to see Thompson move beyond just a test site for airships, and become a hub of operations for northern Manitoba. We have plenty of open space for docking and servicing and those kinds of things. Getting goods to and from Thompson is accessible. Geographically, it is in the center of Manitoba and it is in the center of a lot of remote communities. Nunavut is looking more and more towards Thompson. The Thompson Corporation is looking forward to working with you to find the right climate for both testing and servicing the north.

Question to Dale Booth

Has there ever been consideration of moving manufactured homes to accommodate this housing crisis?

Dale Booth

No, but that would be something that we could bring to the First Nations leadership. If you could take pre-built rafters and move them up, it is a cost effective way of moving that material into a community. Also, if you are taking a truckload of insulation and a truckload of plywood it is still the same load size, but the weight is vastly different. You may be able to move some of the lighter materials with the airships in a more cost-effective way than

with the traditional ways. I am here to hear what the airship industry could bring to the First Nations leadership.

Question to Oliver Hedgepeth

In regards to the growing interest in Alaska, have you worked out what could consist of a consortium of both public and private sectors and who does what to actually make this happen for the airship industry. We discussed it briefly at last year's conference and there did not seem to be a well-defined symbiosis there. Do you have an idea as to how to move that portion along to make it happen?

Oliver Hedgepeth

Yes, I already have a group of public and private decision makers who help me move forward on agendas such as this. They are the leaders of all the air, land, sea, moving, airport and legislature. We have been working for years on a similar task and we have identified airships as one that we are working on.

Question to Bruce Krentz

Are you doing any cold weather testing for aviation?

Bruce Krentz

We have not done too much aeronautical stuff, but we are talking to a group that is looking to use Thompson as a place to test jet aircraft engines. There is a little bit of that in the works.

Dinner Keynote Speaker

Richard Van Treuren

Airship Historian “Hydrogen Fuel Airship”

When we talk about Hydrogen in the same breath as Airships, we do not find an awful lot of people on either side of the aisle that are keeping an open mind. I am going to ask you to bear with me for a little while. Let us talk about our “ph,” our potential for Hydrogen, which you remember from your high school chemistry decreases with increased acidity. Let us be acid-neutral long enough to examine some new facts.

It was quite a long time ago when a professor took the argument out of the academic world and literally put his butt on the line to lift off in a hydrogen balloon. One year later a famous American got to look at that hydrogen balloon and said, “We could use that to move things.” Two hundred and twenty one years later, we are still waiting.

The same year that Jefferson was writing, one of Napoleon’s generals designed an essentially modern airship. All the pieces and parts are there except propulsion, because James Watt had not developed a useful steam engine. It was 122 years ago that an Austrian fellow came up with idea of using the lifting gas to propel the airship. If he had had better materials it might have amounted to more. So many plans have come and gone, dashed by the harsh realities of helium-born aerostatics. How can this be, when airships are not really rocket science?

Over the years we have been looking at different motive power refinements. No one has actually built a true airship engine. We have worked on different things, external combustion, electric power, and human power. It got to the point where airplanes were being mass produced by so many different contractors that it seemed to make more sense to use airplane engines to push the gas bag around. (The first practical British anti-submarine airship was simply a wingless airplane hung under the gasbag. The US Navy just copied it, dubbing it the B-type air ship.) Zeppelin of course adapted marine motors for propulsion.

This “mitigated” the problem, as we are fond of saying around the space shuttle. This did allow us, over eight decades ago, to build hundreds of airships of great capability. One airship reached 22,000 feet of altitude. Another carried 30,000 pounds 4,200 miles without refueling. That was 88 years ago!! 77 years ago we reached the pinnacle of the rigid airship art with the Graf Zeppelin. It was active for over 10 years, flew over a million miles, crisscrossed the Atlantic 144 times, and it was hit by lightning any number of times. It was shot at and hit any number of times. Exactly one insurance claim was filed in 10 years: bullet holes in the outer cover that occurred while they flew over a bad section of Latvia.

The secret to the Graf Zeppelin was not, as you would hear, good luck, but rather skill, proper management and one overwhelming advantage. It had a fuel that was about the same weight as air. It was a blended mix with a certain amount of hydrogen and a certain amount of propane. The upper part of the rigid air ship contained the hydrogen cells and the lower part were bags carrying fuel gas. The Graf Zeppelin lifted off from Tokyo, flew all the way across the Pacific and landed in Los Angeles with essentially the same static condition that it left. It was no accident that the Graf Zeppelin was the most successful airship of all time. Though they built larger ones, the Hindenburg and the Graf Zeppelin II, even though they could carry more, they could not go further. The Graf Zeppelin was simply more efficient with its very high BTU quantity by weight fuel, much more so than the diesel fuel used in the later ships. This allowed the first actual attempt at building a cargo air ship.

So what went wrong? Who dropped the ball? We always had the problem of propulsion, which we mitigated. However, once we adapted helium for lift and gasoline for fuel, we no longer had any control over our lift. Helium and gasoline is a marriage made in hell. The enormous weight of the motor, cars and gasoline, causes the whole bag to sag. Gasoline fuel is a problem for airship engineers and designers because the weight puts a strain on the structure, and disappears as you consume it.

Fuel gas automatically gives you a 25% advantage over liquid gasoline. C.P. Burges, the great guru who preceded Norm Meyer, had this all figured out. How they could have run on fuel gas and been much more efficient.

We are always told that we use helium because it is safer. You really think that helium is safer than hydrogen? Let us look at the facts. The British, during WWI built 158 SS type airships, eight of those were lost to fire. Two of them crashed into each other, one crashed on its maiden flight, and none of that had anything to do with hydrogen. But nonetheless eight were lost with fire. Meanwhile, during World War II the US Navy built 134 K type airships. 12 of those were lost to fire. More gasoline, more fire; it does not matter what is inside the bag. Remember, also, all we had to work with in those days were highly flammable fabrics. The real unsung hero in this is Ralph Upson. He recognized in 1921 that the real problem was that these flimsy bags were very flammable. Of course, no one listened.

You could not have been living anywhere but inside a cave without hearing of the hydrogen economy. Hydrogen is replacing fossil fuel in our society. We will have it in our cars, airplanes; it is inevitable. The Florida Solar Energy Research Centre has run various scenarios and studies to look at using hydrogen fuel in airplanes. They are going to look at the plane size, load, flying range requirements and so on. There is only one problem. They are already more inefficient than airships because you always have to be moving forward with an airplane to generate the lift. By this study, 100 horsepower is required to move one ton, and you always have to be moving forward.

How are we going to use airplanes to move more cargo? We have already built the largest airplane that we are ever going to build. It is not practical to build one larger because the materials do not exist. The Airbus A380 must be a magnificent cargo carrier, but it is only 25 centimeters wider than the 747. It is not going to be carrying larger cargo. If a cargo shipment will not fit inside that fuselage tube, you are not going to carry it. Will we build bigger airplanes? No, we will not. Will we build bigger airports? No, we will not. None of those options are open to us. Let us look at the efficiency of the airship, which according to this study only required 20 horsepower to move 1 ton.

How do we get back to where they were 77 years ago with this magnificent, safe and efficient airship, the Graf Zeppelin? We will use modern materials that do not burn, we will update the electronics, and we will have GPS. It still will be kind of hard to get over this

huge mental block whenever you say hydrogen in moving airships. Even hydrogen fuel guys do not want to talk to me, “Go away, we would rather not talk about airships.” We need that poorly-called “killer” application. I believe we found it: Natural Gas. If we cannot figure out a way of moving natural gas, which is the best possible cargo for an airship because it is lighter than air, it is virtually free and can be sold for a huge profit, then I do not know what a killer application could be. It did not take too much time to find Canadian Superior Energy as one of many natural gas producers that had offshore holdings, in this case, Trinidad. How are they going to get the natural gas to market? Well, they will liquefy it and ship it on an LNG tanker. This is great if you happen to have a liquification plant, a port at both ends, and another plant to handle it, which you do not. They certainly do not want to build this infrastructure. Again, we have to look at the airship.

We can build a modern Graf Zeppelin that essentially is a fuel gas tanker. In the same way that the Graf Zeppelin had fuel gas in the bottom, we would carry fuel gas as the payload. Of course, we would also use it to propel the airship. We would use hydrogen both as lifting gas and as a fuel additive. There are some amazing things that you can do if you use hydrogen as a precisely timed injection in an ordinary internal combustion engine. This allows you to go out to the middle of nowhere where there is natural gas and nothing else and simply make everything that you need right there. They did it 80 years ago; we are smart enough to do that today. Just generate the hydrogen, fill the balloon, fly it somewhere, vent it off if necessary or consume it and come home. This is what they did 88 years ago, and that is what we can do again today – at a price that will put other methods on the sidelines.

We are already making hydrogen out of natural gas, and we have been doing that for 100 years. It is off-the-shelf technology, you can go buy the rig and start producing hydrogen immediately. The only trouble is that it is not very environmental perfect today because it generates carbon dioxide. The guys at the Florida Solar Energy Research Center developed a little rig that solves that problem. It pulls off the hydrogen, but instead of producing carbon dioxide it produces carbon. The carbon is so pure that they can make nanotubes with it. I thought that was pretty neat, but they did not stop there. Someone got to look at it and thought that there was a lot of hydrogen in that landfill gas that we are burning off just to get rid of the stink. They ran some tests and figured out a way to make enough pure

hydrogen to launch the space shuttle eight times a year for the next 40 years just from the gas from one Florida landfill site. You cannot ask for more cost-effectiveness than that.

Ultimately we need to use hydrogen as a fuel exclusively, perhaps even in a natural gas tanker, because H₂ has such an overwhelming advantage by weight. It has three times the efficiency of gasoline. Of course, we can use it in fuel cells to generate electricity independent of the motive engines. (If you need to just go along with the wind you can still have your electric power.) Ballard in Canada has a nice fuel cell package that is ready to drop into a heavy truck or a big city bus; we might be able to use that.

The overwhelming advantage of hydrogen as a fuel is that it can lift itself. Try that with helium and gasoline. If you have liquid hydrogen and you allow one pound of it to expand to 16 cubic feet it will lift itself. If you allow it to expand all the rest of the way, it will lift itself and 10 pounds of payload. You can consume it when you do not need the lift.

I ask you to consider hydrogen for a new generation of profitable airships.

What is your PH factor?

Dinner Keynote Speaker

Ken B. Young

Ken B. Young

Special Advisor to the National Chief

The Assembly of First Nations represents the First Nations of this land. We represent our citizens on reserves and those who live away from the reserves in urban centers or in remote, rural communities. As well, we represent all segments of our population including men, women, youth, elders, leaders and the grass roots citizens. The AFN is dedicated to working on behalf of the First Nations. Through our efforts we want to insure that the next chapter begins with respect, recognition and reconciliation. First Nations expect to be involved in that transformation in terms of how services are provided to our communities and our homes. In that regard, this past year has been a time of intense activity as we have worked toward a fundamental change in the relationship between First Nations and the Crown. This fundamental change will happen; self government will be a reality. We call on you as key public people to work with us, to help make these necessary changes happen more quickly and more easily for everyone involved. We believe that positive relations with federal government employees come from a shared understanding of our issues and a new federalism.

This is an interesting time for all of us. We see a government that has committed in very public ways to transformative change. The broad context for what we are pursuing is not and cannot be limited to funding. What we require includes the ultimate recognition of First Nations jurisdiction and our inherent right to govern ourselves. The renewal of the First Nations/Crown relationship is essential if we are going to improve the living conditions of First Nations communities and to foster an environment for development and success.

Let us take a look at the current First Nations – Crown relationship and look at what is ahead in the future. First Nations people are recognized in Canada's constitution as one of three aboriginal peoples of this land. First Nations, or as they are referred to in the

Constitution, Indians, along with the Métis and the Inuit. Section 35 of the Constitution recognized our inherent and treaty rights. These are not delegated rights or gifts from the government. They are inherent, they are within us as people of this land. We want to assume the authority and responsibility for our communities, nations and citizens regardless of where they live. We want to get out from under the Indian act and Indian Affairs and set our own strategic direction. We can build thriving and viable communities that contribute more to the culture, economic and political life of the country. We cannot afford to lose another generation of our people. Our population is young and growing. More than half of the First Nation population is under the age of 25. This is the work force of tomorrow.

First Nations have done the hard work of mapping a path that will take us towards full recognition and implementation of a First Nations government. Yesterday, a political accord was signed with the Minister of Indian affairs and the Federal Government. It is a commitment to work to fulfill the promise of Section 35 of the Constitution and create thriving First Nations Governments and citizens. This accord is not symbolic. It is an important template for a fundamentally renewed political relationship. As well, there are other foundational steps that will be required to move forward.

We need the government to remove the arbitrary cap that limits the resources our people receive for core services. Since 1996 this cap has been held at 2% a year. This does not keep pace with inflation or our growing population. We cannot stimulate fundamental change when we are stuck trying to manage poverty. This is an absolute truth. Many of our communities are so poor and so poorly managed because they do not have the resources to try and get ahead. We are prepared to work with the government to move forward in a progressive way on a plan that benefits all of Canada and that allows us to deal with those longstanding matters.

Over the past year, a round table was created that includes all the Aboriginal groups, First Nations, the Inuit and the Métis to set out a priority agenda. Yesterday a meeting took place between the leaders and the Federal Cabinet in Ottawa. A political accord was executed that lays out the framework of how we are going to be dealing with the issues that I just mentioned. We expect nothing less than a government to government, nation to nation

relationship with Canada. We expect nothing less than the right to make the decisions that affect our lives and to set the direction that will take us to the full expression of our right to self-determination.

The Prime Minister stated at the first round table that the First Nations would be guaranteed a full seat at the table on all the key forums that direct the political life of the country. The First Nations people have many special rights, including treaties in many situations, and they have Aboriginal title. The Inuit have their own political fight to manage. The Government has used the status plan approach to try to deal with us. We are different and we want to be treated differently. We want to do our own thing. The Inuit want to do their own thing and as do the Métis. The Government has been blanketing us with one common approach. This is not acceptable anymore. We are not tolerating it anymore.

All of our information, ideas and proposals are publicly available. I encourage you to contact our office. We can share the information that we tabled with respect to health, economic opportunities, life long learning, the environment, negotiations and accountability. I know that the public has faced some challenging times recently on First Nations accountability. The Gomery enquiry, and the Auditor General's report, means that a new premium must be placed on accountability. We understand this. Accountability by a government to its citizens is of the utmost importance. It is an issue that First Nations takes very seriously. We would like to set the record straight. The myth of rampant corruption and misuse of funds by First Nations is one that has lodged itself in the public's mind. It carries an extra sting, especially in light of the fact that as the studies have shown that funding that never met our needs to begin with has been declining. Accusations of corruption and misuse of funds are often lumped under the heading of accountability and the demand to make the Indians more accountable. In reality there have been very few problems and these few have been greatly exaggerated.

This is part of what we addressed in our report, *Facts, Myths and the Way Forward*. This study presents a summary of current Federal Government funding on the First Nations issues based on the best analysis and best research available. I firmly believe in the need to spend any funds wisely and to be accountable for those funds. This study looked at First Nations

accountability to see what the situation really is. Our studies showed that out of 557 audits of First Nations, that financial management in 2000-2003 and the Department of Indian Affairs found 16 cases that required remedial action. That is less than 3% nationally. The fact is that our officials are held to one of the highest standards of accountability, including officials in the public and private sector.

Sheila Fraser, the Auditor General, issued a report in 2002 that examined the national reporting requirements that the government imposes on First Nations. She spent time in some of the communities and she found that far from being unaccountable, First Nations are overburdened by accountability. Reserve governments have to file on average 168 different financial reports every year. This is three per week. The majority of these communities have less than 500 people. To make matters worse, she found that the information in those reports is not even used because the information is borderline useless.

We believe that our recommendations for improving the quality of reporting and streamlining programs and services should be required reading for all of the public service, for everyone in government. All of this work points to the need for self government if we are going to restore the quality of life for our citizens and our communities. This is the key point of my remarks. The one truth I would like you to remember is that self determination is directly related to quality of life. When First Nations have control, it leads to more efficient and effective service delivery. Equally important, it has a measurable effect on health and well being. We know this from experience. For more than a century First Nations systems of government and nation to nation relations were displaced. We have been left with the resulting devastating impacts on our communities and families.

Researchers from Harvard University have been examining economics and government since the mid 1980's. They set out to answer a single question: Why are some American Indian nations more successful economically than others? The Harvard project on American Indian economic development research indicates that self-government is essential to real economic success. They concluded that there are three key elements to economic success. It may surprise you to find out that the best predictors of sustainable economic development on indigenous lands are not economic. Instead the best predictors of

sustainable development are a set of political factors. The first is practical sovereignty. This means decision making power in the critical areas of governance like internal affairs, resources and development strategies. The second is capable governing institutions that exercise power effectively, responsibly and reliably. The third is cultural match. This means that the institutions of government match First Nations perceptions of government and authority. The results of this study are self-evident. How can you build a viable and sustainable government and community if someone else is making decisions for you, controlling your resources and funding, dismantling your governing systems and setting up foreign institutions to govern you? This is an accurate picture of our current situation.

First Nations must have the ability to set out their own strategic direction. First Nations have the inherent right to self-government and it is essential for real progress and yet the Department of Indian Affairs currently provides less than 1% of its budget for this work. This is inadequate. Is this the authority that is transferred along with those resources? First Nations have said many times that First Nations government must be defined by First Nations people, according to their own understanding of natural law, based on their own traditions, customs and values. These must also be equally recognized within the Canadian legal systems.

Self-government is fundamental to everything that we do. It is essential to moving forward in every area that we want to make progress, whether it is education, economic opportunities, health, housing, law making or land management. We must chart a course that leads to the effective recognition and implementation of treaty and Aboriginal rights. We must build on a foundation of a fair and adequate land base so that First Nation governments can rebuild their communities, cultures and economies. Existing policies and processes must be reviewed in order to make a real impact on the quality of life of the First Nations people. Our goal should be nothing less than establishing the processes needed to implement the treaties, renew our relationships and create the opportunities that will make a new partnership work for all of our people.

Clearly all of these issues are linked. Real progress on these issues requires the recognition of our rights and interests as First Nations people. We will not find solutions by simply putting forth new programs. The solutions must be based on the recognition and

implementation of First Nations government. If we are going to create healthy, thriving, successful communities and citizens, then we must pursue self-government. When our communities benefit, then all the surrounding communities will benefit and all of Canada will be better for it. To achieve this, we must work together to move forward to a new era of respect, recognition and reconciliation, a new era that we can pass on to our children and our leaders of tomorrow. Whether the leaders today are the leaders tomorrow, what we as First Nations share with you is that despite any changes to the Federal Government, our day-to-day work of implementing change must continue.

*AIRSHIPS TO THE
ARCTIC III:
Day Two*

Airships to the Arctic III: Day Two

Welcome

The Honourable Jim Rondeau
Minister Department of Industry, Economic Development and Mines

Airships are an exciting technology. The industry is a huge opportunity not just for our province, not just for our own economic well being, but for the world. We in Manitoba have one of the largest aerospace sectors in western Canada, and one of the most diversified industrial bases in western Canada. Airships are exciting because we produce plastics, metals, electronics and many other necessary inputs. We also have a huge innovative aerospace industry. Our aerospace cluster is not as visible as it is in some areas like in Seattle, but what we do have is a very important technologically advanced sector that employs about 5,000 people and brings about a billion dollars to our province. We have had a history of innovation in a lot of the sector and we want to continue to do that. Companies like Boeing, with their manufacturing innovation centre, is bringing new engineering for the Dreamliner.

The airship industry has strong economies. The rising cost of fuel overrides a better argument for airships. We have a great argument for transportation in remote locations because the cost per mile becomes more and more important. When you look at the cost of moving heavy objects up north, it is hard to have a good argument for conventional means. This is where airship technology comes in. The argument is cost effective travel. When you are looking at cost effective options the answer is very simple. Airships are cost effective. They are a technology whose time is going to come and continue to be brighter. I think that it is wonderful.

