

Northern Sovereignty and Security

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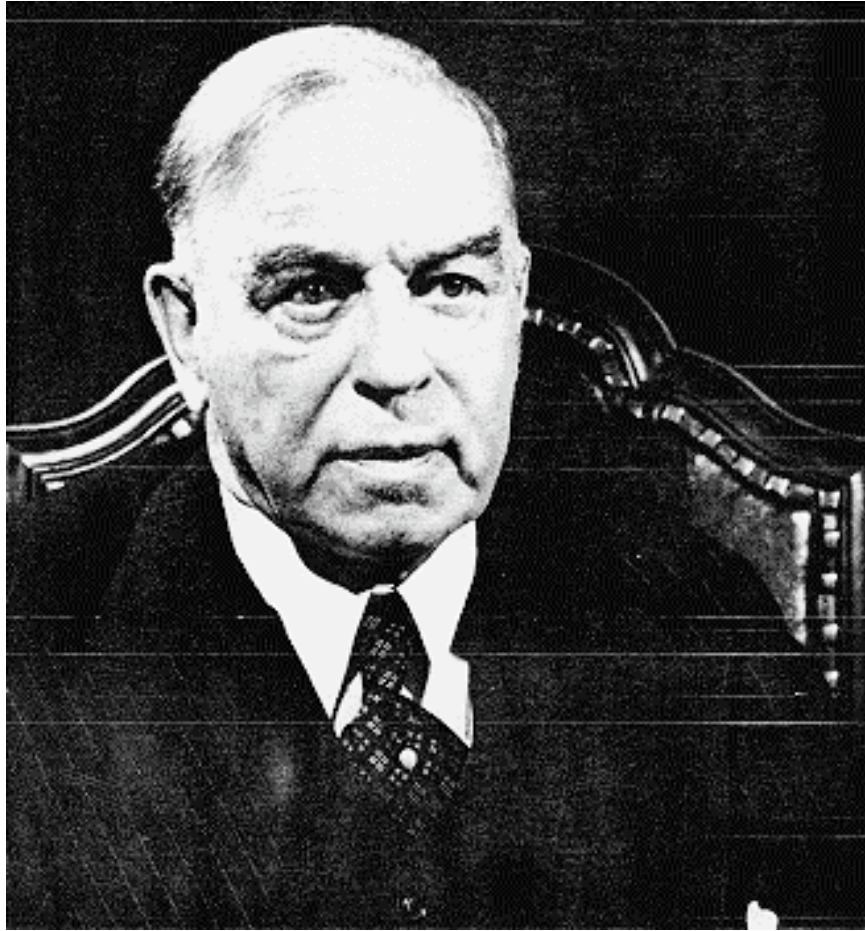
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University of Manitoba

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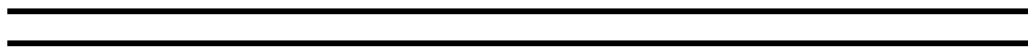
'If some countries
have too much
history, we have too
much geography.'

W.L.MacKenzie
King (1874-1950)
former Prime
Minister of Canada

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Civilian-Military Partnership

- Civilian aviation and marine markets are essential for the military security.
- Stand-by contracts with civilian operators can provide crews and craft for military logistics, on a variable cost basis.
- Civilian transportation options in the North are limited.



Sustainable Transportation in Northern Canada: Issues and Opportunities

- Vast distances
- Thin markets / low incomes
- Arctic weather conditions
- Fragile environment / climate change
- Rare wildlife / aboriginal rights
- Limited transportation infrastructure
- Few backhaul opportunities
- Monopoly service providers



Transport Alternatives in the North

Characteristics	Sea-lift	Barges	Airplane	Trucks
Freight Cost	Lowest	Low	Highest	Medium
Payload	5,000-25,000 T	200-500 T	1-10 T	20-42 T
Seasonality	Summer only	Summer only	Year round	Winter only
Delivery Speed	6-8 Weeks	1-2 Weeks	2-24 Hours	3-7 days
Infrastructure	Minimal	Moderate	High	High
Maintenance	Minimal	Low	High	High
Flexibility of access	Limited to seas	Limited to coasts/rivers	Limited by runways	Limited by roads
Combi passenger-freight	No	No	Yes	No
Environmental Impact	Oil spills	Oil spills	Runways	Ice road routes
GHG Emissions	Low	Low	High	Medium



**Everything old
is new again**

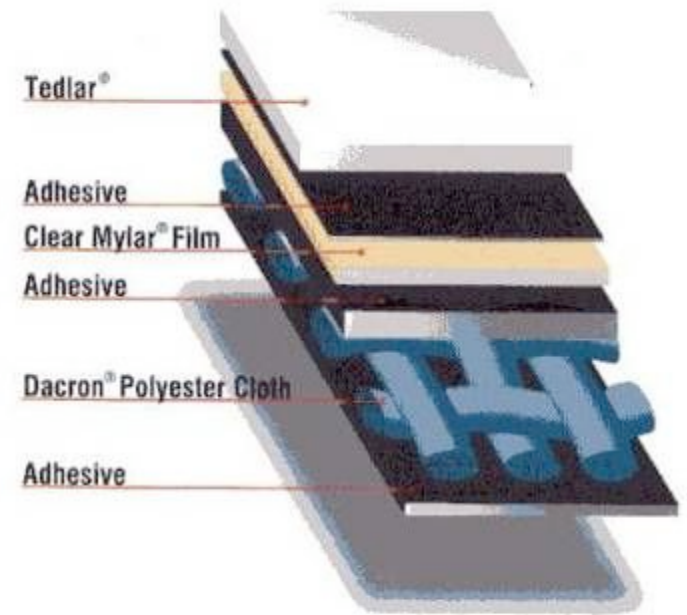


The same technological advances that have been applied to wind power, have also been applied to a new generation of airships



New Generation Cargo Airships

- Robust, lightweight envelope materials
- Computer design tools
- Nonflammable helium gas
- Modern avionics/hydraulics
- Vectoring engines
- Fiber reinforced composites
- Satellite weather information



