THE YOUNG INTERNATIONAL FREIGHT FORWARDER OF THE YEAR

AWARD 2021

"Delivering essential tools to the Western and Eastern Canadian Arctic"

April 30, 2021

TT CLUB

established expertise

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Introduction and summary

"Adopting sustainable supply chain practices is no longer an option, it's what you have to do to stay in business. Green is not going away. It's not a fad."-Brett Wills[1]

Approximately one-quarter of global CO_2 emissions come from the transportation sector, and greenhouse gasses are trapped specially at the poles (Vision). Canada's three northern territories are the Yukon, the Northwest Territories (NWT) and Nunavut occupying 40% of its territory. They are located North of the 60th parallel, where global warming effects are more severe, affecting the ecosystems, land, infrastructure, people as well as the transportation seasonal operating window.

Each territory has different transportation networks and unique geographic characteristics (Appendix-I). The region's primary economic drivers are mining, and oil and gas production. In the NWT, winter roads service is critical for community re-supply. In contrast, Nunavut relies on sea-based transportation as an essential mode of transport to deliver heavy equipment required during the year (Palko and Lemmen 29). To overcome such transportation challenges, significant investments and projects have been made to widen their logistics infrastructure and network.

Freight Forwarders (FF's) face many logistical obstacles in Northern Canada, due to harsh and dry winters. Two transportation projects will be described in this dissertation, addressing the necessities, challenges and uniqueness of the western and eastern Canadian arctic. The first relates to an importation project to bring an over dimensional mining truck from Chicago, USA to NWT, CA. The challenge is to bring it to its destination site before the ice roads become inoperative. The second project focuses on the challenges of a time sensitive movement of bringing a diesel generator from the south to the north of Canada. In this case, the shipper missed the last sailing date and is liable to deliver the freight at his own expense.

[1] Senior sustainability coach of HPS Inc. Ontario 2011.

Acknowledgements

I would like to thank CIFFA, FIATA, the TT Club and everyone who makes this competition possible. I truly believe that it is an amazing opportunity for young freight forwarders to demonstrate a variety of skills and qualities in the international supply chain and logistics.

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Bob Cruthers-Director of Marketing-Arrow Reload Systems

Aaron Collins-Manager Freight Forwarding & Expediting-BBE

Betty-Anne Nickerson-Director of Logistics and Site Services-Tlicho Logistics

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Highfield, Steve-Cargo Logistics-Canadian North

I cannot express enough thanks to my parents, my sister and my boyfriend for all their support and encouragement.

Import Shipment Introduction

In the Northwest Territories (NWT) of Canada, mining is the principal economic industry. For each dollar that is invested in mining infrastructure, the return contributes up to $0.40 to the NWT's gross domestic product (GDP) (Northwest Territories 14).

Transportation infrastructure in the NWT has been affected by climate change. For instance, the El Niño phenomenon in 2006 caused an early closing of the ice roads that travels from Yellowknife to the diamond mines (Appendix-II). The economic impact is severe, as 3,500 truckloads were undelivered due to the ice road closure, totaling a cost of $100 millions to bring supplies by air instead (Prentice 5). The ice roads play a key role in multimodal transportation, connecting all-weather roads, air strips and railways to keep the NWT economy in constant development.

There is a phrase that says, "if you got it, a truck brought it". Road as a mode of transportation falls under the category of non-light-duty vehicles, which consumes a lot of the energy and at the same time pollutes the most (Appendix-III). In contrast, marine transportation has the second-lowest energy intensity next to rail transport, which consumes just one-tenth of the energy in comparison with trucks (Fischer 4-7). FF's must be aware of the Carbon footprint consequences of the modes of transport used and develop strategic plans to overcome transportation challenges while providing excellent customer service.

The Diavik Diamond Mine is one of the world's richest mines with a preeminent source of gem diamonds. Located in Canada's NWT approximately 360 km Northeast of the city of Yellowknife, the mine is surrounded by a hostile subarctic environment (Appendix-IV). Everything the mine requires needs to be transported either by plane or truck from Yellowknife. Usually by November, when it gets cold, the lakes and marshes around it become fully solid

with ice. As a result, an ice road can be constructed every year to give access for thousands of tons of fuel, supplies and equipment. The heavy trucks can transit this road in February, once the ice thickens and it is more than a meter deep and able to support their weight (Shigley 104-108).

Objective

Diavik contacted G-Logistics company (created for this dissertation) to coordinate the movement of a brand-new Caterpillar Off-road Mining Dump Truck Model 785D (CAT-785D) (Appendix-V). From the Caterpillar (CAT) factory in Decatur, IL. USA to the Diamond Mine in the North Slave Region (Appendix-VI) before the ice roads become inoperative.

Terms of sale

The terms of sale are, Ex Works (EXW) at the CAT plant in Decatur, IL, USA. I will arrange on behalf of my client (Diavik) the pickup of the equipment at the CAT plant premises. Due to the dimensions and weight of the pieces, the factory will load the freight onto the hired trucks by using their loading equipment. As soon as the loading is done, the term tends to be Free Carrier (FCA) at the CAT plant. I recommend my client to revise the terms of sale with the shipper to FCA at the CAT plant, where the risk will transfer to my client as soon as the loading has been done. The shipper will be responsible for the loading, lashing and fixing of the CAT-785D for its transportation.