Session One:

Airship Control

Session Moderator
Richard Van Treuren
Airship Historian and Author

Dr. Bernd Sträter
President and Executive Director
Zeppelin Luftschifftechnik GmbH
Speaker

I have been asked several times about the speciality of the new Zeppelin NT. NT stands for new technology. Two innovative concepts were realized in the NT program. The airship has a rigid structure inside, which we call quasi-rigid or semi-rigid. The propulsion system, the cabin and all cables are directly linked to the structure. The internal structure is 75 meters long and the diameter of the airship is nearly 50 meters. The weight of that structure, which is made up of mostly carbon fibre and lightweight aluminium, is a little over 1 metric ton.

The other new concept is the swivelling propulsion system concept. Everyone knows of the tilt rotor concept of Bell Boeing. The rotors of the NT are a bit smaller because we do not need the same performance. We have the option of moving the rotor from a forward condition to a vertical condition. We can turn an airship quite quickly. This propulsion system allows us to land and take off without ground crews. This is important. If we fly into an airfield and we only want to visit a person, we do not need a ground crew to aid landing.

The NT is currently the world's third largest airship. In comparison to the ancient Zeppelins it is very small. We have about 8,500 cubic meters of volume, the old Zeppelin had 200,000. This airship is the first airship certified for commercial passenger transport. We are allowed to sell tickets and are certified in the range between 10-19 seats. This is the commuter rule. We have built three airships so far, and we received our certification in 2001. The maiden flight of our airship was in 1997. We founded an operating company, the Deutsch Zeppelin and we got the licence to operate in 2001. Our objective was always a seasonal operation of

about 7 – 7 1/2 months with 10,000 passengers taking a one hour ride in each airship. In 2001 we had 11,000 passengers with only one airship in service. To date we have not had any accidents, touch wood.

The advantage of the propulsion system and the internal structure is that the propulsion systems are far away from the cabin. The cabin has less vibrations and the noise level is like driving in your car at 50 miles an hour on the highway. This means that you can communicate and it is very roomy. Everything is fly-by-wire so the pilot only has a side stick. The work load for the pilot is very low.

A highlight of last year was the sale of an airship to Japan. The question was how to take the airship to Japan. At first, the customer tried to get permission to fly over Russia. It was an ideal date because it was the 75th anniversary of the first Zeppelin flight from Germany to Tokyo, but they did not get permission. They wanted the airship to fly in the opening ceremony of the World Exhibition in Nygura. Therefore it was a must to bring it to Japan.



Despite all the advantages of our design, the NT 07 has a disadvantage in shipping. We cannot deflate it, pack it in a container and ship it somewhere, because the NT is rigid inside. Therefore we had to make either a ferry flight, or bring it by ship to a foreign country.

Filled with helium it was the lightest load that the ship had every had.

The Market

We are the first company to open up an airship tourist market. We have been very successful. We have requests to go to other countries as well. Our strategy is to expand in such a way that we have to open new destinations. Then we will have to explore new markets.

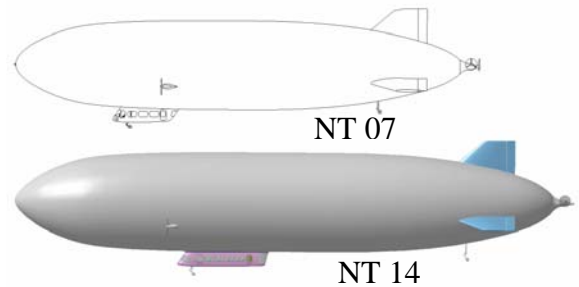
The geological survey market is probably a specialty for our airship because we have full control from 0 knots to 65 knots, our maximum velocity. We simulated a satellite for the Galileo satellite program for the Europeans. The task was to hover over one fixed point over the ground for 20 minutes with an accuracy of 15 meters in all directions at different altitudes from 500 to 2500 meters, which we realized. That was the only platform in the world that could do that. This is only possible with that high amount of ability with the propulsion system.

The economic attractiveness of a twelve-seater is not very high. We have to increase capacity in order to make larger airships and to get a better economic performance. Our strategy is to do this step by step in order to have a calculateable commercial and technological risk. In order to achieve this, the design strategy incorporated the highest degree of commonality. I forbade the engineers to be creative. This is the only way that you can dampen the costs. Modification and changes were made only for improving turnover by payload. Hot and high is very difficult to fly in with an airship. The hotter and the higher, the less payload you have. Then we raised up the design points to dimension. Improving the comfort, improving market attraction by hot points, and increasing endurance.

What does it mean to not be creative in the engineering? It means that everything will be the same: cockpit, avionics, wiring, fibre wire systems and the propulsion system. We will probably fly 5-6 knots slower, but this is not important. This is tourist market driven.

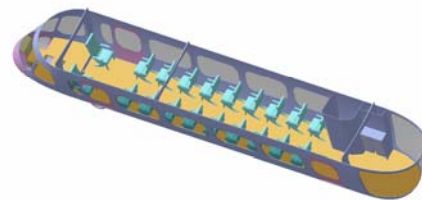
NT 14 Specifications

Length	90 metres
Envelope	16 metres
Height	21.4 metres
Volume	13,500 qm³
Seats	2 pilots, 1 flight attendant, 19 passengers
Max. payload	3.2 tonnes



We will have the same control surface, but will have to modify the structure, envelope, ballonets and gondola. The landing gear can remain the same. The development phase, including certifications should not be more than 3.5 years. We do not have a prototype, we are just going into the fabrication of the series airship. The financing has been approved so we started the design half a year ago. We will hopefully have the maiden flight at the end of 2007. The orders for subcontractors have already started.

Along with the passenger version, we have a cargo version. One of our objectives, is to try and create the ability to carry a 2.5 ton maximum cargo. No one, up until now has really approved of the cargo business. The difficulty is that you have to load and unload at the same time or fix the ship to the ground and that depends on the wind conditions as to whether it can be done or not. This is a difficulty in the cargo area. It is not approved and not yet done enough to say whether it will work or not. Up until now the cargo airship has not been approved.



Session One:

High Altitude

Hokan Colting
CEO
21st Century Airships Inc.
Speaker

I am here to give you a brief look at the development of high altitude air ships. In this case, high altitude airships are airships that can fly up to 60,000-70,000 feet. This is about double the altitude of regular airliners. Some of the applications that this can be used for are telecommunications, environmental monitoring, forest fire detection, surveillance, astronomy, and iceberg survey.

Today's traditional airships, like the Fuji blimps, are generally low altitude airships. They are capable of reaching 5,000 to 6,000 feet depending on temperature and things like that. The requirements for high altitude airships are completely different from any other airship.

One of the challenges is that the helium lifting gas expands with volume. One cubic meter lifts 1 kilo at sea level and expands to 17 cubic meters at 70,000 feet. Because of the gas expansion you have to have a very large airship. In fact, the high altitude air ships will be the largest airships ever built in terms of volume.

More experimental development has focused on the spherical shape as the best shape for high altitude. The development has been in incremental steps. We have flown to 8,000; 13,000; and 18,000 feet and the funny thing is that every time we made a new flight we set new world records. The last flight made it to 24,000 feet, but that will soon be surpassed as we have another flight coming up that will go to about 30,000.

You need a different engine and propellers at high altitude than at low altitude. We have experimented with many different propulsion systems. We have an airship that has a hybrid electric system. To our knowledge it is the first aircraft to fly with a hybrid electric system.

The airship can spin around its own axis, and it is extremely manoeuvrable. Normally it needs 1-2 people on the ground for take off and landing but we can land without any people on the ground if we just want to touch down. This particular airship is 62 feet in diameter. The airships for 60,000-70,000 feet will be about 260 feet in diameter.

Next on the schedule is a flight with another airship, exceeding 30,000 feet. After that, we will have an even more interesting flight. We are building an airship that will make an around-the-world flight. This airship will be 135 feet in diameter and 13 stories high. This may not sound like much, but a Boeing 737 would fit inside of it. For the around the world flight, we will have pressurized cabins equipped with the absolute latest in communications gear. We have already built the mock-up and have started to build the real cabin. During the entire flight we will be connected to the rest of the world via satellite. We have communications equipment equivalent to the best downtown office.

What I have described here is our step-by-step approach in development of high altitude airships. I believe that you have to use a similar, step-by-step approach whether you develop passenger airships or heavy lift airships.

Question for Hokan Colting

Do you have any special considerations at that altitude for radiation compared to what airliners have to encounter? Are there any special safety considerations that you have to incorporate into your cabins?

Hokan Colting

The cabin that we are going to fly in will be very similar to a pressurized aircraft cabin. The airships that are going to be up at 60,000-70,000 feet will be unmanned. At that altitude, yes, radiation is always a problem.

Question for Hokan Colting

I noticed that you have what looked like a little propulsor on the aft part of your sphere. What is that? An attempt to reduce the base drag?

Hokan Colting

It is actually a drag reducer, yes. Even with the small propeller that we had on the test version it does reduce the drag and we can see an increase in speed. We are going to have a much larger propeller to draw the air flow closer to the envelope, and to get it to separate further back.

Question for Bernd Sträter

One of the issues of running a scheduled service is that of reliability. Could you comment on turnaround in times and numbers of tours per day? Also, what number of days per year are you able to operate at that level?

Bernd Sträter

We are having an incredible year. We are totally booked with 11,000 bookings for the season and additionally we have some event flying. This means that when necessary, we are doing the maintenance during the night. We fly each day, 6 or 7 days a week. Reliability has increased dramatically. When we started operations in 2001 we had a lot of problems, which is normal with new technology. In the first season we had to cancel 12-13% of our flights for technical reasons. We have dropped this down now to less than 3%.

The next issue is weather sensitivity. We fly with passengers. We can take off and land up to a wind speed up to 35 knots. We stop the operations depending upon how gusty the wind is in the range of 20-25 knots. If you are flying in those weather conditions with passengers, then you may have the difficulty that the passengers will get motion sick. An airship is so large it rolls with inertia like a ship.

Question for Bernd Sträter

In that first year when you had the first of the NO7 up and flying, please tell me that you did have a power shut down in flight. If you did not that is fine, but just to educate the public about the safety of the aircraft itself.

Bernd Sträter

A motor shutting down is not a critical problem for us. Why? We have three engines and we have proved that in a two engine out mode, we can make a safe landing. We have had motors shut down due to things like gear box problems and we landed without difficulty. We can have safe landings and the passengers do not notice.

Our major accident occurred after maintenance at the very beginning. There was a supply failure, they changed an input and output on a fibre wire. In terms of an airplane this would mean a crash. It means that the rudder is not going up, but it is going down. Even with that, we did not have difficulty getting down safely. When the pilot noticed it, he turned to the pitch control mode. Up to 35 knots we have a combined control of rudder and pitch blade control by the computer system. This means if you are flying lower than 35 knots, then you do not notice what the rudder is doing; you are controlled by pitch control.

Question for Bernd Sträter

Could you comment on the approach that you took to the type of materials and process that you used for the composites, so that they would aid you in the certification process?

Bernd Sträter

The material of course, has to be qualified. Each part has to pass testing, especially the burning test. This was not really a problem.

Question to the panel

Could either of you comment on capabilities under various weather conditions? In particular, northern Manitoba and Nunavut in terms of instrument weather conditions, icing, snow and such. What are the capabilities and theoretical capabilities to deal with those environmental factors?

Bernd Sträter

This is the most important issue if you look for applications of the airship in logistics. Airships are always huge because 1 cubic meter of helium carries 1 kilogram. The more you want to carry, the larger the airship will be. Then you have wind sensitivity. In the aviation

industry, the take off and landing are the critical parts of the flight. I think that you will always have a limitation right from 30-35 knots, plus or minus. You will not overcome that hurdle. If you are in the air, it can blow faster, that is not a problem. Then the problem becomes one of going backwards and not forwards because you have a thrust performance issue which will end in the area of 60-70 knots. Anything more is not feasible because you have to install such a high performance plate. It is not economically feasible. These are the limitations on the wind side.

The next wind sensitive area is if you are on the ground. Most airship accidents happen on the ground. We designed the mast and there is a certification aspect that our mobile mast can be fixed on ground with the airship and is applied up to 70 knots wind speed. If you have a thunderstorm with more than 70 knots, then the probability is that the airship will be destroyed.

We do not fly in icing conditions. We are not allowed to because we do not have an anti-icing system on the propellers. If you have ice on the propellers, even if you have an anti-icing system, then you have ice particles flying away and probably destroying the hull. Then you would need some stiffness in the envelope in order to protect the envelope. With the swivelling propeller this is difficult because the ice particles will fly away in each direction .

Question for Bernd Sträter

Could you expand a little bit on your problems with wind and ground storage of your three airships?

Bernd Sträter

What we have experienced in the way of wind is that we have managed to take off and land with a wind of 30 knots. On icing we had some conditions and we had to protect the airship. We have flown in -15 degrees, high pressure and sunshine. We are located close to the Alps, so it is a wonderful panorama.

Question for Bernd Sträter

What do your passenger flights cost?

Bernd Sträter

We sell the tickets for the average price of 335 Euro per flight hour, which is roughly \$450 US. We have flights that range from a half hour to two hours. We are booked for that price. With operating costs and salaries, our costs are near 2,000 Euro per flight hour.

Session Two:
Aerostatic Lift Devices for Cargo: From CargoLifter to
Lifting Balloons and Rigid Airships

Session Moderator
Professor James E. Lampe
Department of Aviation Technology
Purdue University

Dr. Carl von Gablenz
Member of the Board of CargoLifter
President DELCON
Speaker

Before I present the current activities to using airships for cargo in Germany, I will give you some information about the history of CargoLifter. In the beginning, 1994, it was mainly a research company in logistics for cargo equipment. Similar to your current activities here in Manitoba, we studied the problems of how to move cargo specifically to areas where you do not have a common road or rail infrastructure available. The experience of CargoLifter gives you an idea, how we can approach the market here in Canada today.

CargoLifter was built to deal with “big and ugly freight” such as transformers, that need to be transported from the United Kingdom to Manitoba - something we have seen yesterday. CargoLifter was designed to deal with these kinds of heavy products and extremely large components. The idea of CargoLifter was to pick up those components at the manufacturing plant and bring it to the construction site by air anywhere in the world. CargoLifter as a “flying crane” reflects an old dream for people working in the heavy lift arena.

Technically, we decided, based on detailed studies, to come up with a modern Lighter Than Air vehicle. The CL 160 is slightly longer than the old Hindenburg, which is still the largest airship ever built. The volume needed to lift 160 tons is about 500,000 cubic meters,

compared to the Hindenburg with 200,000 cubic meters.² To create this volume we enlarged mainly the diameter of the Hindenburg from 41 meters to 61 meters, following the design road of the old Zeppeliners. Otherwise, the shape including the fin configuration looks similar to the Hindenburg.

The key element of CargoLifter is the integrated crane which is located in the lower part of the keel. The crane includes a load frame to carry the cargo. The CL 160 as “flying crane” is able to hover above the loading site, which is a key advantage of LTA technology: Lifted by the lighter gas, you can stay in the air without having propellers running and burning fuel continuously. We have a functionality similar to helicopters, but the lift capacity is much more than a helicopter can provide.

To handle the cargo precisely and smoothly, the load frame will be fixed to the ground by a cable system with winches. Relative to its large load, an airship requires small on-site infrastructure investment and allows you to deliver equipment to nearly any place in the world.

CargoLifter is a point-to-point solution. You lift up the cargo and bring it directly to the final destination – even on places where you do not have a common infrastructure, such as roads. You can easily adapt this to the actual situation here in Manitoba. You do not want

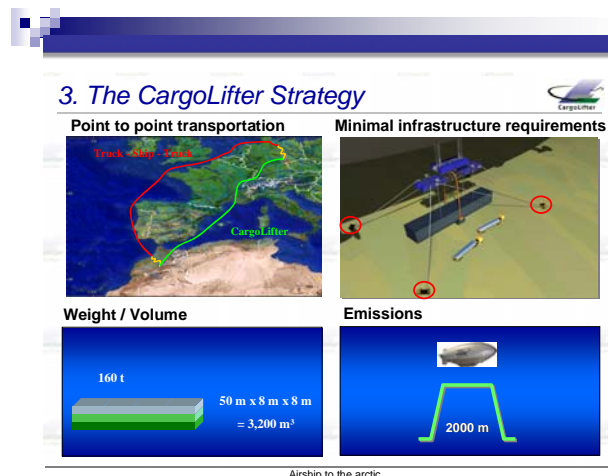
to build waterways, costly winter roads or runways, which allow larger aircraft to deliver significant volumes of cargo. What is needed here in Canada is a smaller type of CargoLifter, which works like a helicopter for 40 tons to deliver cargo to the villages and the mining industry. The infrastructure investment for this transportation mode is just an open field with a diameter of one to two hundred meters.



² *Editor's Note:* One cubic metre of helium lifts about one kilogram. The CargoLifter was designed with 500 tons of useful lift. The Hindenburg was filled with hydrogen that has more lift than helium. The Hindenburg would have a gross lift better than 200 tonnes and is estimated to have a useful lift of 80 tonnes.

However, it is not just for tonnage. What is even more important is the size of the load deck. The CargoLifter load deck is 50 meters long, 8 meters high and 8 meters wide; that equals up to 3,200 cubic meters of cargo volume. CargoLifter decided to go strictly with a purely LTA solution instead of looking for a hybrid version. This is for technical, economic and environmental reasons. If you operate just with aerostatic lift, you only have to provide propulsion to push the airship as you do not need to create dynamic lift by speed. If your cruise speed stays below 100 kilometres an hour - which is good enough for a cargo airship as “airtruck” - you do not burn as much energy as you do by going at higher speeds, which you have to do if you want to create dynamic lift. It is not only economically efficient, but it is also environmentally friendly, which has become a more important issue. In other words, the driving requirements for CargoLifter are pretty much the same as the driving elements for the solution that you are looking for today.

Figure 1



What else can we learn from CargoLifter? First, how to understand the aerodynamic behaviour of large aerostatic vehicles. There is an ongoing debate about large airships regarding their sensitivity to wind gusts. It is always very difficult to explain to people why this huge flying vehicle is not as sensitive to wind gusts as you can assume. The larger the airship the more stable it becomes because of its own volume, its own mass. It is similar to a big ship. If you have a small ship, it moves up and down with every wave. On a big ship, you have a larger surface area – but its own mass is so big that the wave has to break on the ship. It is the same with wind gusts on a big airship.

Figure 2



At CargoLifter we were able to create a computer program that allows us to calculate and simulate the behaviour of this airship. Also, we built special tools to check the software for accuracy. We built our own test vehicles such as Joey, to check the calculated data with the real data under normal flying conditions. Out of these flights and other tests, we earned a specific knowledge - including what we should not do. That is something that you have to learn, and it is not an information that can be purchased.

Figure 3



We also did some fundamental studies and tests to protect the airship from lightning strikes. We worked with a variety of envelope materials and tested the gas management. We constructed the large hangar in Brand and built our own manufacturing facility for the envelope because the size of area we needed could not be bought elsewhere and transported to the assembly site.