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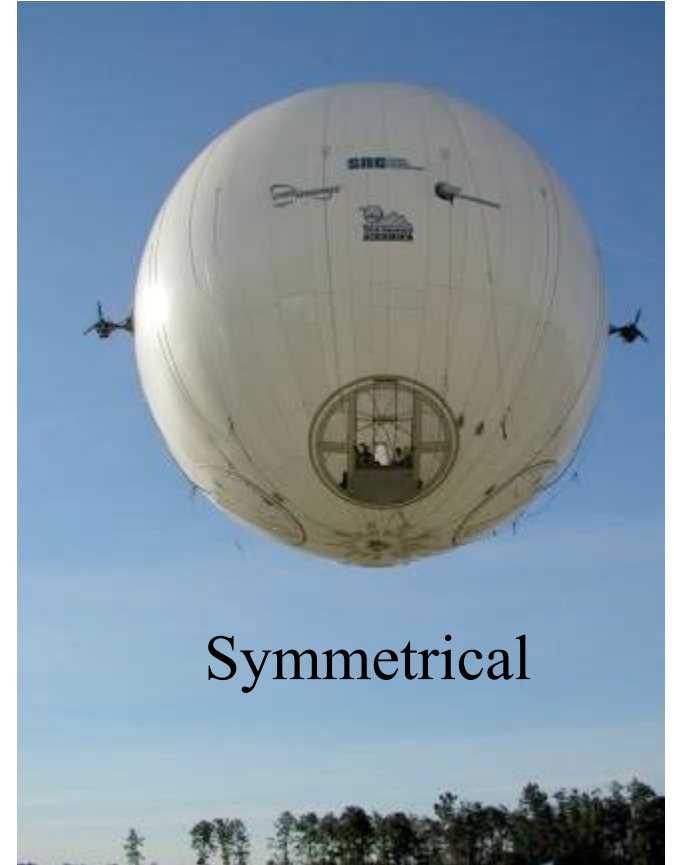
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Status of Airship Manufacturers

Location and Company	Aerostats	LTA Vehicles	Hybrid Vehicles
U.S.: Lockheed-Martin		design	model testing
TCOM	certified		
AeroVehicles Inc.			design
World Aeros	certified	prototype	design
Air Management Services		certified	
American Blimp Company		certified	
Ohio Airships			model testing
E.U.: Zeppelin Luftschifftechnik		certified	
U.K.: ATG		certified	model testing
Canada: 21st Century Airships		prototype	
Russia: RosAeroSystems	certified	prototype	
China: Vantage Airship Co., Ltd.		certified	



Hybrid
Ultra
Heavy
Lift



Symmetrical



**Airship
Options**



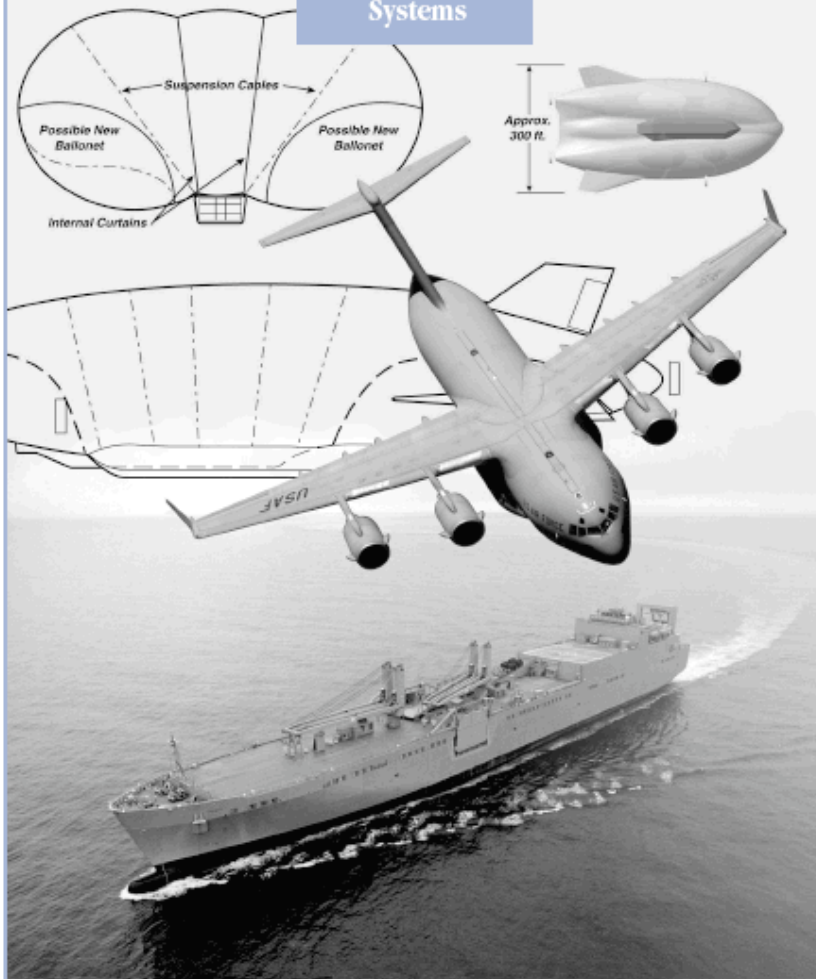
Traditional
Airships



A
CBO
STUDY

SEPTEMBER 2005

Options for
Strategic Military
Transportation
Systems



CBO Comparison

Airlift:

1A - C-17 Aircraft

1B – 16 500 Ton Airships

Surge Sealift

2A – 17 large, medium speed
roll-on/roll-off ships

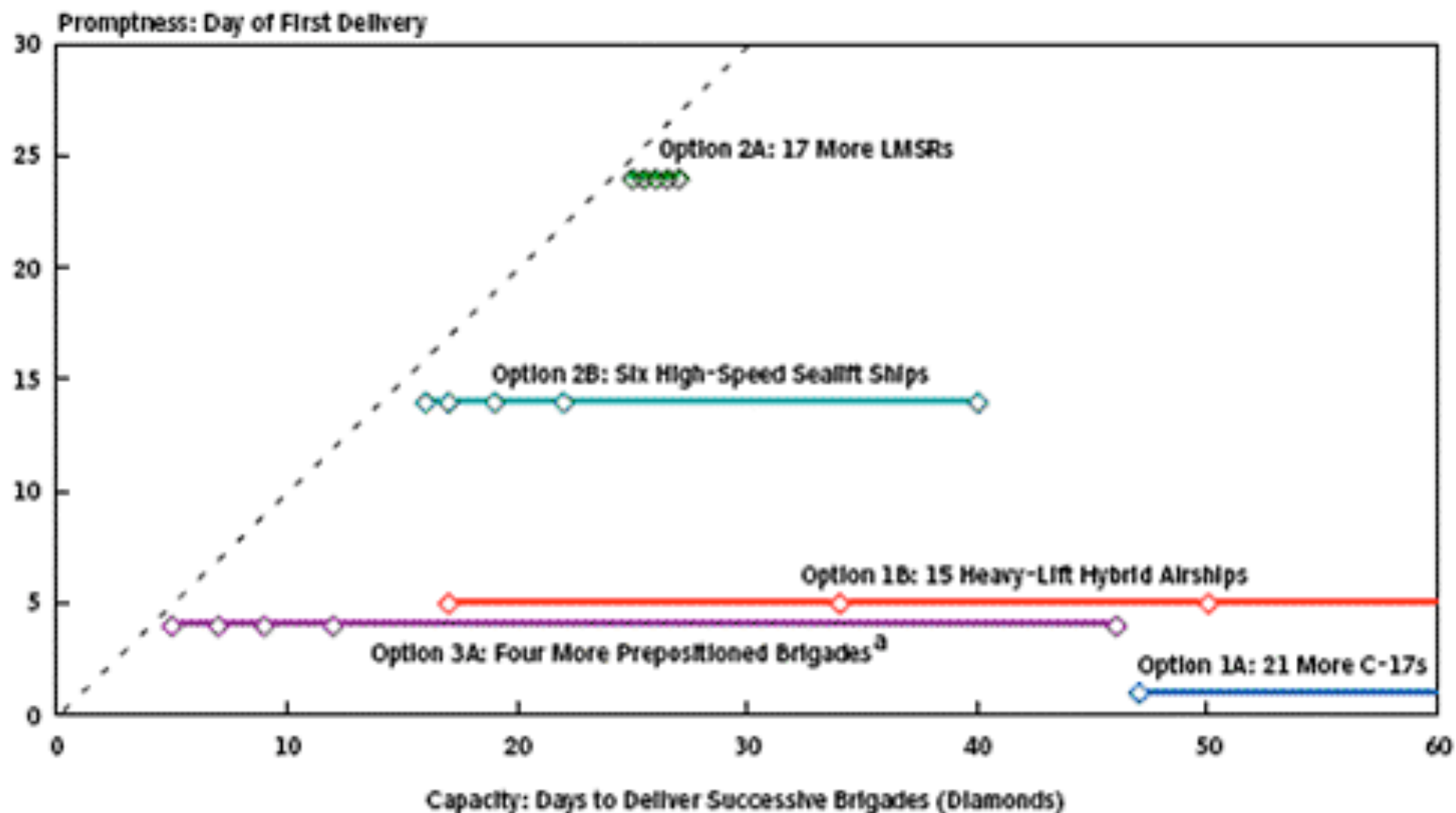
2B – 6 high-speed sealift ships

Afloat Pre-positioning

3A – 4 Stryker Brigade Equip.
and LMSR ships

3B – 5 Stryker Brigade Equip.
stored on LMSRs

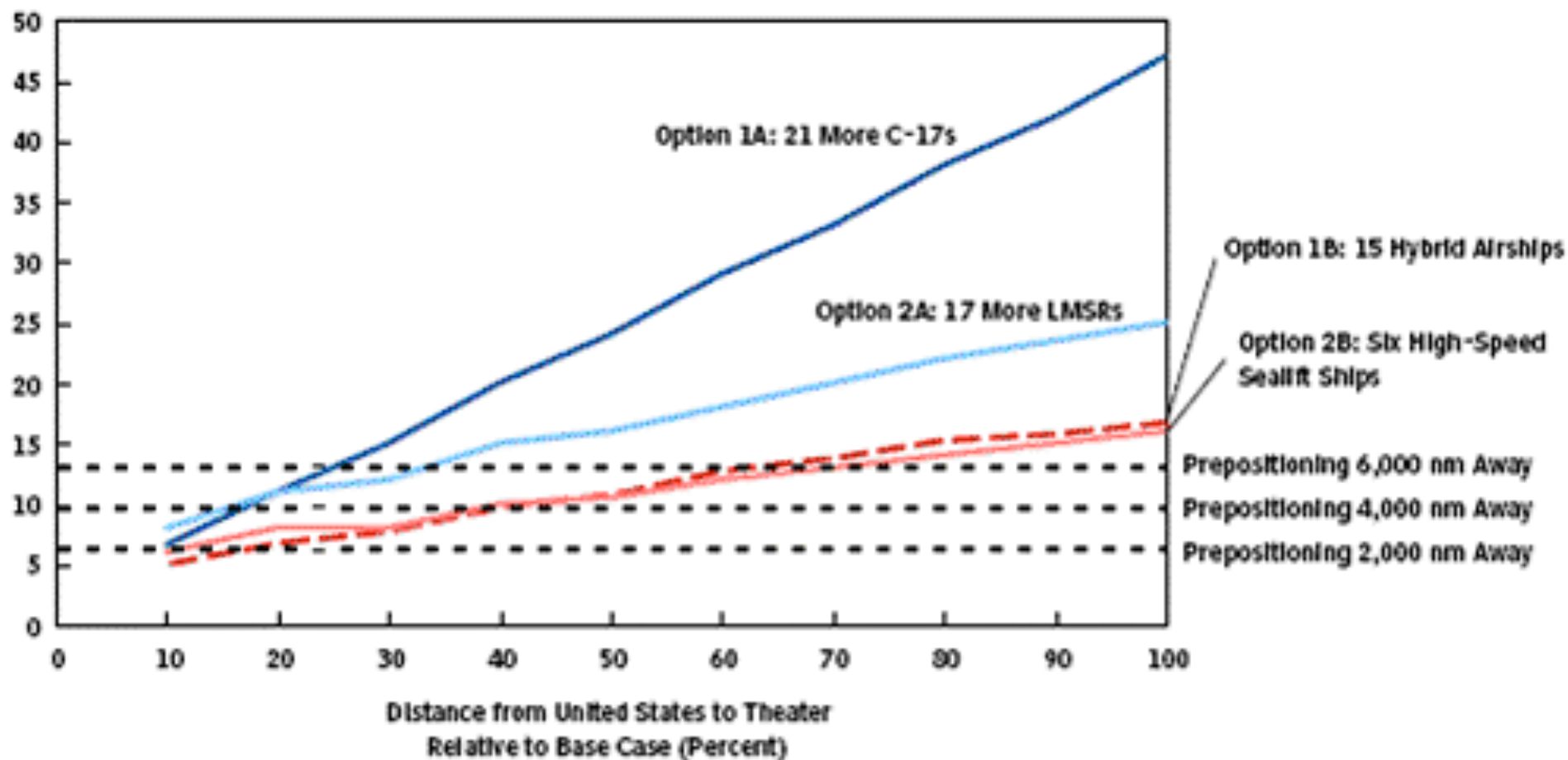
Promptness and Capacity to Deliver Five Brigades Under Various Options for Expanding Strategic Mobility Forces



Source: Congressional Budget Office.