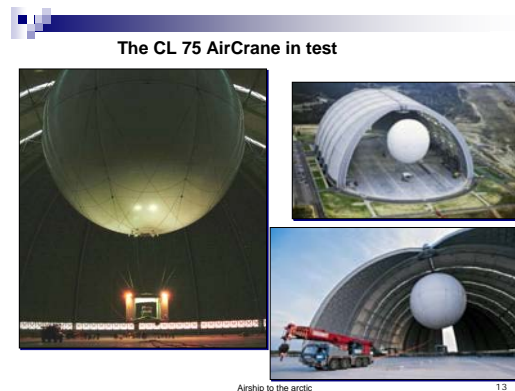
Figure 4



We operated other vehicles like our skyship 600 B for pilot training. It is a 6,600 cubic meter ship that we certified in Germany for passenger service. This gave the team a significant amount of operational experience. Finally we built the big balloon – the so-called CL 75. The balloon was initially an experimental vehicle used to test envelope material on a large

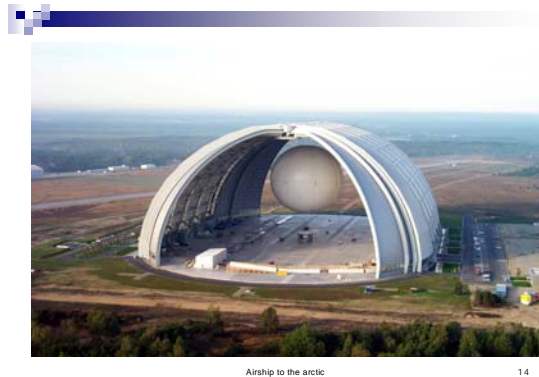
scale. The CargoLifter has a diameter of 61 meters, so we designed a balloon with a diameter of 61 meters, which matched the CargoLifter. We filled this balloon with helium, which was a specific challenge as you have to fill it first with air and reject the “heavy” air by filling in the lighter helium from the top. To deliver this amount of helium we needed four of the largest gas companies in the world working jointly together. The volume of more than 100,000 cubic meters of this balloon is the same as the volume of the famous Graf Zeppelin. The balloon is 82 meters high; the overall weight is about 100 metric tonnes with a lift capacity for cargo up to 75 tonnes.

Figure 5



The first time we floated the CL 75, I had the most amazing experience of my life. After releasing the ballast water, the balloon came up from the ground floating in the air in front of us. If you push it with just one hand, in about 30 seconds the huge balloon started to move. You could steer it up, down, left, right with just one hand! It is impressive to move a 100-ton vehicle with just one hand. The tests results of the CL 75 were excellent. It is as stable in its behaviour as forecast.

Figure 6



We also converted our LTA flying visitor platform to a small air crane. It became a two-ton air crane called Air Hook. We did some testing, used it as a crane to disassemble the fins from our test airship Joey. The Air Hook was fixed by four wires to the ground to move the balloon including the crane hook via the winches exactly like a regular crane. It worked perfectly!

Figure 7



Based on our tests on the CL 75 and the Air Hook, we decided to go into the market earlier as we will be able to finish the CL160. We did studies about building pipelines using a balloon as crane. It could be used for crane operations to assemble windmills, to work as a bridge over canyons, or cross rivers where the bridge has been destroyed by a disaster like an earthquake. You can build a cargo or passenger deck underneath the big balloon and you winch this “air ferry” via ropes from one side to the other. If you once start to open up your

mind, it is amazing what you could do, using Lighter than Air technology already on a comparable simple level.

Unfortunately, at that time CargoLifter got hit by the worldwide crash of the capital markets. Being a company still in a development stage, we were not able to survive without the public support which is a common part of the aircraft industry. We tried to convince the government to give CargoLifter at least the money to start the business using the balloon approach and keep the core team for the CL 160 and the hangar as a perfect Lighter than Air infrastructure. As we did not get the support, we had to declare insolvency. Today, all the equipment has been sold and the hangar has been converted into a tropical island swimming pool. As it is not doing so well, there is maybe an opportunity will exist to get it back in a few years.

What have we done since 2002? We have tried to consolidate our knowledge. It is mainly in our people's heads. One of my colleagues did specific research in LTA crane functions. He wrote his Ph.D thesis on that subject. I met another team which did quite remarkable work on a large airship, which has the same shape as the well-known Hindenburg, the LZ 129. The most interesting part is the construction based on a rigid modern aircraft type of structure. And it is supposed to be filled with hydrogen! This is something that was welcomed specifically by Richard Van Treuren last night. Attitudes toward using hydrogen for LTA vehicles are changing. Most of the testing balloons in the US are already filled with hydrogen. People just do not know it.

Figure 8



We have also formed the first new business unit called DELCON, the company, which I'm representing today. It is supposed to initiate the next steps. A key element is to get the players in LTA in Germany to cooperate. The missing cooperation is a main part of the problem in this business community - the players are not working with each other. Everybody has a good idea on how to build a large airship, but they fight against each other. The result is obvious. We are trying to push for cooperation amongst those companies. Most of the German companies signed a declaration this year that aims for cooperation and we are now starting to form the first network of small and medium sized companies to build the first parts of so called "clusters".

We have teams working on structure elements; engine parts, avionics etc. Based on these clusters we can build up to the next level to integrate these components to an air vehicle. On the top of the pyramid we are planning to create a holding company. Also we are forming a research institute for LTA technology to collect the knowledge. In this Institute we would like to include the still existing know-how of CargoLifter.

Finally we are planning to restart CargoLifter as a unit to address market opportunities using LTA technology in the area of cargo business, specifically to transport goods into remote areas. This is why I am here. We have been in contact with Dr. Prentice for over 4 years and we are looking forward to begin cooperation with the Province of Manitoba to provide this province and other areas in Canada with transport services using an LTA vehicle. The vehicle could look even "big and ugly", but it will fulfill the urgently needed service to support the mining industry and bring fresh and healthy food, dry goods and even fuel year round to the people living in small communities far away from normal road access.

Session Two:
“Roadless Trucking”
A Vision for Canadian Arctic Development

Robert Rist
President
Ohio Airships Inc.
Speaker

Ohio Airships has been in business since 1999. I represent about 40 families that have formed a founders group that have now raised half a million dollars to get this project moving. I will present one of our roadless trucking ideas that comes as part of our REDI concept. Rapid Economic Development Infrastructure, in other words, is like a cell phone. You have rapid communications with a wireless phone, we are trying to jump infrastructure rapidly with aircraft.

Ohio Airships is currently building a small two-man aircraft. We are very comfortable in getting great financing for that aircraft. What I am presenting today is a fast track. The larger aircraft that we predict, if we do it by ourselves, will take 5 years. But fast track money through the military or through corporations could help us, and we have a very good idea for you.

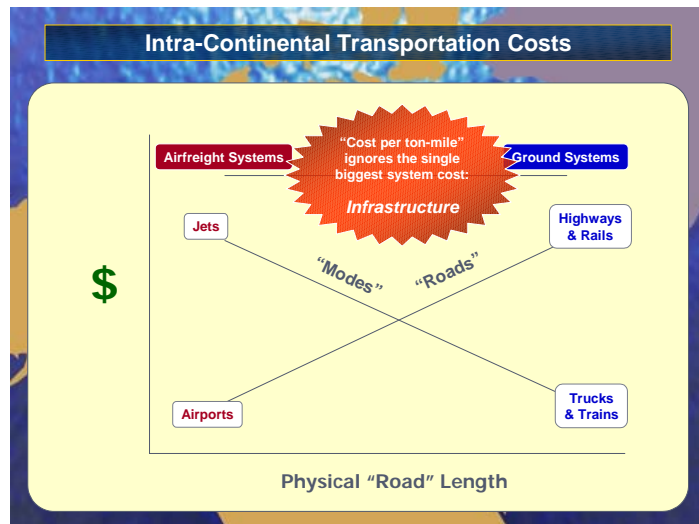
The Dynalifter aircraft is about 700 feet long, it takes off from a slight roll down a runway in less than 4,000 feet with 160 tons and is able to cross an ocean. This is almost 500 tons of useful weight. We are basically a cargo plane that augments lift by helium; we do not use full aerostatic lift. The reason is that we are trying to minimize ground-handling problems with loading, ballast controls, and weight transfer systems. We do not have the problems of traditional airships because we start as a cargo



plane. The aircraft is 700 feet long, but thin which allows us to travel at higher speeds. This is not a balloon. The Dynalifter is built like a fish in that it has an internal spine and external skin and multiple helium cells inside the aircraft. The pattern allows us to have a neutral beam down the middle with a tower over top of the wings, and cables that come down to the neutral beam. When the wings lift up on that tower it spreads the weight to the whole aircraft and allows for concentrated loads.

Why would you want to put wings on an aircraft? Why do you not want to be able to hover? The Dynalifter is going across oceans so we are not currently interested in hovering. Canada has many loads to move: untapped natural resources, remote supplies, and getting into local areas with a very short runway. We are designing a smaller aircraft that can carry 20 tons and land on less than 1000 feet. This is perfect for the little airports of the north.

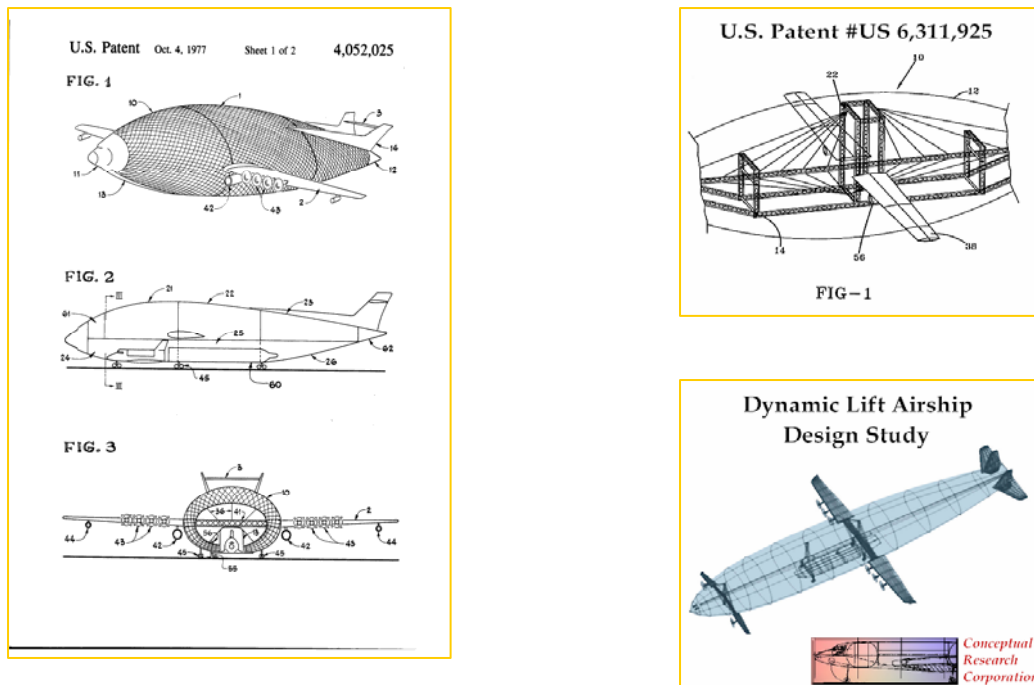
The modes exist but infrastructure is too costly. Highways, railways, canals, and jet airports are all very expensive to operate and build. Jets are one mode and are very expensive to operate. Trains and trucks are relatively inexpensive. The physical road length of the jet (the runway), is very short. The physical infrastructure of highways



and rails have extremely high costs. What am I getting at? You have to look beyond the cost per ton miles. The biggest system cost is not the aircraft, it is not the development of the aircrafts, it is the infrastructure cost. The Dynalifter is not in competition with any mode except infrastructure. This is my point.

We began our idea and search for this roadless truck with large airships because they are very fuel-efficient and they have minimal runway requirements. But, the problems we found outweighed the benefits. Though we are called Ohio Airships, the Dynalifter is not an airship, it is a cargo airplane that has augmented lift with helium.

Figure 1-3



The Dynalifter has a narrow beam down the middle that we call the neutral beam. It has a tower over the wings and all the wings lift up on that tower and the cables spread the weight over the entire aircraft. The helium cells do nothing structurally other than make the aircraft lighter. It gives light wing loads, which allows you to go for long distances, take off in short distances and carry an incredible amount of cargo. We have narrowed the fuselage to a finest ratio of between 6 and 7, the little guy that we are working on right now is a finest ratio of 6. That means it is a little shorter than wider. The longer freighters will be a finest ratio of 7. This also allows us to get higher speeds. With higher speed we can lower the cost per ton-mile. We were able to make the perfect air shape, since we were not restricted by the fuselage and people walking inside of it.

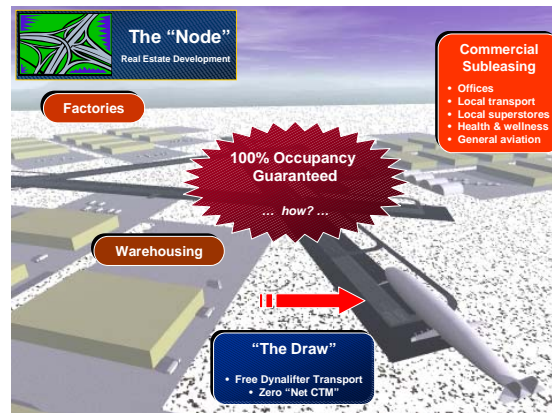
We also wanted a huge cargo bay. The DynaLifter will have a cargo bay almost the size of this room. Cost per ton-mile lowers again by volume. For safety we have multiple cells. We can lose all the helium in our aircraft and still land because the aerodynamic wings and controls are on the neutral beam.

We received a patent in 2001, and hired Dr. Daniel Raymer, an airplane guy, to figure this out. Dr. Raymer calculated how big the engine should be, and how big the wings should be on these large freighters. He said that there were no showstoppers, keep going. We went to a phase two development where we brought in two defence contractors who came up with the structural strength and let us understand how much it was going to cost to operate the aircraft. They found no showstoppers and said keep going. We kept asking about wind loads, etc., but there is nothing out of the ordinary for operation. We engaged Ohio State to make a model to see if the coefficients are right. It had to be scaled up. They came up with it and said no showstoppers, and it can be scaled up.

We have completed conceptual designs on four Dynalifters. We went a little farther with the Dynalifter Patroller, the little guy, and we are going to finish building it at the end of July. Then we will start flight-testing.

An advantage of the Dynalifter that is we are semi-buoyancy. We can air drop, and return to base because the vehicle is heavier than air. twenty tons at a time. We could carry tons of water; drop fire retardant at a slower speed than the C130's. Right now the retardant gets caught in turbulence and may not reach the ground because planes have to go so fast to stay in the air. With the Dynalifter the retardant would be applied in a wide swath and more effectively.

Figure 4



The node, the node is very important to this whole process. We plan to have factories around these nodes, warehousing, and commercial subleasing. It is basically a city built up

around this aircraft. We are going to guarantee 100% occupancy at these warehouses and they are going to be filled to the gills.

When you ask me about cost per ton-mile, it is zero. We told that to NATO. All you have to do is pay us to store your stuff in our warehouses and we will fly it free. But you are going to pay a lot of money to use your warehousing. It is a very easy, commercial real estate deal.

We plan to provide a franchise in Winnipeg. We are doing this all over the world. We met with people in Ghana that have the same problem that you do. They cannot get product in and out. They have roads that kill the livestock before they even get to the port. We are seeking a new Canadian or world company to own exclusive rights to operate the Dynalifter freighter within Canada. Profits from real estate development around the node like warehousing, office space, factories and commercial subleasing, and high subleasing profits will allow free transport from the node tenants.

Session Two:

Hybrid Lifting Body

Lou Foltzer III
President
Hybrid Aircraft Corp.
Speaker

Imagine a new aircraft design with an endurance that can be measured in days, and capable of landing or taking off with large heavy payloads from anywhere, whether it be from remote fields, communities, deserts, marshes, harbours or waterways. Now consider the development time and the cost of this vehicle to be a fraction of what it takes to develop a traditional new aircraft. The science supporting this is sound and the market interest is real. This is not a dream, this is the future. Making aerospace history is right around the corner.

The era of the early 1990's was prosperous and sensitive to evolving market developments. Transportation between continents was accomplished by either air, or sea-based cargo transport. Conventional aircraft are faster, but expensive. Seafaring cargo transport is much cheaper, but is much slower. Since that time little has changed except for views that fast ships, more efficient and faster, with large cargo aircraft will alleviate some of the demand for a rapidly growing cargo market.

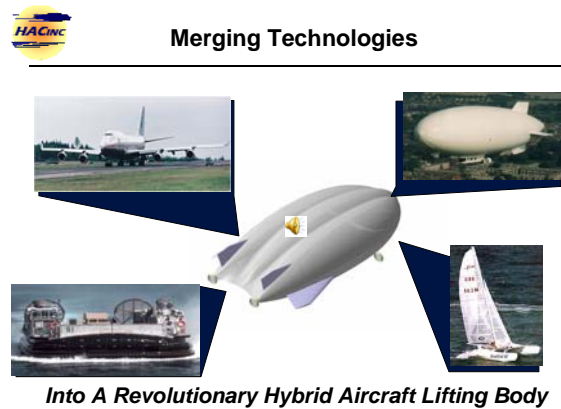
Despite the desire for more affordable and timely cargo transportation methods, the benefits from these technology expectations have been unrealized. Traditional air cargo delivery prices exceeded about \$1.50 per ton mile in the early 1990's. Today prices are significantly higher, even with exceptionally higher demand and lower margins. Against this backdrop, global market forecasters of the early 1990's noted that there was a large disparity between conventional aircraft and surface shipping cost. They wondered if this gap in price, referred to as an unexploited middle market region, could inspire the creation of a new intermodal transportation system.

At first we thought that resurrecting airship technology was among the most promising prospects. Unfortunately, as it turned out, airship ground handling costs associated with loading operations, re-ballasting challenges and structural weight all were unfavourable and a business case would not close.

In the mid 1990's Lockheed Martin, who had previously conducted the airship analysis for commercial clients, came up with a variation on the airship theme by proposing and studying a radical new wing design with a very low aspect shape. The forward air speed would generate about 40% of the aerodynamic lift and the internal volume would contribute the 60% balance of static lift, by displacing air with helium gas. After spending in excess of \$40 million in associated studies, the hybrid aircraft lifting body shape was born again, as US patent records clearly show. However, this time the technology is available to permit feasibility and restore confidence in the concept.

Some regard conventional airships as a serious cargo delivery contender, but at lower air speeds for time sensitive deliveries of air cargo, over great distances with very large and heavy payloads. Analysis, hard work and millions of dollars later determined that something different was needed. Further, it did not help that airship technology seems destined to be universally misunderstood. It is often regarded as a technology whose time has come and gone. Airships have been most difficult to sell except in traditional advertising roles. Hybrids on the other hand are different. They look different and offer vastly improved performance and operational flexibility at a lower cost and smaller size than the conventional airship.

Figure 1



If cargo transportation globally is a commercial goal, HAC offers something different. HAC's hybrid aircraft technology approach is an amalgamation of proven technologies. The contribution from the LTA industry is obvious from its size, construction and static lift derived from helium usage. The contribution of aerodynamic science and design tools is the understanding and application of the requisite control systems that are essential ingredients in the formulation of a hybrid aircraft.

Hover cushion technology as a replacement for wheels allows these larger craft to operate with impunity from anywhere man can walk or swim. They cooperate in all but hurricane-like conditions. Installation of the hover cushion pads in a catamaran-like arrangement provides symmetry and distributes vehicular weight efficaciously. While conceptual designs resembling hybrid aircraft dating back to 1927 can be found in expired US patent applications, the technologies necessary to prove feasibility were unavailable until recently. New high strength-to-weight fabrics, modules enhancements and greater elasticity not to mention enhancements with adhesives, film technologies and bonding processes are all essential if hybrid designers are to get the weight out. After all, weight equals cost and both must be diminished for the design and business case to close.

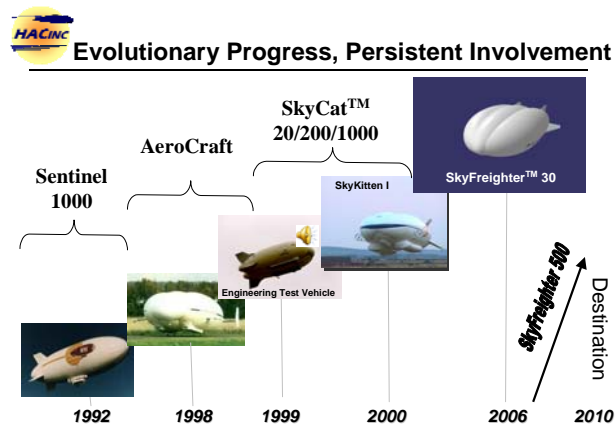
One cannot overlook the challenges and importance of controlling an aircraft of this size, where four displaced propulsers, hover cushions, flight control surfaces and apparent mass effects at various air speeds must be anticipated and controlled by two persons having only

two hands and two feet. The complexities of the overall control mechanization will most likely result in autonomous self-sustainability subsystem and fibre optic data bus signalling implementations to minimize EMI effects while providing a reliable, lightweight redundancy.