Time Needed to Deliver First Additional Stryker Brigade Combat Team at Various Deployment Distances

(Days)



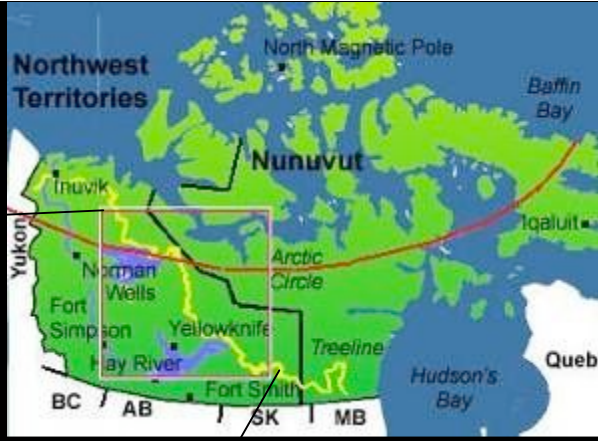
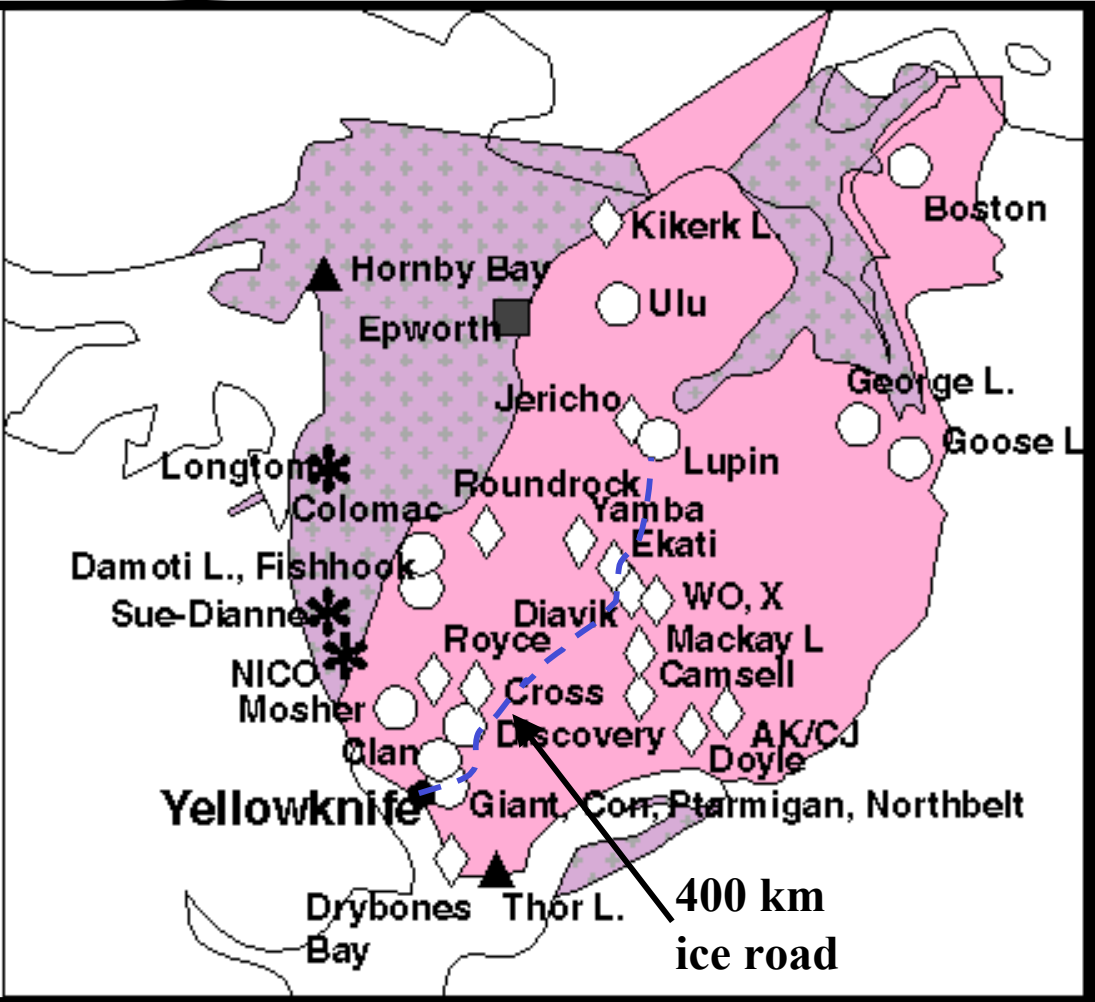
Source: Congressional Budget Office.

Business Case I: Ekati Diamond Mine, NTW

Total fuel requirements (litres)	180,000,000
Total landed cost of fuel	\$150,000,000
Ice road operations	12–16 week period
Distance	400-kilometer
Transportation cost	\$40 million
Inventory holding costs	\$ 5-10 million



Extensive mining prospects for diamonds and precious metals, limited to winter road access