An Achilles heel of airborne blimp vehicles is known to be slow speeds and unanticipated adverse weather. Mitigating weather effects is beyond man's reach, but observation of and leveraging weather effects is possible now that global satellite observation and tracking systems are in place. It gives the faster hybrids an opportunity to navigate high and low pressure patterns much the same way that mariners navigate the seasonal trade winds. Wind shear avoidance radar systems and GPS navigation aids now permit real time navigation planning to ensure acceptable schedule reliability. The involvement of HAC in hybrid aircraft design and support predates the company formation shown at July 2003. In fact, our personnel were in part responsible for, and maintain, continuity in the industry both promoting and supporting the hybrid concept when it was abandoned by others. This is in spite of the downturn of civil aviation investments since the 9/11 terrorism attack on America.

HAC personnel have been active within the LTA industry hailing back to 1980. When the US Navy began an evaluation of the LTA related technologies in earnest, they were partly responsible for the advent of a Navy airship program and the eventual win of that program by Westinghouse. Our leadership and support are legendary and known to be highly ethical. The corporation is home-based in New Mexico, the land of enchantment and is licensed to do business in 4 states. The team is comprised of engineering personnel and marketing specialists. HAC continues to provide its keep by providing support to others in the industry and is pursuing investor prospects and prospective customer interests. Having recently completed our initial investment phase we are now in the second phase of our program which involves governmental and institutional partnerships while looking into additional investment.

Figure 2



While starting out providing consultancy services and previously known as Hybrid Aircraft Consultants, HAC recently changed its name and refocused its endeavours toward commercial design, development, manufacturing support and systems integration of Skycat hybrid aircraft. The Skycat name and three of HAC's unique product configurations of a hybrid aircraft have been trademarked. Additionally HAC has reserved the names and business charter of prospective shell companies under associated corporate trademark names that have been filed under the US trademark and patent office. This action was in anticipation of a need for a focused product introduction support and other diverse needs of our prospective customers beyond manufacturing and systems integration efforts.

Progress is seldom a leap but an evolution of thought, effort and trial. Evolution reflects the progress and developing science and art of LTA related technologies. Progress has been slow but deliberate due to the persistence of the impassioned. The Sentinel 1000 airship created by Westinghouse airships in response to a Navy contract saw the introduction of the first FAA certified fly-by-light control system and the use of pneumatic power generation devices attached directly to the flight control surfaces. Newer fabrics and adhesives and honeycomb composite construction were employed, as was the implementation of a new side stick inceptor and bow thrusters.

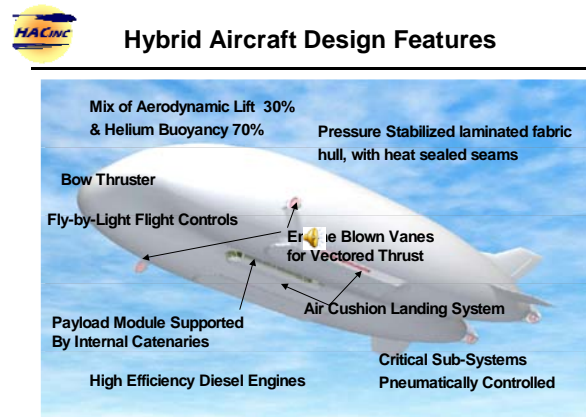
It was Lockheed Martin who followed the defunct Navy airship program that inspired the hybrid transformation from LTA to HTA and created an early hybrid rendition that initially had an H-tail and wheels. This vehicular configuration, which proved problematic

nevertheless was an essential step in aero engineering where conventional engineering tradeoffs had to validate what worked from what did not and why. Having learned those lessons, Lockheed Martin was unfortunately compelled to abandon all commercial program endeavours of which aero craft was a part in order to refocus on DOD core technology businesses. The Skycat and hybrid aircraft-marketing model were managed, financially supported and contractually studied under the authorship of individuals at both HAC and Lockheed Martin.

The Sky freighter notation on the hybrid aircraft is a mission configuration of the Skycat and is configured for cargo transport operations exclusively. HAC's intent, assuming adequate funding, is to complete a detailed design within two years and to field and possibly fly a prototype in the third. Final certification would occur in the fourth year with delivery scheduled thereafter. After successful introduction of the Skycat 30 hybrid aircraft, the Skycat 500 development decision is planned.

HAC's business goal is to advance an aircraft like no other. The key distinguishing attribute in this listing for the 30-ton size Skycat hybrid aircraft is successfully servicing remote and inaccessible global areas. For the 500 ton Skycat however, success will be obtained only if the declared cost of 22 cents or less per ton-mile is obtained. HAC's program phases mirrors the US government. However, does anyone doubt that a commercially funded program takes less time than a government funded program and costs significantly less?

Figure 3



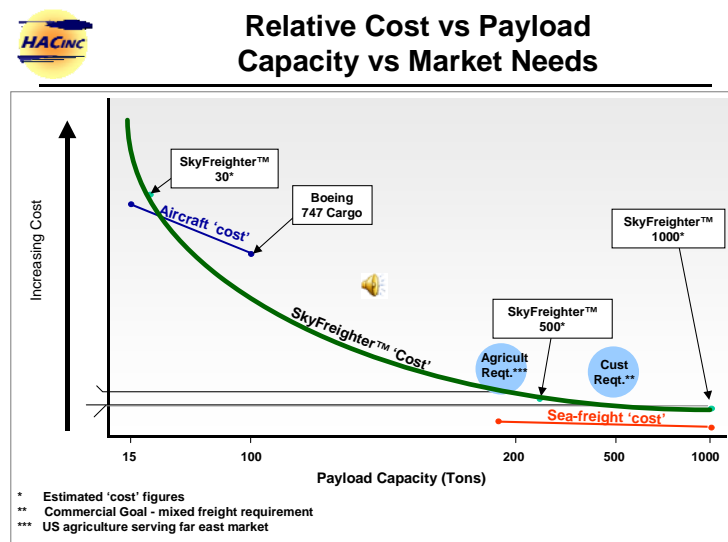
All of the hybrid aircraft design features are off-the-shelf and self-explanatory. I would like to draw your attention, however, to the location of the cargo bay which is tucked into the undercarriage center line. For the 30 ton Sky Freighter, the overall gondola length will be about 95 feet, with the interior about 10 feet high and 17 feet wide. Think of it in terms of a somewhat oversized C-130 cargo bay. We are proud to present our Skycat hybrid aircraft family. Three sizes are supported by previous market assessments. There are also three unique aircraft mission configurations that will be addressed as brand name products. The Skycat 30 is our first development step. It is competitive as a feeder aircraft and will go where others cannot. This size hybrid aircraft has the widest market utility for a small business, the lowest investment risk and is our bread-and-butter program. Pricing is negotiable. HAC is pursuing advance orders for the first block of 10 with refundable down payment terms. Delivery is scheduled in late 2008. Early certification mission configuration is Sky Freighter 30.

All Skycat aircraft are designed to stay outside throughout their life cycle with some prospect of berthing indoors only during depot level maintenance and equipment change situations. Of all the innovations to be incorporated with Skycat, the aircushion landing system is among the most ingenious. First utilized in sea-based, marsh and waterway travel the idea occurred on both sides of the Atlantic that the ACLS would be a key enabling technology the hybrid aircraft and a way to diminish ground loading concerns. The ACLS has three distinct modes of operation. The first is to inflate independent hover pads upon which the aircraft can land, taxi and hover. The second, and perhaps less obvious, is to reverse the direction of the inflation fans thereby creating a suck-down mode enabling the Skycat to anchor against some rather high wind conditions. The third mode is store. In this mode the air cushion is retrieved into the envelope outer mobe line thereby reducing drag count.

HAC recognises that it is initially serving existing markets with the hope of creating new markets over time. Therefore, providing accommodations that support conventional packaging methods and floor tracks to permit utilizing standard containers and pallets is crucial. The size and weight capability of the Sky Freighter 30 is sufficient to lift not only conventional commercial payloads but to lift one Striker combat air vehicle, its crew of 15,

fuel, personnel supplies and artillery, and transport these items 2500 nautical miles to a tactical theatre.

Figure 4



In a Sky Freighter 30 configuration, operational costs are competitive with conventional aircraft, yet the operational features provide exceedingly important operational flexibility reserved only to hybrids. As Sky Freighters get larger they attain vastly improved life cycle economics that are more often compared to ships than airships. Beyond economics there is a significant difference from conventional aircraft. Even if priced similarly to conventional aircraft, doing what others cannot do has considerable market appeal and in many instances makes this aircraft technology compelling and the only obvious choice. Think of it, anywhere globally without restriction, no airport or ground handling equipment required. Truly, Sky Freighter will be this century's revolutionary commercial transportation monument.

The market potential of the Sky Freighter 30 is predictable at best. Some of the prospective markets that have been identified and relevant to this conference are shown. HAC would appreciate hearing of your specific needs and documenting those requirements as part of an ongoing market research survey to better shape our product offerings. New ideas tend to

spring up when folks come to realize what a hybrid aircraft can do that others cannot do, either at all or affordably.

Let me share a couple of ideas that have surfaced as a result of the Pacific Rim Tsunami disaster. Does anyone think that a hospital or clinic version of a hybrid aircraft would be a practical way to provide medical support to flood, fire or plague victims? What about a power generation and water purification hybrid aircraft to be used in situations of natural disaster whereby the Skycat lands in the middle of a disaster area and the population simply plugs in and plays back the benefits of those essential services? Consider providing food and vaccine distribution to refugee encampments directly, avoiding black market opportunists who rob those in critical need. Lastly, Skycat might be ideal in providing critical fuel supply and distribution to remote communities hit by exceptionally cold weather where timely distribution is always a challenge as is affordability for regional governments.

Skycat offers an unrivalled flexibility because it can service otherwise inaccessible areas. HAC would appreciate hearing your ideas.

HAC's most significant challenge is your support. Whether it be as a committed end user for services or as a prospective investor. Either party can make a difference if you believe in our product and our determination. Letters of intent and some monetary commitment will enable us to move forward. If you personally cannot make a commitment but know a party that might, HAC would greatly appreciate your assistance. Our private placement memorandum makes allowances for individual rewards to those who successfully steer an aircraft purchaser or contributing equity partner into our midst.

The recent Pacific Rim Tsunami made a critical point that I believe few would disagree with, namely that hybrid aircraft would have made a significant difference had they been available. The time for planning is now, the time for execution is tomorrow. The technology is off the shelf. Little design and engineering time is required to complete a final design. Skycat availability is totally dependant on market commitment and investor support. HAC's development road map is well reasoned and executable. It proposes two years of design followed by a year of prototype manufacturing and assembly followed by FAA certification flight-testing. In fact, the FAA involvement commences at day one of the design effort.

There is no reason to get it wrong from the start if the FAA is invited to the design process early. Rate production is initially forecasted at 24 Skycats a year in a Sky Freighter configuration. Once market acceptability is demonstrated and efficiencies of assembly are attained, enlarging the site and increasing the associated tooling can multiply that rate.

We believe that hybrid aircraft technology is here today, the deliverable and new market opportunities are lucrative. There are those that believe that affordability, fuel efficiency and pollution benefits are particularly inviting. Operating to and from anywhere at the lowest ownership and operating air cargo cost without infrastructure restriction or need for airports and ground support has obvious compelling market appeal. HAC and its partners look forward to hearing more about your requirements and incorporating them into our business strategy.

Question for Carl von Gablenz

What kind of propulsion do you have for your vehicles?

Carl von Gablenz

It depends on the size of the vehicle. The balloon is not propelled. The larger airship in the future has standard aircraft engines like the Rolls Royce. You can operate this with normal fuel for an aircraft and they are simple to change to hydrogen. The RRTM is one of the best modern engines for helicopters. We would like to take one of these engines for the 40 ton flying cargo vehicle.

We would like to use hydrogen also as a lift gas because it is one of the energy sources of the future. We are running public buses in Berlin with hydrogen. There are gas stations with hydrogen.

Question for Carl von Gablenz

With the large size of your envelope have you considered using solar collectors?

Carl von Gablenz

Some of our team members designed, built and operate a solar driven airship called Loti and a few other ones. You can do this, but even if the surface is comparably large, the amount of power that you can collect with the panels is not that significant. That is for the future, maybe the airship can improve by collecting solar power during flight. There is some thought that it could be used specifically for the high altitude platforms. For commercial operation on the ground here in Canada, it might be nice to have, but I would do without it.

Lunch Keynote Speaker

D.W. (Dave) Murray
Regional Director General
Prairie and Northern Region
Transport Canada

With capacity increases, we are beginning to see many new challenges in the transportation industry, particularly in the global market. On the marine and rail side, we have seen a 500% growth in Canada-China trade from \$5 billion in 1993 to well over \$24 billion now. Private infrastructure investment and development is struggling to keep pace with that demand. As you are aware, the railways are working with the Port of Vancouver and Prince Rupert to make major enhancements to handle that trade.

The air sector has had its ups and downs. We need it to remain healthy and diversified through domestic competition. Recently, the Government of Canada announced that it would pursue with the United States, discussions toward potential further liberalizations supported by the air carriers and the aviation industry in general. Clearly, security imperatives since September 11th and the border trade issues continue to pose challenges not only in the movement of people, but to goods and services. In addition, we are seeing major congestion in our metropolitan area, freight is being diverted as we speak from the west coast to a variety of other ports.

We do have some fairly distinct transportation advantages that we can capitalize on. Our deep water ports in western Canada are close to a growing and increasing Asian market. This presents a distance advantage over competitors in the United States, leaving us with Vancouver, Montreal and Halifax as competitive gateways to North America. Our Canadian railways offer among the most competitive freight rates in North America. We are seeing some expansion and double tracking on the CN side.

What can government and Transport Canada do? Our vision is a multi-fold sustainable transportation system. One that integrates and finds the right balance between social, economic and environmental imperatives and guided by Transport Canada's strategic priorities. The first of which is a safe and secure transportation system. Since 9/11, security has become a fundamental driver in our system, not only to protect the people travelling, but to ensure the efficient movement of goods, and the confidence of our trading partners. We have a number of new initiatives with the marine security process under a contribution program. We are currently looking at \$115 million to help the marine sector boost security and meet international code requirements in our ports and with shipping companies.

A second priority for us is a transportation system that is efficient. We focus on market based policy frameworks, infrastructure, gateways, trade corridors, and innovation, but intermodal integration and national security objectives have clearly got a focus along with the efficiency of the system.

Last but not least, and we have heard the issue today, we look at a transportation system that is environmentally responsible. We accomplish that through a decision making approach that balances economic, social and environmental factors. We traditionally define the North, as north of the 60th parallel, but having grown up in northern Saskatchewan I am well aware of northern Manitoba and Alberta. For us that is very often where the road stops, at 50, 55 and up. As we know, the North is not a single place. The challenges, and the opportunities in the three territories are very different. We have a large diverse and small populated part of the country, but a whole spectrum of economic and social challenges and opportunities. Many communities in this area are dependant upon access to the outside world to provide food stuffs, fuel, building supplies and the transportation system is limited. Clearly that provides inhibition to potential social and economic development opportunities in the community.

While transportation in the North is not nearly as developed as in the southern part of Canada, it is important to realize that there is significant variations in that infrastructure to the North. For example, the Yukon is comprised of a reasonably well developed highway system with only the community of Old Crow not currently served by road. This

community relies on air. Clearly, funding for projects like the Alaska highway, many of the bridges and most of the transportation infrastructure along that highway has come through agreement with the United States. The United States relies heavily on that highway to move goods and people to and from Alaska.

In the Northwest Territories, the transportation system has been impacted in the last number of years by unprecedented economic growth with the opening of mines and mining exploration. Two diamond mines are operational and a third is moving into production within the next two years. Not only has this opened a whole new area of the economy and prosperity for the Territory, but it has been followed by the revving up of activities related to the proposed McKenzie Valley Gas Pipeline and resulted in considerable investments in transportation infrastructure.

Currently, half the communities in the Northwest Territories are located on all weather roads. Other parts of the communities and resource sites rely on very expensive winter roads that are experiencing shorter seasons. When we look at Nunavut, we see an area that has 26 widely dispersed communities, a lack of major transportation infrastructure beyond airports and many, many ongoing challenges. There are no roads in Nunavut with the exception of a very short road to the now discontinued Nanisivik mine site. There are some community roads, access roads in various areas. Air transport is obviously the only year round service for much of the north, again, often constrained with weather and extreme operating conditions for aircraft.

In recent years, Transport Canada and the federal government have provided much of the needed funding to invest in transportation infrastructure through government programs such as the Strategic Highway Infrastructure Program and the Industry Canada's Infrastructure Fund. In the Yukon, we have provided approximately \$19 million towards transportation projects. The Northwest Territories have received \$70 million and in the case of Nunavut with building infrastructure priority areas have tended to be water, sewer and community support and they have received approximately \$4.3 million. We also provide extensive funding for eligible airports through something we call the Capital Assistance Program. So far, the three territories have received \$32 million in federal funding since they

have become eligible. By comparison, the province of Manitoba has received \$31 million under that program, much of it targeted for the northern air ports. Clearly, that is where the money is needed and spent at the moment.

Infrastructure and resources go hand in hand. As we heard earlier, they are spending a lot of money to ensure that those projects can be launched. In the last budget the federal government announced an initiative to develop a comprehensive northern strategy that is currently being led by Indian and Northern Affairs Canada. We are working closely, not only with that department, but the three transportation departments in the Territories. Throughout all the economic changes that are being experienced in the north, our top priority again is the safety of the transportation system through our regulatory programs in all modes.

In regards to the regulation of airships, we need to get involved early. The first thing that we have to deal with is the certification of airships. Presently our Canadian aviation regulation 5-41 is out of date. We are aware of the European standard and we are aware of the proposed federal aviation administration standard in the United States. But, as a national initiative we will not necessarily take steps on certifying, nor can we until, we have an actual design and a proposal from industry.

Second, there is the certification of the pilots and the licensing, which in Canada and the United States normally comes out of test pilots flying and the various companies working with the components, or the hot air balloon world in some cases. We look at endorsing specific pilot licenses.

Third, if it is a commercial venture, we have the certification and operation of the commercial operation in the country. There is a lot of work to do. Something that three years back had a giggle factor has come a long way. I encourage you all to pursue and to push us along the lines that we have to go. There is no doubt that the idea of creating a more sustainable alternative, or new mode of transportation, is important particularly for the North and northern Canada.

Session Three:

Composite Structures

Session Moderator
Todd Schwartz
Consul and Principal Officer
U.S. Consulate

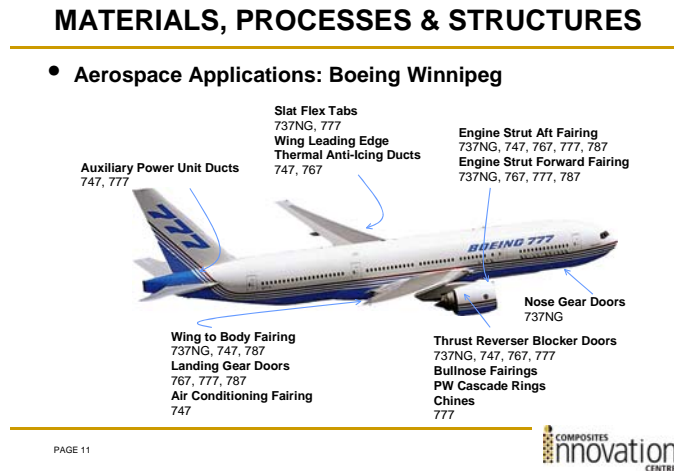
Sean McKay
Executive Director
Composite Innovation Center
Speaker

What is a composite? The definition we like to use is a reinforcing material embedded in a resin matrix. There are some nuances to the definition, but that is basically it.

Typical reinforcements that we use are ECRNS glass fibres; fibreglass; straw, flax and hemp fibres; graphite and Kevlar. If you are going to develop a composite product those are the types of fibres that you would look at. We need to bind it with something, so we bind it with a resin system. We look at two types; thermal sets and thermal plastics. In terms of aerospace, the majority is epoxy systems or thermal sets. It means that if you make the pot afterwards, the resin sets up and you cannot change it. Thermal plastics are coming more to the fore in this area. In the case that you mess up while making a pot, you can always reform it. It is a lot easier to mould things from composites than stamp them out of steel.

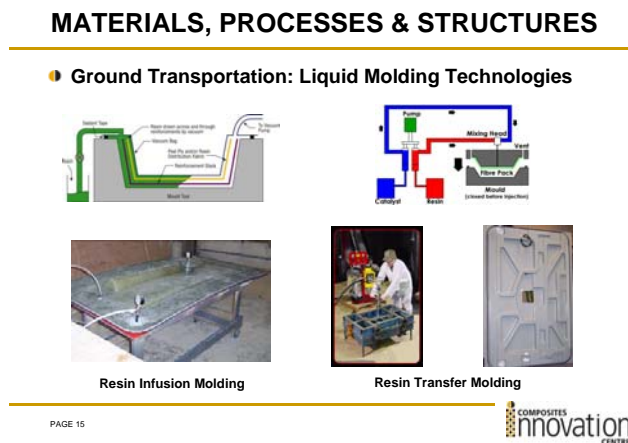
There is a pre-picture process. It starts out with a layer process of machines that cut the cloth, and most of the materials are then hand laid. We cure in a large autoclave, which is a high temperature pressure cooker to cook the material. Then it is trimmed, finished, assembled and inspected. These types of capabilities exist in a couple of companies in Manitoba. Another unique possibility is from one company just outside of Winnipeg who has developed a unique process of electron beam curing. They are probably the world leaders in it.

Figure 1



This figure illustrates the types of products that, for example Boeing makes, in the city. Just some typical applications are blocker doors and wing to body fairings. A lot of composite panels, which are made from different materials, are predominantly made using the autoclave process.

Figure 2



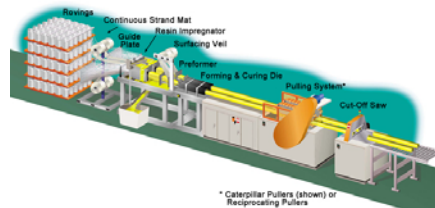
There is a resin and infusion process, which is where you take a dry mount fibre, put it in a mould, put a cover on top, pull vacuum on it and allow resin to flow into the mould to make the product. There is another form of infusion that uses a mould, puts in a dry mat and then

pumps in catalyst. The resin combines and is shot into the mould under pressure to give you a similar type part, but you can make more of them in a shift.

Figure 3

COMPOSITE FABRICATION PROCESSES

Ground Transportation: Pultrusion



PAGE 16

COMPOSITES
Innovation
CENTRE

Another capability found within the province of Manitoba is pultrusion. This is where you get a bunch of dry fibres, take them through a resin bath, and apply resin to them. There is a heated dye, the material is pulled through and after it comes out of the heated dye, is cured and ready to go. Typical types of applications are panels for doors within the New Flyer buses. There are a number of different technologies that have evolved and are used in both aerospace and ground transportation.

The Composite Innovations Centre was started in 2000 with some industrial interest in clustering. We have a number of different manufacturers in the province, three levels of government, universities and colleges and other institutions that support the program. The CIC was formed in 2003. Our chairman is the President of Boeing Canada and we have representation at the world level from most of these companies. Our mandate is to stimulate growth through innovative research, development, and industrial application of composite material technologies. What does that mean? Well, if somebody comes to us with a business opportunity in another market, and says “we just need to tweak the product

a little bit to make it work, can you help us?” We would say “sure” and we would develop a project plan together, pool our research capabilities with their production capabilities and put a project together and hopefully develop that derivative product.

We are project focused. We have to have an industrial partner with a relevant business opportunity and we have a number of core technologies that we look at as well. We cross several industry sectors, not just aerospace. We find that is key because we can bring aerospace technologies over to the other industry sectors and back and forth.

In terms of what we do, we basically partner with companies and put partnerships together to accomplish our projects.

We have the third largest aerospace industry in Canada, and with Boeing Winnipeg, the largest fabricator of composite components and assemblies. In support of these applications for aerospace businesses we have design, analysis and prototyping capabilities along with, manufacturing of composite components and assembly capabilities. We have approved maintenance, repair and overhaul facilities for composites along with the education and training to support the skills and development of skills in the workforce to meet those applications.

Finally, we have the CIC and other government agencies and educational establishments that support the development and growth of the industry.

Session Three:

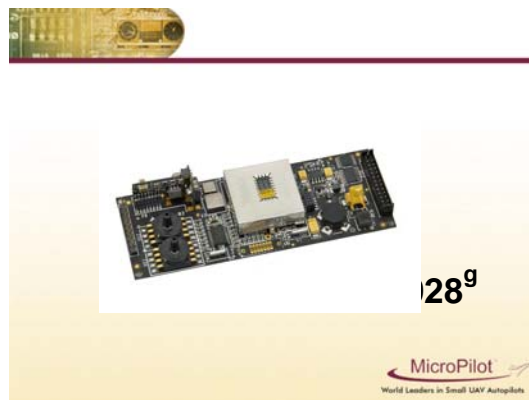
Flight Control and Civil Applications of UAV

Lisa Shaw
Director of Communications
MicroPilot, Winnipeg
Speaker

We have Airships to the Arctic. Sean with composites can build those airships, and with MicroPilot we can fly them. In fact, we can fly them unmanned if you want to dream big. What we do is design and manufacture miniature autopilots. When you think of an autopilot you think of a great big one. We do the exact same thing, but our autopilot fits in your hand. It weighs 28 grams and you do not fly it in a cockpit, you fly it in your laptop computer through GPS waypoints.

MicroPilot is based here in Manitoba, and was founded in 1995 by Howard Loewen. In 2000 he launched his first autopilot, hence MP2000, which is the original. We sold 400 autopilots from 2000-2003 and as technology gets better so does our product. In July 2003 we launched an even smaller autopilot.

Figure 1



This autopilot is 28 grams and is called the MP2028. It has been extremely popular and we have sold over 400 units to date. Our company has experienced tremendous growth. We

have gone from zero to 26 employees. We thought our facility was large enough, but you know how it is.

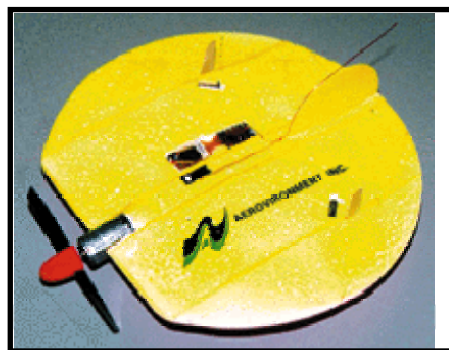
We are located 7 kilometres north of Winnipeg in Stony Mountain. We have a large building and, more importantly, we have 40 acres to fly on. We are Transport Canada approved; we have an SFOC, a Special Flight Operations Certificate. We are a global company, and some of our clients include NASA, commercial applications, and military applications. We sent one of our technicians to Devon Island to be part of the Mars Rover project.

Figure 2



This is designed for the backpack-able market, it is called the Snake Eye and is a military application. It is a UAV, an unmanned aerial vehicle that fits in a backpack. The soldier takes it out, it is bungee-launched, our autopilot flies it and it is purely to look over the hill.

Figure 3



This is the Mosquito; it is designed to go through windows and doors. This is where the size and weight of our product really shine through.

MicroPilot has a good relationship with NASA and we have been working on a blimp. In fact, because of the collaboration, we have developed a compass module that is appropriate to fly airships and is also used for dead reckoning. Overall we have 300 clients in 47 countries. Right now 65% are in the US and 35% are global. South East Asia is really enthusiastic for our products and if I had to round up how much business we do in Canada it would probably be 1%.

Some of our products, such as the MP2028 autopilot, we developed and sell. With that, we have also developed HORIZON ground control station. Two years ago we launched the XTENDER software developers kit so you can now customize your applications. We give you the platform and you can access our autopilot to do more things. Accessories are a whole new market for us, as our clients demand new things and we fulfill that with accessories. We now have radio modems, compass modules, AGL, ADC, etc.

One advantage that we are starting to realize is our space here in Manitoba. We are starting to market our on-site services. We can send a technician or you can come to Manitoba. Living here on the Prairies with 40 acres of flat land surrounded by horses and cows is a huge advantage to be able to fly.

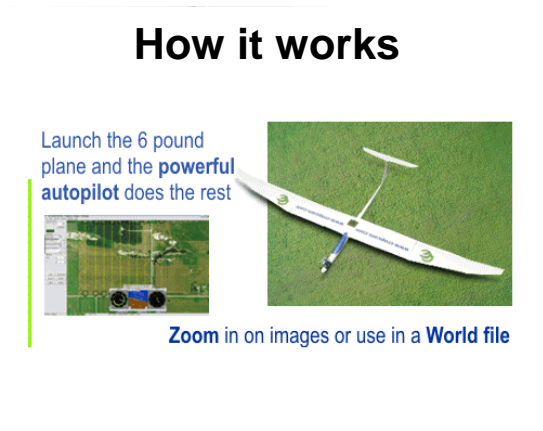
On the MP2028, the GPS is fully integrated and the components are all on one board: three access gyros, accelerometers and everything that you need for flight control, fully autonomous from take-off to landing. You can set your waypoints, set your pattern, altitude, and destination. There are various ways to launch a plane: hand, bungee, catapult or it can take off on a runway, or on a field. It all depends on your airframe. You can mix and match, if you want to retake control we allow that too. If you want to adjust your altitude, speed, or change direction you can do all of that through the HORIZON ground control station. It is very versatile.

Our applications are military, research institutions, NASA and educational. MicroPilot is really firmly committed to education. In fact, we are the sponsor of the upcoming AUVSI

Student Competition in Baltimore. We also offer an educational discount and we like to support the universities.

We are also proud to tell you about the commercial application of UAV's. UAV's are just starting, they are coming. A very exciting industry is the commercial application. It just so happens that MicroPilot is launching a new agricultural product, so this is perfect timing. We have developed a product called the CropCam. We have taken our technology and our expertise in autopilots and applied it to an agricultural application.

Figure 4



Through HORIZON ground control software we program some preset flights. The producer will stand in one corner of the field, hand-launch the 6 pound CropCam and the autopilot does the rest. It flies a set pattern and controls a digital camera. When it lands all by itself, you go and get the CropCam, take the camera, download the images. You now have GPS- based images, latitude, longitude and altitude for precision farming. What are the benefits? It is all about crop spraying. Manitoba spends about a billion dollars a year on spraying and about 40% of it is wasted. This will help to spray what needs spraying and increase your bottom line dollar. It is GPS based and you get a very detailed photo.

Question for Lisa Shaw

You made mention of being able to control an airship into the Arctic. How remote can a UAV be?

Lisa Shaw

Basically the range of our autopilot depends on your application. Right now we are flying around the world. There are two or three airships that are flying. As long as it is not too technical and you are using a data link that is RS232 full duplex, it really depends on your range. We also have applications that are starting to use satellite phones. We have clients that go as far as two kilometres and clients that fly across the ocean. Our autopilot can adapt to whatever data link capability that you need.

Question for Lisa Shaw

The Arctic has different magnetism, electrical storms and aurora borealis. Is there any aspect that would limit the kind of signals and usage that you know of?

Lisa Shaw

I can tell you one thing about the Arctic and Manitoba. The weather in the winter time is harsh. Our autopilots are tested to minus 60 degrees. It is not the cold that is going to do it. With respect to the electrical interference, GPS reception and data links, that could be a concern. With the compass module that we have been developing, the autopilot wants to get to its wave point fast an airship is kind of like chugging. With the compass module, if you did lose control at least you could revert to the compass module for control.

Question for Sean McKay

Obviously you are developing real applications for your technologies and you have a large number of partners. Do you find that proprietary concerns are interfering? How do you handle the questions of proprietary corporate information in the partnerships that you develop?

Sean McKay

We do not tell anybody else what the other person is doing. We start off with a confidentiality agreement. If there is a licensing of any technology developed we identify and deal with that right up front. Once we get the project going we have processes in place that allow us to segregate the information and we have limited discussions both within the organization and at board meetings because there is also conflict there.

Question for Sean McKay

Airships are very large. What sort of size limitations are there on the composite materials, within the city, and theoretically can any size be made?

Sean McKay

It generally depends on the process. I would say that if you are looking at autoclave processes, the largest autoclave for a single part which is in Boeing is about 35 feet long. If you are looking at a resin and fusion type of application it can be as large as you want. There are some boat manufacturers in the States that are making boats about 120 feet plus. It could be longer, you just have to make sure that you catalyze your resin so it does not kick on you before you infuse the product. It is a matter of playing with that. Of course there are limitations but it depends on figuring out how much you want to spend on your tooling. If you develop a tool and can put some commonality in to the design.

Question for Sean McKay

Solar cells seem to have a certain amount of metallic components in most instances. I was wondering if you are able to look into composites that would be non-metallic or minimal metallic for solar cell collectors.

Sean McKay

Not specifically at the moment. We are involved in building a solar car. Basically, the regular solar cells were bonded onto a graphite substructure for light weight support. We are working on another application that is more related to wind energy. This is combined with a certain technology where the material heats up during the day and loses heat when it cools. That transfer of heat is converted to energy. I am not certain how it works and it is not specifically solar cell technology but it does produce an energy that can be turned into electricity.

Question for Sean McKay

In the possible application of airships and composites, is there any question or issue with the fire danger. Do you include fire retardants?

Sean McKay

I would say it is specifically related to the requirements.

Question for Lisa Shaw

What is the price on your CropCam in total with the airplane and the software and so on? Are we going to see every farmer in the Prairies with those soon?

Lisa Shaw

Now there is a thought! We actually completed training our first group of CropCam beta testers this afternoon. They are not for sale yet. What we are offering is a very competitive pricing package right now at \$15,000 for three CropCams, training and support. We want to really test it this summer. We will probably go to market with them in September. Right now our first group has their three CropCams and they are heading back to Swan River. This commercial application is not a dream anymore.

Question for Sean McKay

I noticed that you made some products like the landing gear hatch door and wing bearings and so forth. But what I did not see was a composite wing spar, a critical piece of structure. What is the reason? Certification? Lack of confidence in the consistency of the manufacturing? Perhaps lack of confidence by the public or the aircraft manufacturer? Composites and plastics have been called a temporary alliance of molecules and they try to come apart with time shortly afterwards. Is that the issue? Deterioration with time?

Sean McKay

In Manitoba, the issue is that we have not got a company that manufactures that type of structure. If you look for example at the four-seater aircraft in Souris, North Dakota, they make their wings fully composite with a composite spar. For the Boeing 787 aircraft, the wing that is being subcontracted to Japan is all composite with a composite spar. The

technology has been proven over the last 10-15 years so it is starting to be used in full wing spans. In Manitoba we do not have those type of components being manufactured.

Session Four:

Low Altitude Surveillance

Session Moderator
Ian Glenn
President
Unmanned Vehicle Systems Canada

Rudy Bartel
Vice President
American Blimp Company
Speaker

Who is American Blimp Corporation? Eighty percent of the worlds blimp fleet is a product of the American Blimp Corporation. It sounds like a lot, but it is only 26 blimps. It shows you how small this market really is. We have almost 200,000 hours of flight time and we have 5 FAA type certified models. We are certified in over 9 countries including Canada. We have operated in a range of environments from minus 40 degrees during the Lillehammer winter Olympics and in desert sand storm conditions up to about 120 degrees.

We have designed a variety of aerostats including a 600,000 cubic feet logging balloon used on Vancouver Island that is capable of lifting 10 tons. Those are really interesting. These balloons are huge! We have several FAI recognized endurance records of 24 hour endurance for our class. The Graf Zeppelin has a 71-hour record, but really, these records can easily be broken. We have a 98.2 kilometre per hour speed record that may have already been broken. We have an operations company (The Lightship Group) that operates the airships for us. They do all of the training, and selling and a subsidiary of ABC.

Both ABC and The Lightship Group took part in a two-year FAA rule-making committee to update the FAA operating regulations to include airships. We had to go through all the regulations and alter, change and write new regulations for airships or to include airships. Trying to define airships (vs. hybrids) was interesting.

Why use airships for low altitude surveillance? It is old technology; why not use aerostats or an aeroplane or a helicopter? I was reading the latest issue of Aviation Week, on the airplane coming here. Here is an oft-repeated scenario condensed from a number of interviews with the US in Iraq. “At night a coalition ground party raids the house of an armed insurgent group. As they go in the front door a pair of F15’s with high-resolution day/night optical sensor pods and an RC135 signals intelligent aircraft circle nearby. The RC135 is capable of monitoring side swaths of the electromagnetic spectrum for illusive or disguised communications, the fighter will use infrared sensors to track those who run out the back door.”

They are using a fighter jet in the sky to track some guy walking out the back door. It is a very expensive way to do something. If you compare airship to aerostats, a tethered balloon with sensors, each of them does have their place. The acquisition costs are about the same because essentially a large part of the cost is the sensor package. If you have the same sensor package on both vehicles, then it is going to cost about the same.

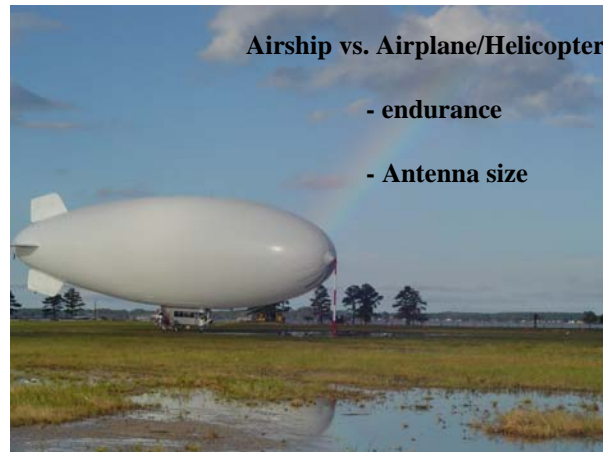
Operating costs are slightly higher for an airship because the airship is more complex. The weather limitations are a little tighter on an aerostat. They have to be pulled down and taken out of service in more benign conditions than an airship could operate in. Aerostats require a restricted airspace to be defined around the tether. It is very important that you do define this airspace. In Iraq we have lost several helicopters due to their flying into the tethers of the aerostats. Plus, I like to say using an aerostat is like going hunting with a dog ... that cannot be let off the leash!

Airships can also be deployed a lot more easily than aerostats. The inflation of an ABC blimp is pictured below.

Figure 1 - 2



Figure 3



Airships versus the airplane or helicopter ... this is where the airship really shines. The two key elements are endurance and equipment capability. Airplanes and helicopters cannot compete with airships in endurance; hang time, persistent surveillance, being able to sit above something. In terms of equipment, I can take any antenna, any platform that anybody has, any sensor, and I can put that on an airship and increase its capability by a magnitude just by increasing the aperture of the sensor. Millions are spent making sensors smaller

while struggling to maintain the same capability. Due to the ability of an airship to carry multiple extremely large sensors, sensor size can increase resulting in a magnitude jump in capability due to the squaring effect. And multiple sensors allow observation over mutispectral ranges.

The key thing that we have learned is that a surveillance airship acts as an early warning and command centre, augmenting helicopter and ground operations, not replacing them. The airship, with a suite of sensors providing a broader field of view, has the ability to spot a mix of targets. When the airship sees an item of interest, a helicopter or a ground asset is sent in to investigate closer and manage the item of interest.