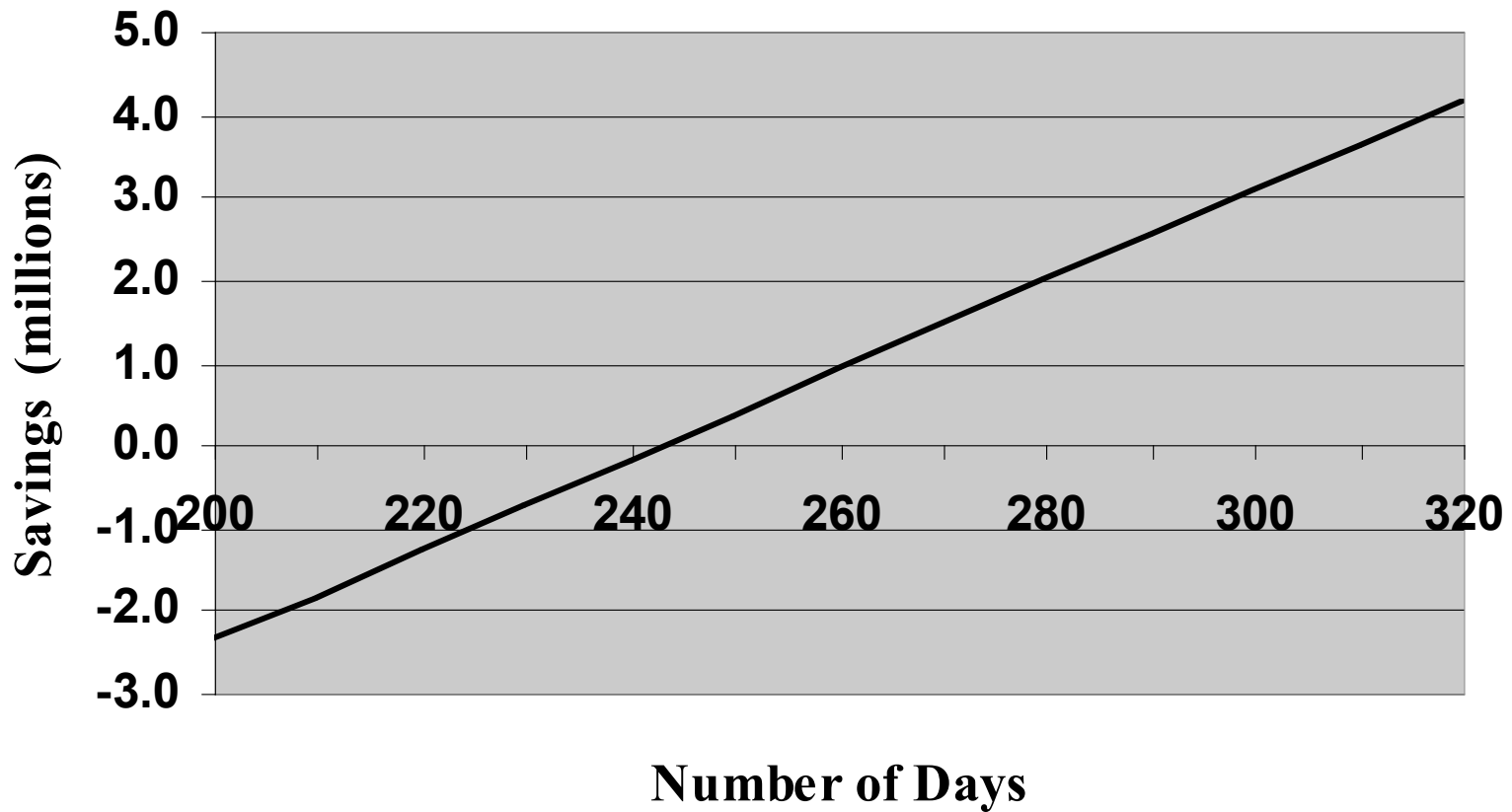


Economic Model of Fuel Haul to Ekati

- Key Assumptions
 - Vehicle size 84 tonnes/100,000 litres
 - Flying distance 380 kilometers
 - Average flight speed 161 kph
 - 24 hour operation
 - Purchase price \$60 million
 - Return on invested capital 10 percent



Airship Utilization Breakeven Analysis (3 flights/day)



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Large volumes of fuel and heavy equipment to move



Problems with indivisible loads

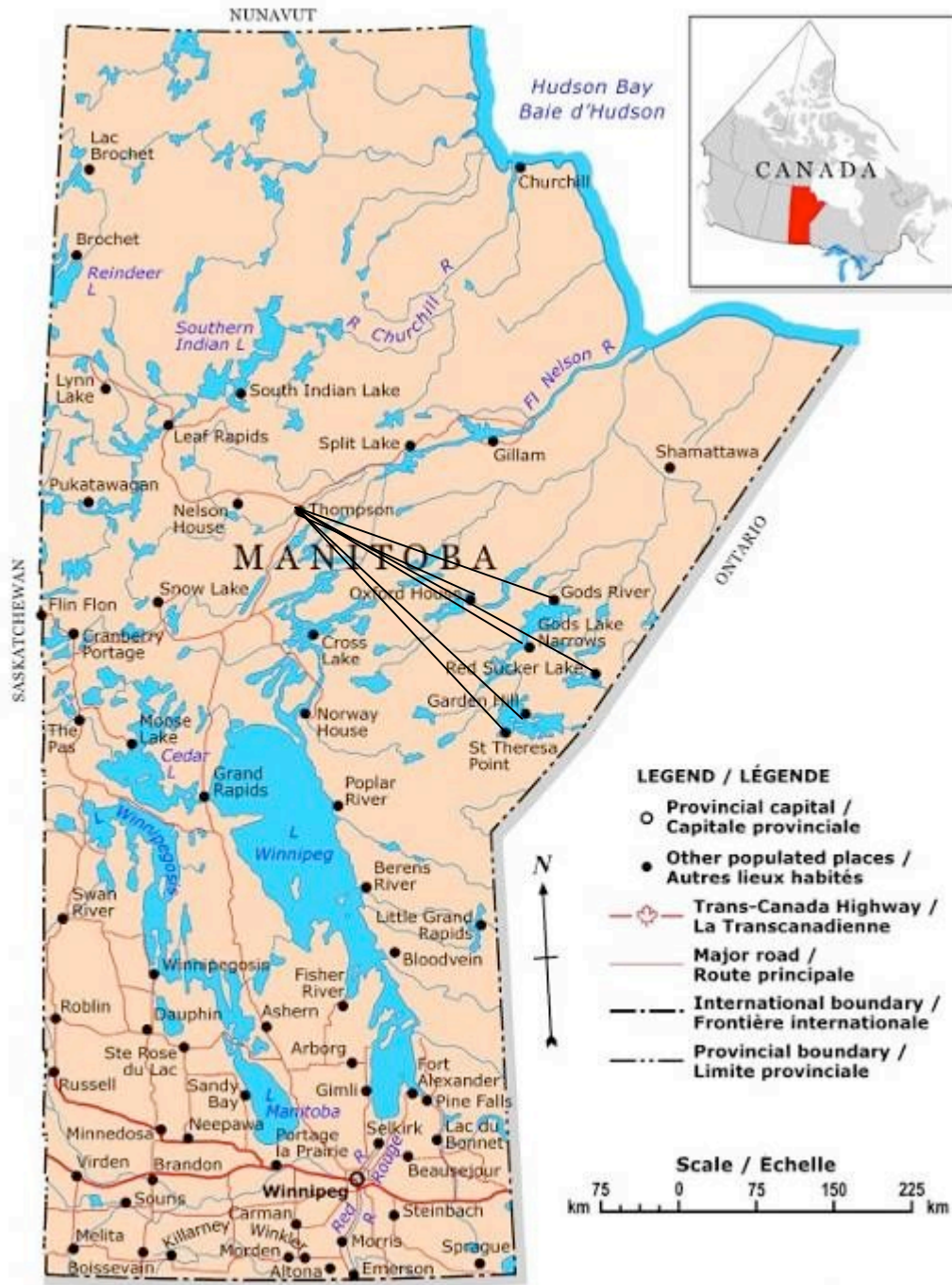


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Business Case II: Re-Supply in Northern Manitoba



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Analysis based on direct out and back flights from Thompson to the six First Nations villages

Utilization: 9 hours operation per day, 285 days per year

Community Profiles

COMMUNITY	POPULATION	ESTIMATED ANNUAL FREIGHT	NUMBER OF PASSENGERS	NUMBER OF FLIGHTS
St. Theresa Point /Wasagamach	4,021	11,600	14,127	6,061
Garden Hill/Island Lake	3,204	13,000	37,933	11,245
Red Sucker Lake	773	3,200	6,073	1,923
Oxford House	1,998	8,150	9,649	3,102
God's Lake Narrows	1,393	6,260	9,741	3,396
God's River	466	2,100	5,957	2,399



Comparative Costs for a 30-Ton Hybrid

DESTINATION	CONVENTIONAL COSTS (\$/TONNE)	HYBRID NO PASSENGERS (\$/TONNE)	HYBRID WITH PASSENGERS (\$/TONNE)
St. Theresa Point/ Wasagamach	\$435	\$671	\$304
Garden Hill/Island Lake	\$450	\$676	\$366
Red Sucker Lake	\$500	\$696	\$550
Oxford House	\$530	\$591	\$456
God's Lake Narrows	\$500	\$648	\$502
God's River	\$525	\$650	\$552



Comparative Costs for a 150-Ton Hybrid (fuel haul only)