Session Four:

High Altitude Communications

Mike Lawson
CEO
Techsphere
Speaker

I met Hokan Colting in 1995. We had a cigar type airship and understood its capabilities and its limitations in what it could and could not do. I was really intrigued by 21st Century and their technology. We have been friends for years and finally we executed a world licensing agreement with Hokan. What he does for the Techsphere team is that he is a dreamer, and a thinker. His word is his bond; he delivers when he says he is going to deliver. He holds a world record for a blimp going to 22,000 feet. He is an expert at being able to build different shapes, knowing what they can do in different atmospheric conditions, and knowing what the airship can do at different altitudes.

One of the things that everyone asks is “how do you keep something so large on station?” Obviously being a marketing guy and putting Pepsi cans in space, I did not have the answer to that one. We executed an agreement with Sierra Nevada Corporation who developed the instrument landing system for the F18 fighter to fly remotely off and onto an aircraft carrier. I figured that if they can put an F18 fighter on an aircraft carrier, they would be a good partner to have on board. They have completed the remote piloting system for the 94 foot airship that will be flying some time late August / early September.

As far as aerodynamic design, there are different shapes and sizes and we really needed some intelligence in that area as to what is the best shape at 68,000 feet or 20,000 feet. It is not the same shape, it depends on the mission and requirements. We have developed an airship that actually changes shape. This design will be flying some time this fall.

Extract From CBS Video:

Could this be America's next weapon for National Defence?

The government is testing a security program that involves the return of the helium-filled airship. On its first test flight near Washington DC, there were 2000 reported UFO sightings.

It is actually a helium airship, a low cost, low hanging satellite and quite possibly America's next weapon for national defence.

What the Pentagon can suddenly envision is a fleet of these airships guarding America's coastlines. On board would be surveillance sensors, video cameras and a wireless communication package. Unmanned airships could stay aloft for days, even months depending on the mission and the altitude, relaying suspicions to operators on the ground. Another possibility would be patrol the sides of Iraq and protecting US soldiers from above. Imagine a convoy travelling down the road and we have eyes on the road 4-5 miles ahead over hostile territory at altitudes of up to 70,000 feet. The airship would be hard to spot, and even harder to shoot down.

Mike Lawson's company created this radical redesign which includes a second inner bag to hold the airship's helium. A hole is not going to make that big a difference. Even under attack this airship would be a survivor. All of its outer skin is made up of Spectra, a synthetic that is 10 times stronger than steel by weight. Because of the pressure of the helium inside, a bullet hole, or any puncture of its skin would become a slow leak and not a catastrophe. Even a thousand rounds would not take it out. The airship would slowly descend.

In the next couple years, thousand of airships could be on patrol keeping terror away from America soil.

Question to Mike Lawson

What sort of time frame are you looking at in the future to get to what we see as television's version of the long range plan?

Mike Lawson

The 2004 budget for Techsphere was appropriated through the Georgia delegation at about 5 million dollars. With those funds we were able to have the test flights at St. Marys in Camp Roberts out in the desert to test various payloads as well as a new propulsion system. With that in mind we had enough dollars left over to purchase 36,000 yards of fabric to build the high altitude airship. We project that a prototype will be completed in a year. The 94 foot version is a stepping stone that Hokan mentioned. The 94 footers at 20-25,000 feet will have the same packages running on a parallel track for the high altitude version.

Question to Mike Lawson

Is the airship envisioned to be solar powered? Are you going to have enough fuel to stay aloft for that period?

Mike Lawson

Excellent question. We can only go so far with existing technology. Fuel cells are a patented answer for duration. To become a telecom platform for the wireless industry for 6 months to a year duration is going to take new technologies. What kind of growth is that? We feel that fuel cells are about 2 years away. As far as using solar panels, yes, we will be using those.

We will get approximately two weeks time on station on current technology using hybrid electric. From there we will be moving into the fuel cell area and hydrogen rich fuel cells.

Question to Mike Lawson

You made reference to the ideal size and shape for 20,000 feet not being the same as at 60,000 feet. What is the difference?

Mike Lawson

It is amazing when you go into some of these meetings. Every day there is a new requirement that is put on you. What we did collectively with the Techsphere team is we developed an airship for 20-25,000 feet. By the way, that is not the best place to be with an airship that you are flying at anywhere between 35-60 miles an hour. We are in a low-cost niche market, taking a 1000 pound payload up to 20-25,000 feet. When we need to get a

burst speed, about 90 miles an hour, we will be able to fly like a cigar-shaped airship, yet be spherical as we were very concerned about the integrity of carrying 6,000 pound of fuel to 20-25,000 feet. We had some design constraints.

Question for Rudy Bartel

You mentioned that the Lightship Group actually flies the 26 airships that are out there now. From the experience of the pilots, what have been the worst conditions possible presented to them? What have they perceived as a threat or a danger and how have they dealt with that in controlling the airship?

Rudy Bartel

One incident immediately comes to mind with one of our pilots who had a lot of fixed wing experience, flew for Good Year, SkyShip Industries and then became our chief pilot. About 6 years ago he got caught in an extremely fast and violent thunderstorm. The airship got tossed around. He had full power going down and the air ship was going up at about 30 miles an hour. Gusts were bending the hull around the gondola and the operative word is “bending.” The advantage of the fabric hull is its flexibility. In a thunderstorm like that with an airplane, the wings would have broken off. We are not too concerned with bird strikes. We have to have lightning protection by regulation so it is all well grounded. We have actually done a lot of tests with a company in California that specializes in lightning tests.

People shoot at airships, but we are not really concerned about bullet holes. We had a couple of bullet holes in an airship, and as Mike mentioned, they will not bring the airship down. It might take two days to notice that you have any loss from one bullet hole, because the internal pressure is about 0.2 PSI, which is very low. If you had 1000 bullet holes, you would be talking about a 200 square inch hole, which is a pretty big hole; you would probably notice that.

The biggest danger is variable wind conditions when you are taking off and landing. Like any aircraft, the point where you are most vulnerable is that transition point when you are in the process of getting airborne or landing.

Question for Mike Lawson

This is more of a cautionary note and probably should be noted by the conference in general. When we are working on the Sharp microwave powered airplane that was intended to fly for long durations at 70,000 feet, we did quite an intensive study of the atmospheric wind conditions over Canada. Fortunately, we are located close to Environment Canada so we had access to their records. There was a 3% probability over central Canada that you could have winds in excess of 60 meters per second. Admittedly, the atmospheric density at that altitude is 1/16 of sea level so the dynamic pressure is not as dramatic as that would sound. Nonetheless, that is something to bear in mind if you are talking about long duration and high probability of availability for the aircraft. Are these things that have been considered by Techsphere?

Mike Lawson

It is a concern in the development process. You are correct; it is probably about 3% of the time that there are going to be some peaks that any airship or aircraft is not going to like or do well at that altitude. An airship is not going to be perfect in every place around the planet, there are places that we will not go. For a hot nation, the Bahamas, or the Hawaiian Islands, a package at 68 is very suitable. An issue came up as related to the Mid-East, an area that they wanted us to fly. At that altitude, there was a 3% possibility of losing a craft. That means that 97% of the time you are going to have success. The odds of losing a craft or not being available are 3%.

The other thing is the altitudes and being able to have the sensors on board. This is the proprietary issue that Sierra Nevada has been working on to be able to have that influence on the craft to dip down 10-20,000 feet and go back up or above it. There are some packages that we are looking at.

Rudy Bartel

Sometimes your client can live with that. If you are a civilian providing digital satellite coverage or cell phone coverage over an area, you will lose clients if they do not get good

coverage. Some guy is watching TV and suddenly he loses it. If it happens 3 days out of every 100 days, that is not acceptable. So other solutions have to be considered.

On the military side, 97% success rate would be considered good.

Mike Lawson

Do not think that there is just one airship in that area of concentration. There will be redundancy. As an inexpensive platform, you can have redundancy without spending the billions of dollars that it takes to put a geostationary satellite up. We have looked into using K-Alpha technology to be able to use repeaters off airships the same way that they do with the geostationary satellites when they lose a signal. There are some redundancies in our program.

Question to Rudy Bartel

How large are your airships?

Rudy Bartel

Our particular airships are mainly used for advertising. Basically, we have two different sizes of airships. We do not normally need to carry cargo, but our larger airship does carry 9 passengers. Through Bell Canada, they are very busy taking advantage of that, bringing certain reps on board.

Conference Conclusion and Synopsis

*By: Dr. Allister Hickson
Dr. Barry E. Prentice*

With 5 airship CEOs and significant representation from industries that could use this innovative mode of transport, the third airships conference held in Winnipeg proved to be a resounding success. While the theme of the conference was sustainable northern transportation, an emerging perspective was the potential nearness of airship commercialization and the related potential for Canada.

The conference kicked off with an evening public lecture presented by Dr. James De Laurier of the University of Toronto. Dr. De Laurier discussed orinithopters that are machines that fly by flapping their wings, similar to a bird. Dr. De Laurier took the audience through the history of orinithopters and models that are currently in development.

The first day of the conference opened with the welcoming remarks from the Honourable Ron Lemieux, Minister responsible for the Department of Transportation and Government Services in Manitoba. The morning session focused on environmental changes and the related potential of airships.

Dr. David Hik of the University of Alberta and Henry Hegeveld of Environment Canada took the participants through information on global warming and the effect it will have on the Arctic. With rising temperatures, it is anticipated that there will be a substantial decline in the arctic ice cap over the next 100 years. This will open the Arctic up to additional shipping. As a contrast, Captain Narendra Mathur of Transport Canada presented a picture of current ocean shipping practices in the Arctic.

The focus of the morning shifted south to the boreal forest region of Canada and Manitoba. This is the area running between the arctic tundra and the southern developed zones. The Wildlands League presented information on the effect that transportation by road and rail has on the boreal forest and species such as woodland caribou. This was followed by a presentation on the high costs of transportation into these remote areas, in particular where they are serviced by winter roads. Finally, related health issues for persons inhabiting these areas were discussed. Airships were seen as a possible method to increase service to these remote areas, with less disturbance to the environment.

Dr. Heather Dean presented the luncheon keynote speech that tied together the problems of diabetes in remote First Nations. In particular, bad diets have become associated with early onset of type 2 diabetes amongst adolescents.

The afternoon session focused on technical applications of airships from supporting mining operations to assisting in improving housing stock in remote communities. Abraham Drost of Sabina Resources discussed the issues of moving materials to mining sites in the north. Some of the issues include the large initial costs of developing the necessary road infrastructure for access of various mining sites, shipments of large-sized equipment as well

as the costs of shipping mined materials to market. Drost believed that airships could play a large role in addressing these issues. Manitoba Hydro's Les Reckseidler presented the current methods and concerns of moving large transformers by rail into northern areas. This is particularly important to Manitoba Hydro as the bulk of their hydroelectric capacity is in northern areas. Airships were described as having potential to support both these activities.

This was followed by Hugh Freeman who described the methods used to control forest fires and the potential use of airships. The advantages of airships include the ability to carry a greater amount of fire suppressants and a relatively slow travel speed that allows fire suppressants to be dispersed to the floor of the forest more effectively.

The session in the afternoon also looked at transportation in Alaska. Dr. Oliver Hegepeth of the University of Alaska described the importance of Alaska as a transportation hub to the rest of the world, as well as the unique needs for transport within Alaska. Alaska is currently surveying potential users of airships to assess the market. They are being cautious in their approach, first determining demand and examining barriers that may exist to airship use. The expected benefits for Alaska include reduced environmental effects, lower shipment costs, and improved service. An example application is the pick up and delivery of fresh salmon from the Alaskan fishing fleet.

First Nations housing was the topic of the subsequent speaker. Dale Booth described the significant problem of affordability of First Nations housing. When building products must be airlifted the costs rise dramatically. Airships have potential, provided they can carry sufficient loads, to resolve these problems.

The final presenters of the first afternoon advocated Thompson, Manitoba as a hub for airship deployment, as well as their work in developing cold weather testing capabilities.

Two keynote speakers addressed the banquet. Richard Van Trueren presented the case for using hydrogen as a fuel for airships. He noted the historical precedents and the advantages of ballasting and reduced greenhouse emissions. Ken Young, Assembly of First Nations, provided an overview of the issues that confront aboriginal people as they adjust to mainstream culture in Canada.

After greetings from the Honourable Jim Rondeau, Minister of Industry, Economic Development, and Mines, the second day of the symposium shifted focus on the state of the airship industry and recent technological advances in airship design and construction.

The participants heard presentations from Zeppelin and 21st Airships. Dr. Bernd Sträter of Zeppelin described the airship tourist service in Germany and their plans to build a stretched version that will carry 19 passengers. As a tourist attraction the venture appears to be very popular, being fully booked for the current tourist season. Hakan Colting of 21st Century described the tests of its spherical airship, which has set high altitude records, reaching 22000 plus feet. Plans are to build larger versions pushing the height envelope further, and to undertake a circumglobal flight next year.

After hearing about airships in operation, the final morning session, chaired by Dr. James Lampe, moved to airships that were in design and prototype stages. The focus was hybrids

that take off like an airplane but with additional lift capacity provided by envelopes with helium. Hybrids offer the ability to lift larger shipments over longer distances at relatively fast speeds. They also can operate from relatively short runways. They are a bridge in terms of costs and capacity between the economical but slow transport of goods by large vessels, such as ocean freighters, and the fast but costly shipment of goods by airplane. Dr. Carl von Gablenz provided a background into developments at DELCON, formerly CargoLifter. Robert Rist of Ohio Airships described the early prototype of their product, with a focus on roadless trucking in the arctic. The final speaker, Lou Foltzer III, described the design concepts of the hybrid lifting body being developed by Hybrid Aircraft Corporation.

The afternoon session of the second day opened with Sean McKay of the Composite Innovation Centre who described current and emerging materials technology. Composites can provide higher strength, flexible materials than those that have been traditionally used in airships. The discussion of composites was followed by Lisa Shaw of Micropilot that manufactures remote flight control systems for unmanned aviation vehicles (UAVs). Remote flight controls are designed to provide UAVs with the ability to change course and mission during their flight. Participants could see the potential benefit for such controls used in airships for similar purposes.

The final session focused on the related topic of persistent surveillance. Rudy Bartel of American Blimp Company provided participants with an overview of the American Blimp Company that has more than 20 airships in operation. This is more than 80% of all airships flying worldwide. While chiefly used for advertising and special events, American Blimp has also been engaged in tests of airships for persistent surveillance. Mike Lawson of Techsphere is taking surveillance a step further. A high altitude spherical airship design is being developed to operate remotely for communications and surveillance. An example of the latter is persistent monitoring of the United States border.

The conference ended with Dr. Barry Prentice of the Transport Institute providing an encompassing overview of the discussions that were held. Overall, the conference showed that the airship industry is progressing to develop in a step-by-step manner as companies develop and test their vehicles.

Speaker Biographies

Mayor Bill Comaskey City of Thompson

Mayor Comaskey was born in Ireland and arrived in Canada in 1966 to commence a career in mining. While working in the mining industry, various positions in production, safety and personnel were held. In 1980 he left the mining company and started employment with the Provincial Government as a Mines Inspector.

His political career started in 1989 when he was elected to Thompson City Council. In a 1991 by-election, he was elected to the office of Mayor. In 1992 and 1995 he was re-elected by acclamation. In October 1998 Bill was re-elected for a four-year term, with a 79% majority of the popular vote. In 2002, he was again re-elected to another four-year term.

Together with his wife Pat, they have two grown children, Brenda and David.

When time permits, all kinds of sports are enjoyed such as racquetball, long distance running and especially golf.

Dr. James DeLaurier Professor University of Toronto Institute for Aerospace and Project Ornithopter

Dr. DeLaurier graduated from Stanford University with a PhD. in Aeronautics and Astronautics. He has worked extensively in his field including positions at the NASA Ames Centre during the Apollo Program, McDonnell Aircraft, working on hypersonic-flow calculations, and Sheldahl Corporation, working on scientific balloon designs. In 1974, Dr. DeLaurier joined the University of Toronto Institute for Aerospace Studies.

Dr. DeLaurier has done research on a variety of different topics. Some highlights of these projects are: Lighter-than-air technology (airship and aerostat design), Remotely piloted microwave powered airplanes (the SHARP project), Mechanical flapping wing flight – achieved successful flight with an engine powered remotely piloted flapping wing aircraft (ornithopter) in 1991. There has also been testing of a full-scale engine powered piloted ornithopter since 1996.

The Ornithopter Project has won many awards. Among these are, the Popular Science “Best What’s New” award, the Popular Mechanics “Design and Engineering” award, the Rolex “Spirit of Enterprise” award, and the Canadian Aeronautics and Space Institute “Romeo Vachon” award.

The Honourable Ron Lemieux
Minister, Manitoba
Department of Transportation and Government Services

On November 4, 2003 Premier Gary Doer appointed Ron Lemieux as the new Minister responsible for Transportation and Government Services. Previously, Ron served as the Minister of Culture, Heritage and Tourism, and as the Minister responsible for Sport, as well as Minister of Consumer and Corporate Affairs. From September 25, 2002 to November 3, 2003 he served as the Minister of Education and Youth and as Minister responsible for the voluntary sector. Ron is a member of Treasury Board, the Community and Economic Development Committee of Cabinet, a member of the Healthy Child Committee of Cabinet and the Neighbourhoods Alive Committee of Cabinet.

Ron earned his BA and BEd from the University of Winnipeg. He also completed Post Baccalaureate Certification in Education from the University of Manitoba.

Before becoming an educator Ron worked in sales and also as a recreation director. The Pittsburgh Penguins drafted him and for a time he was a professional hockey player. He was also employed as a provincial civil servant and brings with him an intimate knowledge of how government works.

Ron and his wife Val have lived near Lorette for 27 years. They have two children attending university in Manitoba and one who attends the Lorette Collegiate.

Dr. Terry Dick
University of Manitoba
NSERC Northern Research Chair

Terry Dick is a professor in the Department of Zoology, University of Manitoba and a recent recipient of an NSERC Northern Research Chair in aquatic northern ecosystems dealing with freshwater and marine environments. His research focuses on human interactions with northern environments including conservation biology, ecosystem based management and developing and applying new technologies to assess perturbed and unperturbed environments.

His interest in resource development in the north and the Arctic and the opportunity to see how developments and climate change are affecting the communities has led him to explore other transportation options for the Arctic. Specifically, community access to traditional food sources, the development of new sustainable marine resources, environmental monitoring, and the transportation of people and goods in and out of the Arctic. He is particularly interested in transportation technologies that will allow communities and

resource areas (freshwater, marine, terrestrial), to be accessible throughout the year but at the same time minimize the environmental footprint.

Dr. David Hik
Canadian Research Chair, University of Alberta
Secretariat Canadian International Polar Year 2007-8

David Hik is the Executive Director for the Canadian International Polar Year (IPY) Secretariat as well as a Professor and Canada Research Chair in Northern Ecology in the Department of Biological Sciences at the University of Alberta. His research is primarily focused on the interactions between herbivores and tundra vegetation, and how these relationships may be influenced by climate warming. His current field studies take him to the Yukon, NWT and Svalbard, Norway.

He completed his B.Sc. at Queen's University in 1986, and subsequently graduate studies at Toronto and UBC, and a PhD in with CSIRO in Australia.

Henry G. Hengeveld
Emeritus Associate
Environment Canada

Henry Hengeveld recently retired from the Meteorological Service of Canada (MSC), after 36 years of service. During the last two decades of his career, he served as EC's senior Science Advisor on Climate Change. He continues to have a post-retirement emeritus role with MSC, and regularly makes climate science presentations to a broad range of scientific and lay audiences, including policy makers, industry groups and the general public. He also continues to serve as chair of the Panel of Research and Development (PERD) steering committee for carbon sinks research. He has been actively involved in IPCC science assessment activities since its inception, and in other related international meetings, including those dealing with the development of the UNFCCC and the Kyoto Protocol. Over the years, he has published numerous reports and papers on the science of climate change.