DESTINATION	CONVENTIONAL COSTS (\$/TONNE)	HYBRID NO PASSENGERS (\$/TONNE)
St. Theresa Point/Wasagamach	\$435	\$301
Garden Hill/Island Lake	\$450	\$305
Red Sucker Lake	\$500	\$219
Oxford House	\$530	\$249
God's Lake Narrows	\$500	\$285
God's River	\$525	\$286



Business Case III: Geo-physical Survey



- about half the cost of traditional ground gravity surveys
- 500 times quieter than an aircraft
- low vibration levels
- slower speed enables greater resolution.

www.bellgeo.com/products/zeppelin.html

Airships Make Sense for the North

“Killer Application”

- high margins
- minimal competition
- large potential market

Characteristics	Airships
Freight Cost	Medium-low
Payload	2-300 T
Seasonality	Year round
Delivery Speed	8-48 hours
Infrastructure	Minimal
Maintenance	Minimal
Flexibility of access	Unlimited
Combi passenger-freight	Yes
Environmental Impact	minimal
GHG Emissions	Low

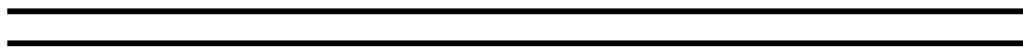
Canadian Military Opportunity

- Military deployment
 - New and unique capability
- Commercial market driven
 - Not dependent on DND procurement
 - No additional burden on DND force structure
- Sovereignty/North American Security
 - Increased capability/decreased costs



National Interest

- Promote northern commercial development
- Create jobs in aerospace and transport sectors
- Stretch DND budgets
- Demonstrate a pro-Kyoto technology
- Help meet commitments to NATO and NORAD
- Enforce Canadian sovereignty in the Arctic



“The Canadian army isn't
ABOUT shooting people--it's
about career training and being all
you can be on a limited budget.”

The Frantics

Winnipeg Comedy Fest, 2005



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**ISO Polar Airships Inc.
Not-for-profit Research
Institute**

**ISO Polar Airship
Association**

**Cold weather testing &
certification**

**Airship pilot training in
Manitoba**

Economic analysis

Engineering

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Freight Sustainability
Demonstration Program



Application Form

*** subject to further review ***

Next Steps

Demonstration Project

Northern Re-supply Airship

- IsoPolar Airships Inc.
- 21st Century Airships
- Province of Manitoba
- In-kind Business Support
- First Nations

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Next Steps



SUSTAINABLE DEVELOPMENT
TECHNOLOGY CANADA

Partnering for real results.

Invitation to
Phase II
Funding

Demonstration Project

**Vertical delivery medium
heavy lift airship**

Industrial Partners

21st Century Airships, ATC,
EnCana, Airborne Solutions,
others TBD

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Next Steps

Critical Infrastructure: The Hangar

- Necessary for assembly, repairs and cold weather testing
- Very large, expensive structures
- Wind and snow loading
- Heating and cooling issues
- Entry and exit accident risk



360-meters in length, 210-meters in width and 107-meters in height

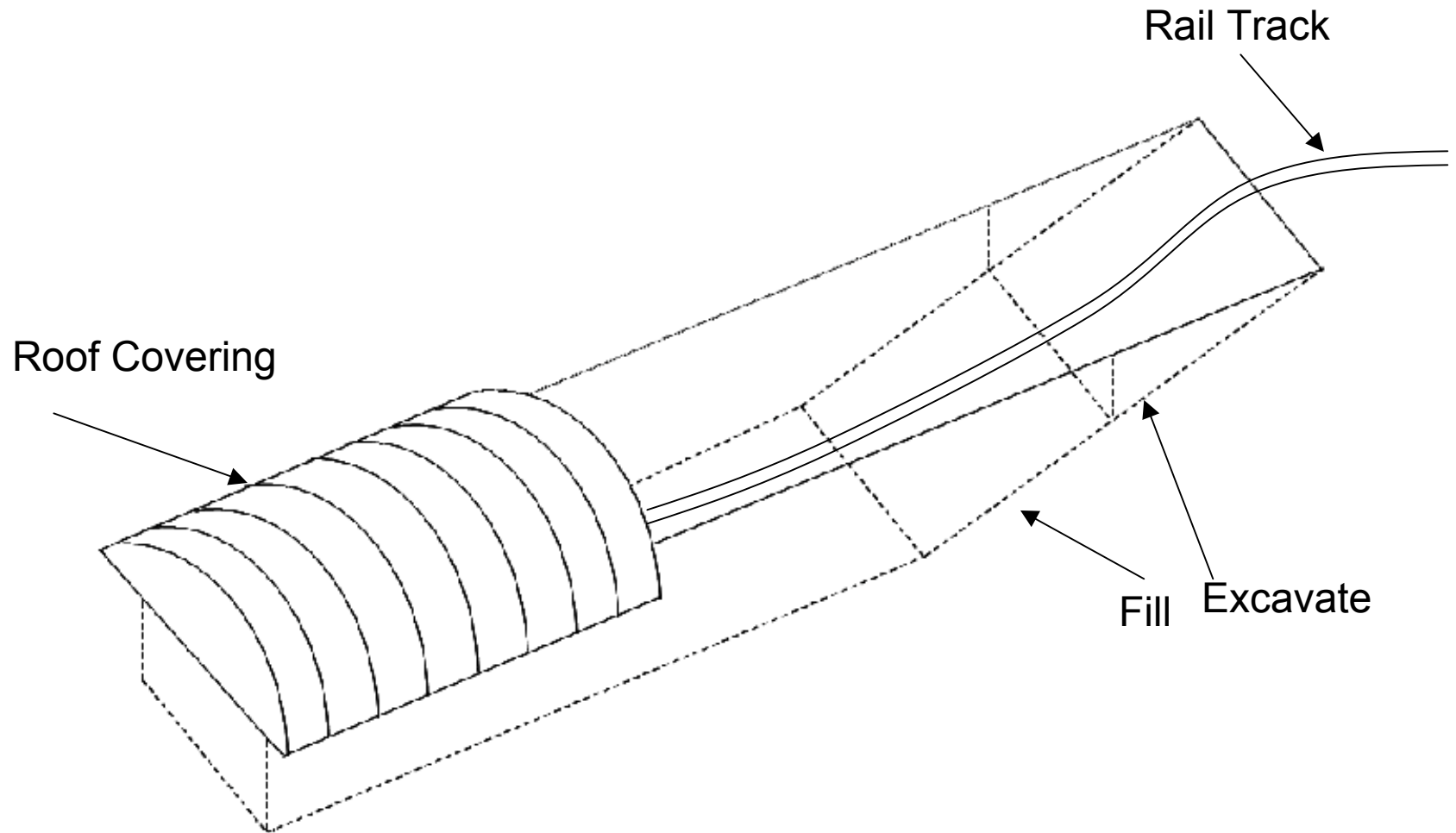


Could an open pit mine be converted into an airship hangar?