Henry obtained his BSc in Mathematics and Physics in 1968 and his MSc in Meteorology in 1970, both at University of Toronto. Prior to assuming his activities on climate change, he spent more than a decade studying operational methods of monitoring sea ice using remote sensing.

Narendra Mathur
Manager, Marine Safety
Transport Canada

Narendra Mathur is a Master Mariner with command experience on large commercial sea going ships. He has been sailing around the world taking the world's commerce on General cargo ships, Multi Purpose Ships, Oil-Bulk & ore Carriers and dedicated very large Bulk carriers. He was in command of these ships from 1982 -1988 when he decided to come ashore in 1998 and dedicate himself to working on the commercial side of International shipping and charter party operations

He was a lecturer and an Examiner of Master and Mates at the Maritime Academy of Malaysia from 1990 - 1996. During his stay in the Maritime Academy, he completed his Diploma in Business Management and acquired the memberships of the prestigious Institute of Chartered Ship-Brokers in the UK and equally prestigious The Chartered Institute of Transport in UK. He is the recipient of the "UK Chamber of Shipping Award" for writing the best papers in the Commonwealth countries on Maritime Transport Management, a award for which he was invited to London, UK to receive the award from HRH Princess Royal.

He migrated to Canada in 1996 and now works as the Manager for Prairie and Northern Region (PNR) of Transport Canada - Marine Safety responsible for all safety and oil pollution related issues on the waters within PNR.

Anna Baggio
Director of Conservation Land Use Planning
Wildlands League

Anna is currently the Director of Conservation Land Use Planning for the Wildlands League, a chapter of the Canadian Parks and Wilderness Society. She completed an undergraduate degree in Biology from McMaster University and a M.E.S from York University's Faculty of Environmental Studies. Her passion for conservation was sparked at Georgian Bay Islands National Park in Ontario where she studied spotted turtles and other reptiles and amphibians.

For her Master's research, she worked with communities outside two small-protected areas in Southern Costa Rica, examining land use and the possibility of designing and implementing ecologically sustainable practices in agriculture. Currently she sits on the Protected Areas Working Group of the Northern Boreal Initiative and the Ontario Advisory Committee for Woodland Caribou (a species at risk in Ontario and in Canada).

Brian Gudmundson
Manitoba Aboriginal and Northern Affairs
Commission on the Costs of Food

Brian Gudmundson, MSW, serves as a senior policy analyst for Aboriginal and Northern Affairs Manitoba. Brian has worked with First Nation and Métis organizations in Manitoba to further development of First Nations' self government, off reserve child welfare governance for First Nations and Métis residents as well as First Nations health care revitalization (involving all First Nations and Canada).

Brian has worked for the Manitoba Government for 30 years, focused upon health and social service needs. Recently, Brian served as a member on the Joint Northern Foods Prices Report. Subsequently, the Manitoba Government launched the Northern Healthy Foods Initiative. Today's presentation links Northern food security issues to the potential capacities of Airships. Aboriginal and Northern Affairs Manitoba has supported "Airships to the Arctic" Conferences for 3 years.

Wendy Whalley, RN, BN, MPA
Island Lake Renal Health Program

Wendy Whalley is currently Program Manager of the Island Lake Renal Health Program located in Garden Hill, Manitoba. Wendy's previous experience working for the WRHA and fourteen years in dialysis at the Health Sciences Centre as a dialysis nurse, educator, and manager were instrumental in preparing her to take on this challenging new program.

She received her BN and Masters of Public Administration from the University of Manitoba.

Dr. Heather Dean
Head, Pediatric Endocrinology
Department of Pediatrics and Child Health
University of Manitoba

Dr. Heather Dean graduated in Medicine from Queen's University in 1975, and pursued her Pediatrics training in Montreal and Ottawa from 1975-1978. She completed her Pediatric Endocrinology training in Winnipeg with the MRC Fellowship from 1978-1982. In 1982, she received her GFT Faculty appointment at the University of Manitoba.

Dr. Dean is involved in many different clinical activities including consulting for Pediatric Endocrinology at the Winnipeg Children's Hospital, serving as a medical director for

Manitoba Diabetes Education Resource for Children and Adolescents (Winnipeg), and serving as a Pediatric Medical Advisor for Manitoba Diabetes and Chronic Diseases Unit

(Manitoba Health). Dr. Dean is also a consultant on numerous provincial, national and international diabetes advisory committees regarding care of children with Type 1 and Type 2 diabetes. As well as involvement with clinical activities, Dr. Dean also pursues many different research activities, which focus on Type 2 diabetes in youth, and screening and prevention in international multicentre studies of Type 1 diabetes.

Dr. Dean's research and work has garnered her many awards and achievements, which include the 2000 Charles H Best Award (Canadian Diabetes Association), the 2001 Distinguished Service Award (Canadian Society of Endocrinology and Metabolism) and the 2003 YM-YWCA Woman of Distinction in Science and Technology Award (Winnipeg). She is currently a Professor of Pediatrics and Child Health at the University of Manitoba and the Section Head for Pediatric Endocrinology at the University of Manitoba.

Jim Thomson, CA
President
Mercatus Ventures

Jim Thomson is a Business Development Consultant specializing in transportation and energy related projects. He has consulted in the areas of new project development, business planning, safety risk and compliance management, trading systems, market assessments, third-party logistics, transportation planning and acquisitions. He also has experience with business processes and technology applications. For the past several years he has been actively involved in the development of a commercial airship industry and has co-authored research papers that address how airships can help solve many energy and northern re-supply transportation related issues.

Jim is a Chartered Accountant and has worked in several business development roles for both transportation and energy companies. He developed an electronic trading system for natural gas that pre-dated today's e-commerce. In a more traditional Chartered Accounting role, Jim served as a Controller for real estate companies and was a public practitioner in the audit, tax and insolvency sectors.

Abraham Drost
President
Sabina Resources

Mr. Drost earned his Bachelor's Degree in Earth Sciences from the University of Waterloo in 1984. He earned his Master of Science degree in Mineral Exploration from Queen's University in 1987, with readings in Ore Reserve Estimation and Mineral Economics. A

professional geologist and seasoned explorationist, Mr. Drost has 20 years of varied experience in the Canadian mining industry with a proven record of exploration success. Most recently with the Ontario Geological Survey, Mr. Drost developed considerable expertise in mineral development and land use issues which will serve the Company well in

its goal of increasing shareholder value by advancing the Company's existing portfolio of properties to production and continuing to acquire significant advanced stage exploration projects.

Les Recksiedler
HVDC Engineering Manager
Manitoba Hydro

Les Recksiedler graduated from the University of Manitoba with a degree in Electrical Engineering in 1971 and obtained a Certificate in Management (Gold Medal Award) in 1985. He is presently the Manager of the HVDC Engineering Department in Manitoba Hydro. He first got involved with the transportation of transformers and other large pieces of equipment in 1987 and the challenges never seem to stop. Les firmly believes in one of Murphy's Laws: "If something can go wrong; it will go wrong given enough time."

Hugh Freeman
Consultant
B.C. Forest Service (Retired)

Hugh was with the British Columbia Ministry of Forests for 34 years, primarily in the Wildland Fire Control and Aviation program and to a lesser degree, the Forest Health and Forest Management program. Since retirement Hugh has been working as a consultant in the forest, forest protection and aviation sector.

Hugh has completed consulting projects for various fire agencies including BC, Alberta, Saskatchewan, Quebec, California, Yukon and Northwest Territories. Hugh has undertaken projects for several aviation companies including Thrush Aircraft, Basler Turbo Conversions and the Firebirds. Hugh sees airships as an opportunity to improve wild land fire control.

Henry Lasslo
Executive Director
Iso-Polar Airship Inc.

During a career spanning nearly forty years, Henry has been extensively involved in Transportation and Logistics from both carrier and shipper standpoints. He has held various

positions in retail distribution, heavy industry, freight forwarding, customs brokerage and freight costing.

Since joining SAAN Stores in 1980, he has been influential in the development of in-house distribution channels supporting time defined movement of merchandise to stores located throughout Canada and has been extensively involved with import and trade finance.

He has received a certificate in logistics from the University of Manitoba, is a graduate member of the Canadian Institute of Traffic and Transportation, has been awarded membership in the Canadian Institute of Logistics and Transport in North America and is an accredited member of the Canadian Professional Logistics Institute.

Henry teaches professionally in the field, and is a sessional instructor in Freight Forwarding at the University of Manitoba Transport Institute.

Dr. Oliver Hedgepeth
Chair, Logistics Department
University of Alaska, Anchorage

Oliver Hedgepeth received his Ph.D. in Engineering Management from Old Dominion University, Norfolk, VA. His educational background includes degrees in chemistry, mathematics, engineering management, and graduate work in nuclear science and engineering. Currently, Oliver teaches at the University of Alaska Anchorage. His workload includes graduate and undergraduate courses in such topics as supply chain measurement, global logistics management, materials management, transportation management, complexity in logistics, native logistics, SAP logistics, automatic-identification and supply chains, knowledge management and seafood supply chain management. He has taught university courses in Finland and Russia. He has been the Chair of the Logistics Department in the College of Business and Public Policy at the University of Alaska Anchorage since 2002.

Dr. Hedgepeth's research is in the use of radio frequency identification or RFID, which he has been conducting for three years at UAA, in conjunction with Alien Technologies. His research includes developing a logistics test bed demonstration for the Department of Defense on net-centric systems based on the use of RFID technology, as well as research in the Russian Far East as part of a Department of Labor grant. He has spent three years teaching Russian oil and gas engineering, construction engineers and academics in methods of Western project management and in logistics management. This research is ongoing today.

Before becoming a teacher at UAA in 2001, Oliver was a principal investigator for GRCI (later merged with AT&T) for a period of five years. Prior to that, he was an operations research analyst for the U.S. Army Training and Doctrine Command for more than 28 years. During that time he held such positions as Senior Scientist for Mr. Walt Hollis, the Deputy Under Secretary of the Army for Operations Research; was Chief of the TRADOC Research

Office, Chief of the Artificial Intelligence Center for Army Logistics, and Principal Science Advisor in the Army Models Management Office.

He has published approximately 200 articles and technical papers and 100 conference presentations from 1970 to the present, was a Department Editor of the *Phalanx*, professional operations research magazine during the 1990s for 10 years, and has published book reviews for *Science Books & Films*, AAAS, from 1984 to the present.

Oliver lives in Anchorage, Alaska, with his wife, Elizabeth, a retired newspaper editor. They spend their summers in Norfolk, Virginia on the shores of the Chesapeake Bay, and visit with their two children and four grandchildren, teaching the younger generation sailing.

Dale C. Booth
Special Advisor for Economic Policy
Private-Public Partnerships
Indian and Northern Affairs

Dale Booth is a bilingual results driven First Nations' business and economic development expert with more than 12 years experience. Known as a visionary leader, who was identified for promotions within every organization he has worked, with special and tested talents for shaping productive and cooperative working environments, eliminating deficits and creating a successful corporate vision for the future. Dale is an Anishinabe from Whitefish Bay First Nation in Northwestern Ontario.

As a Special Advisor on Economic Policy, Public-Private Partnerships Initiative, Dale has Planned, developed and lead the execution of the department's Private Public Partnership initiative within the Socio- Economic Policies and Programs (SEPP) sector. He has interacted and lead teams of HQ and Regional INAC personnel and First Nations to implement a strategy that would see the introduction of new sources of revenue, risk sharing and technical expertise from the private sector that can be used to facilitate the building of badly needed infrastructure in First Nations communities.

Previously, Dale has taken on the position of Acting Chief Executive Officer (Assembly of First Nations), Director Of Economic Development. In this capacity, he occupied the most senior non-political administrative position in the organization, having the operational responsibility for 18 Directors reporting directly to the A/CEO with a full organizational compliment of 158 personnel with financial responsibility of an annual budget of \$32.8M. The A/CEO was responsible to the Board of Directors of the AFN for the coordination of all business lines of the AFN. The CEO is responsible for the fulfilment of all planning, growth and development of the AFN, as set by the Board. The CEO was also responsible for the development and implementation of all corporate policies and procedures to ensure the on-going success of the AFN administration. The CEO was also responsible for the overall growth and sustainability of the AFN including both human and financial resources.

Dale Booth is married to Karen and has three children Erika, Dasan and Brenna; they live in Barrhaven.

Bruce Krentz
General Manager
Thompson Community Development Corporation

The Thompson Community Development Corporation is a new organization dedicated to business development in Thompson, Manitoba and to enhancing the community. Bruce comes to the Thompson Community Development Corporation via the Norman Regional Development Corporation and The City of Thompson Recreation Department. Bruce grew up in Thompson and is very involved in the Community.

Rick White
President
Thompson Community Development Corporation

Rick is the volunteer president of the Thompson Community Development Corporation. Rick is the owner of the Thompson McMunn and Yated Do-It Center. He is a long time resident and very involved in a broad range of community projects.

The Honourable Jim Rondeau
Minister, Manitoba
Department of Industry, Economic Development and Mines

Jim was first elected as the MLA for Assiniboia in the 1999 Manitoba election. He was appointed Legislative Assistant to the Deputy Premier and Minister of Intergovernmental Affairs in 2002. Jim has served as a member of the Legislative Review Committee, as well as on the Graduated Drivers License, Disability White Paper and Provincial Budget Hearing task forces. He was also instrumental in the introduction and passage of The Canadian Forces Personnel Act, which improved the rights and benefits of military personnel moving into Manitoba.

Prior to entering politics, Jim had an extensive career in education. He graduated from John Taylor Collegiate and earned his Bachelor of Education degree from the University of Winnipeg, and completed post-baccalaureate studies at the University of Manitoba. He has taught at schools in Norway House and Cranberry Portage, and was a seminar and school experience instructor at the University of Winnipeg. He later became the Adult/Work Education Coordinator for the Frontier School Division, where he played a leading role in establishing 18 adult learning centres and libraries throughout the province. Jim also developed an award-winning school-to-work transition program for young people from

northern Manitoba. Jim's work as an educator, at all levels within the public schools system, reflects his dedication to life-long learning throughout Manitoba.

Jim has always been a willing and committed community volunteer. While living in northern Manitoba he served on the Cranberry Portage Ambulance Service; later, he was involved with the St. John Ambulance Volunteer Services. He has coached numerous volleyball and badminton teams to zone and provincial awards, and sat on the boards of directors of Literacy Partners of Manitoba. He is also a proud member of the Assiniboia Optimist Club, and regularly works with community clubs, parent councils, seniors groups, military organizations and other community initiatives.

Richard Van Treuren **Airship Historian and Author**

Richard G. Van Treuren has been a Space Shuttle teammate for the past quarter-century as an Astronaut Crew Changeout Technician, but his passion is Lighter-Than-Air. He has produced videos and published books about airship history; during the past year Van Treuren and his associates have published the long lost expose on US Navy Airships by Charles Rosendahl, "SNAFU," and a collection of memoirs, "THE AIRSHIP EXPERIENCE." Currently working on two books about airships in WWII, he serves as Chair, History Committee, Naval Airship Association. Van Treuren is working to produce an English version of the DGLR airship technical book, and continues to be an outspoken advocate of hydrogen fuel for airships."

Dr. Bernd Sträter (Diplom-Ingenieur) **President and Executive Director** **Zeppelin**

Dr. Sträter is currently the managing director of Zeppelin Luftschifftechnik GmbH and Deutsche Zeppelin-Reederei GmbH.

He has held previous positions as the Managing Director of Dornier Luftfahrt GmbH and was responsible for engineering. As well, Dr. Sträter was the Managing Director of the international space company Eurocolumbus and the Manager of the Profit Centre "Daimler Benz Airport Systems." Before becoming Managing Director at Zeppelin, Dr. Sträter was the head of the military aircraft program "Mako" in the EADS division "Military Aircrafts."

Dr. Sträter is married with two children.

Hokan Colting
CEO
21st Century Airships Inc.

Since 1988, Hokan Colting has been operating 21st Century Airships Inc., a research and development company for airship technologies that focuses entirely on airships and their applications. He has patented many of his inventions for airships; including the enabling technology for spherical airships.

Hokan holds 9 altitude world records, including the absolute world record set in 2003, for airships. In 2004, he was the recipient of the prestigious Santos Dumont Gold Airship Medal and FAI's Henry de la Vaulx Medal.

Professor James E. Lampe Jr.
Department of Aviation Technology
Purdue University

Professor Lampe is the Assistant Director of the College of Technology at Purdue University in Indianapolis, Indiana. He is a seasoned airline professional with 40 years experience in line, and headquarters positions. He has been employed with major, national, and integrated cargo carriers, and has held senior positions in marketing, planning flight and ground operations.

Professor Lampe graduated from the University of Miami in 1965 with a Bachelor of Business Administration. In 1996, he completed his Masters of Aeronautical Science from Emory-Riddle Aeronautical University. His professional experience includes serving in the United States Air force from 1954-1958, working at Pan American Airways from 1958-1984, serving with Emery WorldWide Airlines from 1984-1992 and American Trans Air from 1996-1998. Professor Lampe has been an Assistant Professor at Purdue University since 1999.

Research interests include, Transportation of Hazardous Materials, Human Factors, and Airline Marketing and Management. Professor Lampe is also affiliated with the American Society of Engineering Education.

Dr. Carl von Gablenz
President
Delcon (Formerly CargoLifter)

Dr. Carl von Gablenz studied Law at the Frankfurt University and completed his PhD in law in Munich. He started his business carrier with the Bavarian Hypo Bank as Director in

finance for large and medium sized companies. As a member of the board he was responsible for business administration, including logistics of one of the leading German machine tool companies. In 1992, he went to the University of North Carolina at Chapel Hill as a visiting research professor in logistics.

As a result of his studies, he developed the concept of a global logistics infrastructure network, including a new transportation vehicle, known as the "CargoLifter". In 1996 he formed CargoLifter AG and led the project as CEO from the beginning onwards. Following the crash of the international capital markets, CargoLifter went insolvent in spring 2002. Dr. von Gablenz is still a member of the supervisory board of CargoLifter. Known as an "innovator" in Germany he is consulting technology start-ups and is restarting Lighter-Than-Air activities on a broader scale.

Robert Rist
President
Ohio Airships Inc.

Robert Rist age 44 grew up in the farm country of northwestern Ohio and graduated from Tulsa Oklahoma's Spartan School of Aeronautics in Tulsa in 1982. As a child, he dreamed of working in the aerospace industry, but did not anticipate playing such a potentially large role.

In 1983, Rist worked in the TVRO Satellite Communication Industry as a technician, and then became manager of a distributor, which produced over \$3 million in sales. He is an accomplished project manager, including the design, integration, and installation of commercial satellite systems. During his tenure at Mount Union College, he managed all of the college's electronic systems and significantly contributed to Mount Union's ranking as one of the Nation's "Most Wired Colleges" (US News and World Report. In his spare time, Robert built remote-controlled planes from kits with his son, Rob. Rob will be entering commercial flight school this fall.

Rist met his business partner, Brian Martin, who was also a Mount Union employee. During their daily lunchtime pursuit to find the "Next Big Thing", Robert conceived the Dynalifter hybrid aircraft concept, while Martin envisioned the market opportunities for such a vehicle. Since then, the two formed Ohio Airships, Inc., an aerospace startup company that has produced practical designs for four scales of Dynalifters, has briefed the Pentagon on 8 separate occasions, and is now completing fabrication of the two-seat, Dynalifter-1

prototype. Rist and Martin's combined talents offer a unique management style that consists of one part inventor, one part visionary, and one part entrepreneur. The two agree that Dynalifter technology is not "rocket science", and that for every step of the development process, there are plenty of talented companies and individuals who need the work. Their primary job has been to merge these people with financiers to achieve their visions.

Rist and Martin's ultimate vision is "To reduce global suffering through the implementation of affordable, innovative transportation systems".

Lou Foltzer III (Cdr Retired USN)
President
Hybrid Aircraft Corporation

Mr. Foltzer is President and principle owner of the Hybrid Aircraft Corporation, headquartered in New Mexico, located near Albuquerque. The company was founded in July of 2003 to provide engineering and consultancy services in support of Hybrid aircraft design and developments. The company is focused on commercial Hybrid Aircraft developments and subcontracturally supports aerospace and governmental interests. Mr. Foltzer is a native of Baltimore, Maryland and a permanent resident of New Mexico.

Mr. Foltzer was previously President, SkyCat Technologies Inc. from 1999 – 2002 until the company was abandoned by its UK owners due to a downturn of civil aviation investments. During this time Mr. Foltzer was responsible for assembling a world-class engineering team and advancing the hybrid aircraft business and analytical studies leading to the SkyCat 1000, and eventually the thirty-ton hybrid aircraft conceptual definitions (these same cardinal design points, now form the basis of the DARPA “Walrus” program).

From 1996-1999 Foltzer was senior project manager for the famed Lockheed Martin Skunk Works located in Palmdale, California Palmdale California, where for four years (1996 – 1999), he worked for Lockheed Martin as a Senior Project Manager in the Advanced Development Projects Directorate where he was responsible for creating new business concepts and prospects and nurturing their development. In this regard he supported or helped inspire projects such as the X-33 space shuttle replacement program, Lockheed Martin’s 21st Century long-range technology development prospectus, Aerocraft, Bridge-to-Space, Very High Speed Ground Transportation analysis, and various Unmanned Aerial Vehicle studies.

Mr. Foltzer was Vice President Sales Western Region of Westinghouse Electronic Systems Division and, earlier in his career, the executive assistant to the General Manager of the Airborne Surveillance Division. Having authored several aircraft radar development concepts and promoting and establishing the Westinghouse Airships Company, Mr. Foltzer’s AEW expertise was a key-enabling ingredient that facilitated Westinghouse’s successful bid against Boeing and Goodyear in the Navy’s program. Additionally he continually authored numerous technical white papers and operational concepts for the Department of Defense and other agencies.

Commander Foltzer's military career spanned twenty years. His military specialty was aviation programs and operational tactics. His acknowledged expertise by both services resulted in his assignment as the project manager of the Navy's Integrated Tactical Surveillance System, a multi-billion dollar investment in command, control communications,

global alertment, surveillance and targeting. A digital and avionics systems expert, he was assigned to many maintenance and developmental organizations throughout his Navy Career leading to command at sea of VAW-125, the Navy's finest operational E2 squadron with many noteworthy "firsts".

Todd Schwartz
Consul and Principal Officer
U.S. Consulate

Todd Schwartz arrived in Winnipeg, Manitoba on June 9, 2003, to take up the post of Consul and Principal Officer at the U.S. Consulate. As such, he is responsible to explain and advance the interests of the United States to the residents of Manitoba, and to report their views and issues to the U.S. Embassy in Ottawa and to Washington. His expected tour of duty is three years.

Mr. Schwartz joined the State Department in 1987, and has served overseas in Kuwait, the Philippines, Tunisia, Qatar, Saudi Arabia, as well as working at the State Department in Washington. He has received several awards, including a Meritorious Honor Award for his service in Kuwait during 2003 war with Iraq. He speaks Arabic and German.

He is a graduate of Miami University in Oxford, Ohio, and received his B.S. Degree in Business Economics in 1986. He is married to the former Nancy Dye Sunderland, and they have four children (Christopher, David, John, and Marian).

Sean McKay, P.Eng
Executive Director
Composite Innovation Centre

As Executive Director of the Composites Innovation Centre, Sean McKay is responsible for all of its administrative and technical operations. He brings over 25 years of composite industrial experience to the organization, having worked to develop numerous composite products and processes in many business sectors including aerospace, ground transportation and civil infrastructure. Previous positions held include President of Base Composite Technologies Inc., Vice-President of Engineering & Quality at Acetek Composites Inc., Manager of Engineering at Boeing Canada Technology Winnipeg Division, Manager of Research and Design at EDO Canada Limited, and various other engineering positions held

with Boeing Canada and British Aerospace Limited PLC. Sean has a Bachelor of Science degree in Civil Engineering from the University of Salford, England and is a member of the Association of Professional Engineers and Geoscientists of the Province of Manitoba

Lisa Shaw
Director of Communications
MicroPilot

In November 2002, Lisa Shaw joined MicroPilot as Director of Communications. As the company experienced tremendous growth, Lisa was responsible for establishing and developing a corporate presence in North America and abroad. Lisa has a BA (1989) from the University of Winnipeg. In addition, Lisa has recently been appointed to oversee CropCam a new division of MicroPilot. The CropCam is a mini agricultural plane designed to take geo referenced digital images of crops for precision agriculture.

Ian Glenn
Chairman
ING Engineering Inc.

Ian Glenn's education ranges from an undergrad in mechanical engineering from RMC, graduate studies in tank design in the UK, Army Command and Staff College, to a Masters of Science in Electrical Engineering from the US Naval Postgraduate School.

Throughout his early military career, Ian enjoyed the privilege of commanding tank and reconnaissance troops in Europe and Canada prior to returning to engineering at the end of the Cold War. As a RCEME officer, he managed a wide range of the Army's complex systems, including radar, electro-optic, electronic warfare, and intelligence systems – the most stimulating of which was the long standing Army UAV project. He played a significant role in advancing the recently adopted NATO interoperability standard for UAV systems - STANAG 4586. Before retiring from active service, Ian was the principle architect of the Canadian Army's Intelligence, Surveillance, Target Acquisition and Surveillance (ISTAR) capability.

Ian Glenn is chairman of ING Engineering Inc., a consultancy focused on pioneering Capability Engineering for C4ISR within National Defense. A recent assignment for Ian was as the Operational Architect for the CF Joint Information and Intelligence Fusion Capability.

In addition to being very active in Ottawa's high-tech community, in 2003, he founded UVS Canada, the all-volunteer national non-profit association representing both public and private innovation in unmanned vehicle systems. Ian is serving as UVS Canada's first president.

Rudy Bartel
Vice President
American Blimp Company

Mr. Bartel has twenty-five years engineering and management experience in the aviation industry.

After graduating from the Southern Alberta Institute of Technology, in Calgary, he worked for several years in the Experimental Department at Bombardier Canadair Ltd. in Montreal. He then became program manager of eleven different flight test programs at Kohlman Systems Research in Kansas.

His last fifteen years have been in the Lighter-Than-Air industry. As Engineering Manager at American Blimp Corporation he was responsible for the design of five airship models and achieved type certification in nine countries including Canada.

In 1990 the US Federal Aviation Administration appointed Mr. Bartel a Designated Engineering Representative, authorizing him to approve data on behalf of the FAA. He is also currently on the FAA Aviation Rulemaking Committee, tasked with incorporating airship operations into the operating regulations of FAA Part 61/65/91/125/135.

Mr. Bartel obtained his Aeronautical Engineering Diploma from the Southern Alberta Institute of Technology and his B.S. Aerospace Engineering from the University of Kansas.

Mike Lawson
President
Techsphere

Mr. Lawson has been involved with the international aerospace community for 15 years. In 1989, Mr. Lawson founded Space Marketing, Inc., which successfully worked with the NASA and Russian Space Agency on commercialization of space program initiatives. SMI was responsible for creating a national promotion for Pepsi-Cola Company in a 1990 "Take Flight with Ideas" campaign with NASA. Mr. Lawson also participated in President George Bush's Outreach Program to evaluate the return to the Moon and ultimately a manned landing on Mars. Mr. Lawson was involved with the Lunar Prospector project that landed on the Moon in mid 1997. In 1992 Mr. Lawson's company created two International Space Exhibits, a Space Station Tour with NASA exhibits and a full scale Lunar Habitat. The two exhibits toured 50 cities throughout the United States and Canada and was visited by more than 20 million people between 1992 and 1996. Mr. Lawson was responsible for executing a contract with Pepsi-Cola to film the first commercial in space outside the Mir Space Station. Pepsi and Mr. Lawson's success led to other promotional space campaigns with corporations such as Frito-Lay and MTV.

Dr. Barry E. Prentice
Director
Transport Institute

Barry E. Prentice is the Director of the Transport Institute and a Professor in the I.H. Asper School of Business. His major research and teaching interests are logistics, transportation economics, urban transportation, and economic development and trade policy.

Dr. Prentice has authored or co-authored more than 150 research reports, journal articles and contributions to books. His scholarly work has been recognized for excellence in national paper competitions and awards. In 1999, National Transportation Week named him Manitoba Transportation Person of the Year

Dr. Prentice has served on the Boards of Directors of several transportation organizations: Winnipeg Airports Authority, Inc.(1994-2002), National Transportation Week (Canadian President, 2001 and 2003), and the Canadian Transportation Research Forum (Past President, 1997). He is Associate Editor of the *Journal of Transportation Research Forum*, and *Honourary President* of the Canadian Institute for Traffic and Transportation (2001-3). In addition, Dr. Prentice has served Winnipeg TransPlan 2010, the Mid-Continent International Trade Corridor Task Force and expert committees. In 1999, he received a University of Manitoba Outreach Award.

2005 Participants

Speakers (in order of appearance)

Dr. Barry Prentice
Mayor Bill Comaskey
Dr. James De Laurier

Transport Institute
City of Thompson
University of Toronto

Hon. Ron Lemieu

Manitoba Transportation and
Government Services

Dr. Terry Dick

NSERC Northern Research Chair

Dr. David Hik

Canada Research Chair;
University of Alberta

Henry Hengeveld

Environment Canada

Narendra Mathur

Transport Canada

Graham Starmer

Manitoba Chamber of Commerce

Anna Baggio

Conservation, Land Use

Planning Wildlands League

Brian Gudmundson

Manitoba Aboriginal and Northern Affairs

Wendy Whalley

Island Lake Renal Health Program

Dr. Heather Dean

University of Manitoba

Jim Thomson

Mercatus Ventures

Abraham Drost

Sabina Resources Ltd.

Les Recksiedler

Manitoba Hydro

Hugh Freeman

Fire Tech Management Ltd.

Henry Lasslo

Iso-Polar Airship Inc.

Dr. Oliver Hedgepeth

University of Anchorage Alaska;

Logistics Dept.

Dale C. Booth

Indian and Northern Affairs

Bruce Krentz

Rick White

Richard Van 'Treuren

Hon. Jim Rondeau

Dr. Bernd Sträter

Hokan Colting

Prof. James E. Lampe

Dr. Carl von Gablenz

Robert Rist

Lou Foltzer III

Todd Schwartz

Sean MacKay

Lisa Shaw

Ian Glenn

Rudy Bartel

Mike Lawson

Thompson Community Development
Corporation

Thompson Community Development
Corporation

Airship Historian

Manitoba Industry, Economic Development
and Mines

Zeppelin Luftschifftechnik GmbH

21st Century Airships Inc.

Purdue University

DELCON

Ohio Airships Inc.

Hybrid Aircraft Corp.

U.S. Consulate

Composite Innovation Centre

MicroPilot

Unmanned Vehicle Systems Canada

American Blimp Co.

Techsphere

Participants

Norbert Alvater	Alvater Law Office
Mrs. Norbert Alvater	
Grant Anderson	Manitoba Metis Federation
Michael Anderson	Manitoba Keewatinowi Okimakanak Inc.
Major Trevor Antifave	Air Force Strategic Planning Canadian Forces
Pat Atkinson	Transport Canada
Hart Berger	
Jeff Betker	Manitoba Metis Federation
Dr. Bob Boyd	Lockheed Martin
Eleanor Brockington	Manitoba Aboriginal and Northern Affairs
Amar Chadha	Manitoba Transportation and Government Services
Graham Chandler	Free Lance Author
Steve Clarke	Keewatinowi Okimakanak Inc.
Ken Claudel	The Northwest Company
Gil F. Costin	Millennium Airships Inc.
Rich Danis	Manitoba Transportation and Government Services
Mark Dourn	Manitoba Aboriginal and Northern Affairs
Dave Duncan	Manitoba Transportation and Government Services
Gord Earl	Wasaya Airways LP
Dillon Fast	Fast Air

David Faurschou
Tim Feduniw
James Fergusson
Glenn Flett

MLA Portage La Prairie
Destination Winnipeg
Centre for Defence and Security Studies
Northern Association of
Community Councils

Brian Gudmundson

Manitoba Aboriginal and Northern Affairs

Mrs. Oliver Hedgepeth
Steven Hogan

Transport Canada

Crystal Isaacs

University of Manitoba
Transport Information Group

Steve James

I.H. Asper School of Business

Robert Kadas
Tom Kam
Don Kuryk

Foreign Affairs Canada
Wasaya Group of Companies
Manitoba Transportation and
Government Services

Arthur Landry
Chris Legrange

Arnif Construction
Standard Aero

Larry Maguire
Don Mahnke
Bruce Macleod
Bill McDonald
Lucille McLaughlin

MLA Arthur Virden
2000675 Ontario Ltd.
Winnipeg Airport Lands Corporation
Office of Anita Neville
Manitoba Transportation and
Government Services
Manitoba Keewatinowi Okiumakanak Inc.

Phillip Michelle

Gordon Morris
Trevor Mueller

Wasaya Group Inc.

Patterk Nester
Bud Norris

Legislative Assembly of Nunavut
Sirron Ltd.

Major Alain Paquet
Gerry Pasloski
Thomas Pflasterer
Dean Polchies

Department of National Defence
Manitoba Hydro

Assembly of First Nations

Stanley Sainnawap
Mike Shumsky
Robert Sinclair
Lloyd Snelgrove
John Spacek

Wasaya Group of Companies
Transport Canada
Principal Oil and Gas
MLA, Government of Alberta
Manitoba Transportation and
Government Services

Mary Ellen Thomas
Gordon Tufts

Wasaya Airways LP
Manitoba Transportation and
Government Services

Karen Wohlgemuth
Greg Wood

Southport Aerospace
Northern Association of
Community Councils

Lawrence Woolley
Eric Wright
Mrs. Eric Wright
Dario Valdivia

Green and White Yard Care
Hybrid Aircraft Corp.

WESTAC

UMTI STAFF

Kathy Chmelnitzki

Sharon Cohen

Doug Duncan

Allister Hickson

Gene Morales

Al Phillips

Dr. Barry Prentice

Matt Seguire

Christy Sokol

Conference Agenda



AIRSHIPS TO THE ARCTIC III



Sustainable Northern Transportation

Hotel Fort Garry, Winnipeg, MB

May 31-June 2, 2005

In honour of Norman J. Mayer, Airship Engineer, Goodyear (retired)

Tuesday May 31, 2005

A2A3 Public Lecture and Reception

Chair **Dr. Barry E. Prentice**, University of Manitoba

7:30-9:30 pm
Welcome
His Worship Mayor Bill Comaskey
City of Thompson

Ornithopters: History and Future

Dr. James De Laurier
Professor,
University of Toronto Institute for Aerospace
and Project Ornithopter Inc.

Wednesday June 01, 2005

Chair **Dr. Barry E. Prentice**, University of Manitoba

8:30-8:35 a.m.
Welcome
The Honourable Ron Lemieux,
Minister, Manitoba
Department of Transportation and Government Services

Session 1: *Environmental Change and Arctic Research*

8:35-10:00 a.m.
Session Moderator **Dr. Terry Dick**
University of Manitoba
NSERC Northern Research Chair

Research in the Arctic

Dr. David Hik

Canadian Research Chair
University of Alberta and
Secretariat Canadian International Polar Year 2007-8

The Arctic's Changing Climate

Henry Hengeveld,

Emeritus Associate
Environment Canada

Northern Sealift

Narendra Mathur

Manager, Marine Safety
Transport Canada

10:00-10:30 a.m. **Coffee**

Session 2: *Environment of the Boreal Forest and Remote Communities*

10:30-12:00 a.m.

Session Moderator

Graham Starmer

President
The Manitoba Chamber of Commerce

Roads in the Boreal Forest

Anna Baggio

Director, Conservation Land Use Planning
Wildlands League

Northern Food Costs

Brian Gudmundson

Manitoba Aboriginal and Northern Affairs
Commission on the Cost of Food

Developing a Renal Health Program: Prevention and Treatment Closer to Home

Wendy Whalley, RN, BN.

Island Lake Renal Health Program

12:00-1:30 p.m.

Lunch Keynote Speaker

Dr. Heather Dean

Head, Section of Pediatric Endocrinology
Department of Pediatrics & Child Health
University of Manitoba

Session 3: *Logistics Challenges in Remote Areas*

1:30-3:00 p.m.

Session Moderator **Jim Thomson**
President
Mercatus Ventures

Mining Logistics in the Arctic

Abraham Drost
President
Sabina Resources Ltd.

Oversized Freight Logistics

Les Recksiedler
HVDC Engineering Manager
Manitoba Hydro

Airships in Wildland Fire Suppression

Hugh Freeman
Consultant
B.C. Forest Service (Retired)

3:00-3:30 p.m. **Coffee**

Session 4: *Transportation Needs in Remote Markets*

3:30-5:00 p.m.

Session Moderator **Henry Lasslo**
Executive Director
Iso-Polar Airship Inc.

Alaska's Transportation Requirements

Dr. Oliver Hedgepeth
Chair, Logistics Department
University of Alaska Anchorage

Transformative Changes in First Nations Housing: "Getting Ready to Support the Build"

Dale C. Booth
Special Advisor for Economic Policy
Private-Public Partnerships
Indian and Northern Affairs

Cold Weather Testing Centre

Bruce Krentz
General Manager
Thompson Community Development Corporation and
Rick White
President
Thompson Community Development Corporation

A2A3 Symposium Banquet

Reception 5:15pm

Dinner 6:30 p.m.

Keynote Speakers

Richard Van Treuren
“The Hydrogen Fuel Airship”

Mr. Ken Young
AFN Regional Vice Chief

Thursday June 02, 2005

Chair	Dr. Barry E. Prentice, University of Manitoba
8:30-8:35 a.m.	Welcome The Honourable Jim Rondeau Minister, Manitoba Department of Industry, Economic Development and Mines

Session 1: *Airship Performance and Applications*

8:35-9:45 a.m.	
Session Moderator	Richard Van Treuren Airship Historian and Author

Airship Control

Dr. Bernd Sträter
President and Executive Director
Zeppelin Luftschifftechnik GmbH

High Altitude

Hokan Colting
CEO
21st Century Airships Inc.

9:45-10:15 a.m. Coffee

Session 2: *New Airship Cargo Design Concepts*

10:15-12:00 a.m.

Session Moderator Professor James E. Lampe
Department of Aviation Technology
Purdue University

Aerostatic Lift Devices for Cargo: From CargoLifter to Lifting Balloons and Rigid Airships

Dr. Carl von Gablenz
Member of the Board of CargoLifter
President DELCON

“Roadless Trucking:” A Vision for Canadian Arctic Development

Robert Rist
President
Ohio Airships Inc.

Hybrid Lifting Body

Lou Foltzer III
President
Hybrid Aircraft Corp.

12:00-1:30 p.m. *Lunch*

Announcements:

Gil Costin
CEO, Millennium Airship Inc.

Robert Kadas
Department of Foreign Affairs and International Trade

Keynote Speaker

D.W. (Dave) Murray
Regional Director General
Prairie and Northern Region
Transport Canada

Session 3: *New Airship Materials and Systems Technology*

1:30-2:30

Session Moderator **Todd Schwartz**
Consul and Principal Officer
U.S. Consulate

Composite Structures

Sean MacKay
Executive Director
Composite Innovation Centre

Flight Control and Civil Applications of UAV

Lisa Shaw
Director of Communications
MicroPilot, Winnipeg

2:30-3:00 p.m. Coffee

Session 4: *UAV / Surveillance/Communications Airships*

3:00-4:30 p.m.

Session Moderator **Ian Glenn**
President
Unmanned Vehicle Systems Canada

Low Altitude Surveillance

Rudy Bartel
Vice President
American Blimp Company

High Altitude Communications

Mike Lawson
CEO
Techsphere

Closing Remarks

Dr. Barry E. Prentice, Chair

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