INCO Open Pit Mine, Thompson, Manitoba

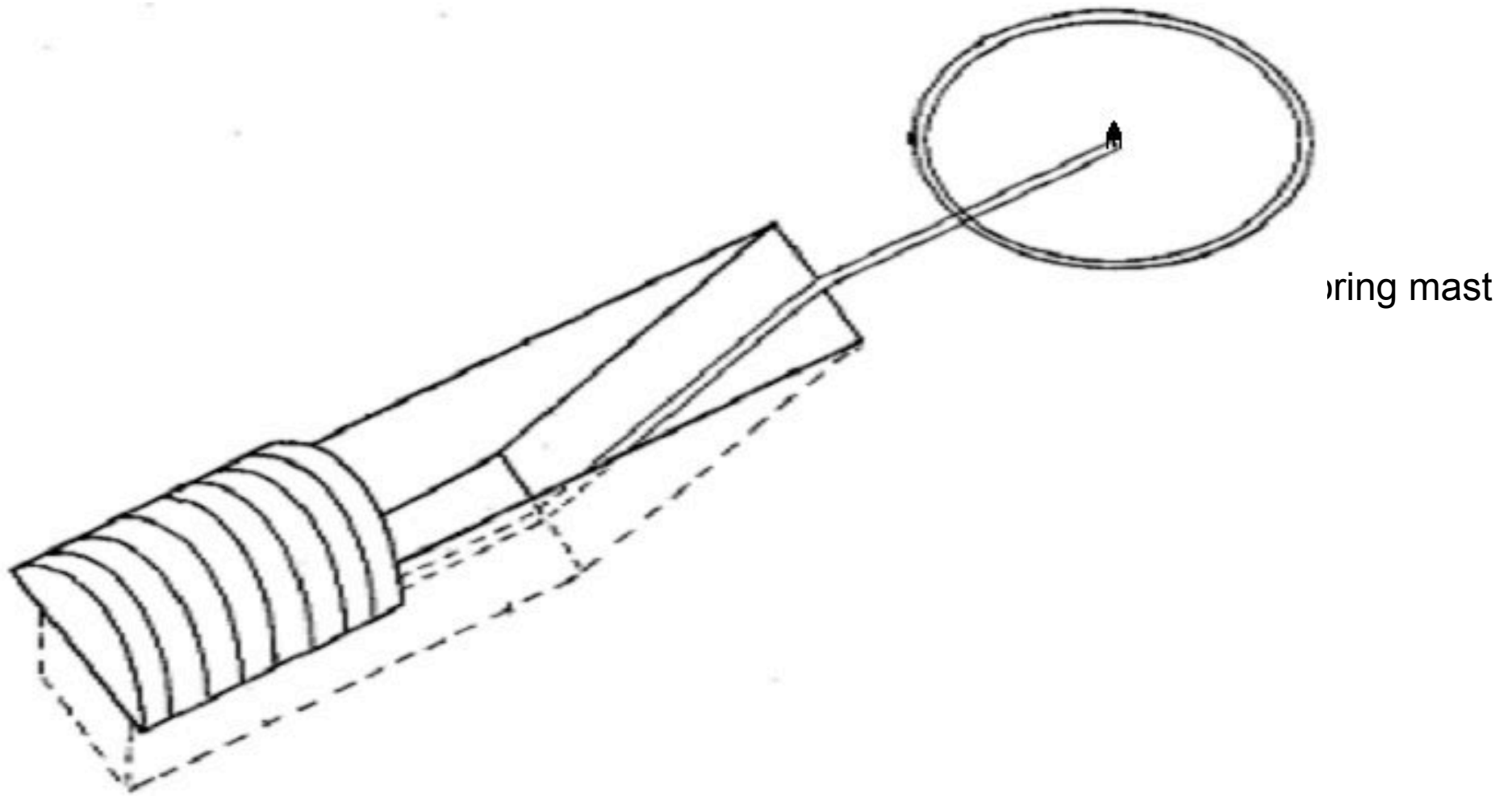
Top View: Earth-Dock[®]



Patent Pending: University of Manitoba, 2005

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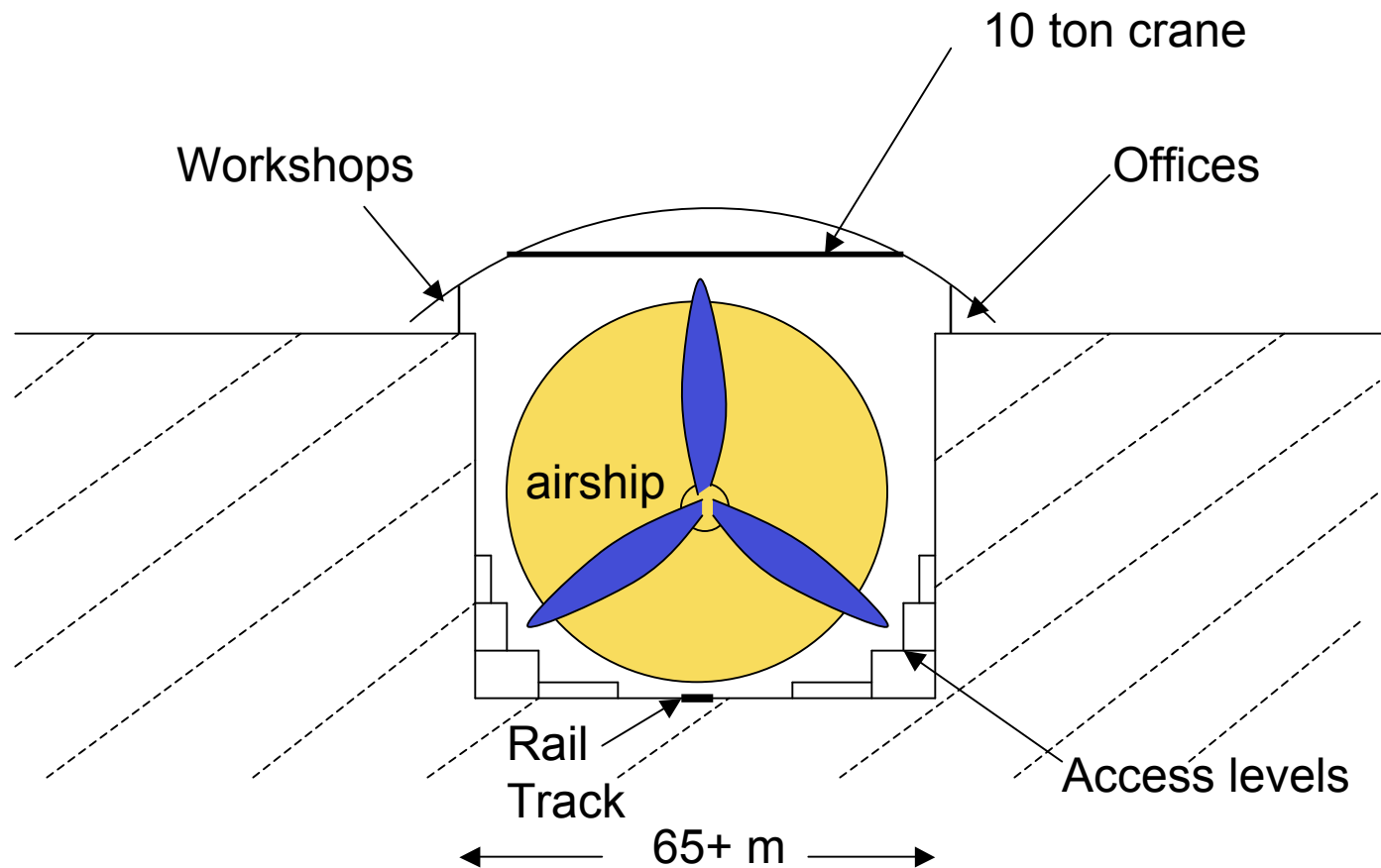
Mooring System: Earth-Dock®



Patent Pending: University of Manitoba, 2005

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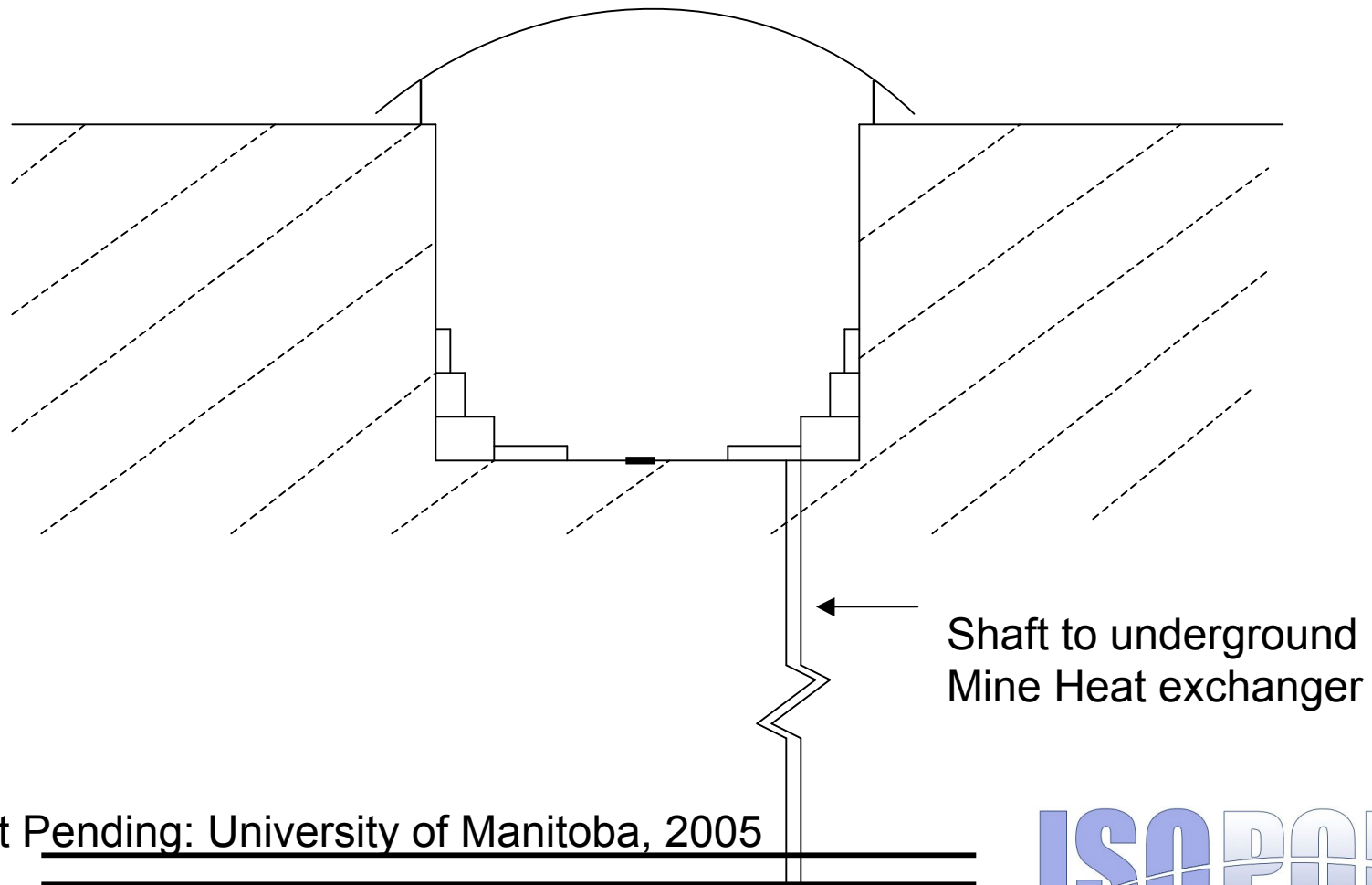
End View: Earth-Dock®



Patent Pending: University of Manitoba, 2005

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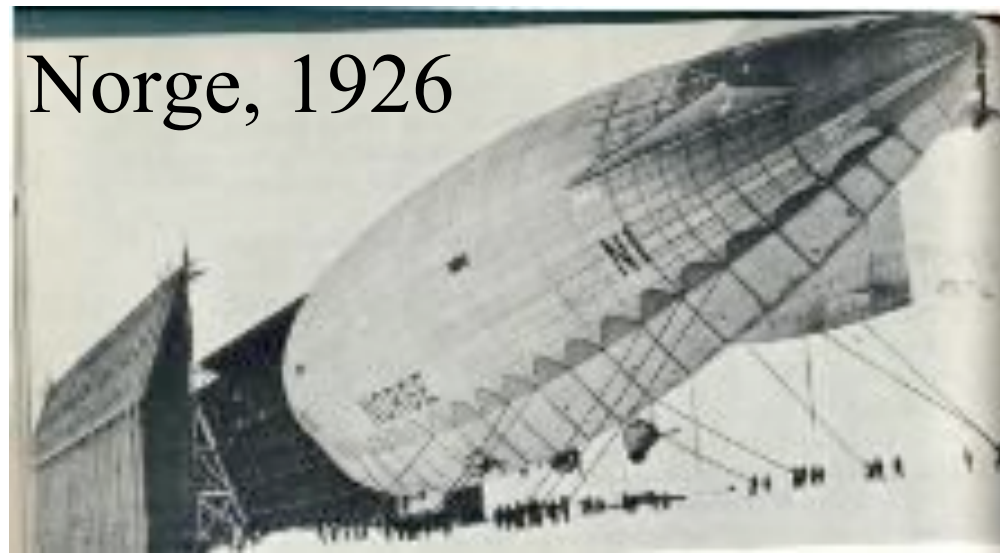
Ground heating system: Earth-Dock®



Patent Pending: University of Manitoba, 2005

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It's not rocket science.



It's just balloon science.



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