Analyzing the modes of transportation

Freight can be moved either by air, land or water, because of the geographical area between the USA and Canada. Due to the oversized dimensions and weight (Table-1) of this freight, transportation is very challenging.

Table-1. Dimensions and weight

Parts	Length (m)	Width (m)	Height (m)	Diameter (m)	Weight (kg)
Chassis	8.15	5.90	5.12	NA	58,230
Body	11.55	6.75	2.56	NA	25,160
6 Tires on rim for each	NA	1.00	NA	3.96	4,150

I evaluated all available modes of transportation and after a careful analysis and consultation with experts, the following has been identified as the best mode of transport. By air, according to the loadmaster, the chassis and body will not be loadable in an Antonov An-225/124, one of the world's largest cargo airplanes. The maximum width and height that their cargo door can take is 6.4 m and 4.4 m respectively. This freight wouldn't be able to move via rail, because anything over 13 ft wide or up to 15 ft height would be considered over-dimensional cargo, exceeding the legal standard-size criteria of the area (CIFFA 51). There are also no marine options for this freight, as there are no barges involved in the routing because Diavik is inland. Due to the nature and size of the cargo, the modes of transportation are very limited. The best option to bring this cargo up to the Diavik mine is by road.

Timing of the transport will be critical to its success. The 400 km ice road is scheduled to open on February 1st ,2021, but according to an expert carrier we would get a date at the end of

February or the beginning of March. We would require the unit to be departing the factory in Decatur, IL USA at least 14 days prior to its scheduled slot for the ice road. Permitting would be started 3 weeks before that time.

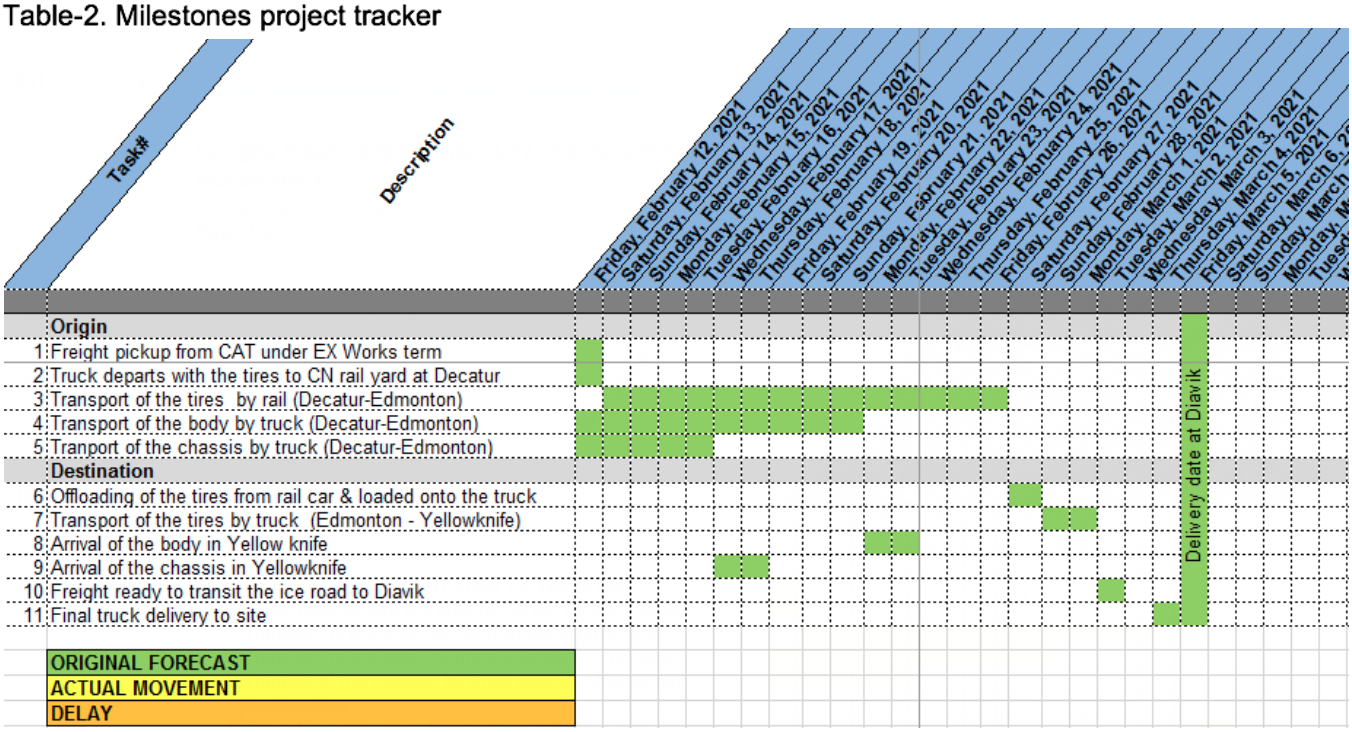
Transportation plan analysis

The full shipment can be hauled by truck, but as previously mentioned this mode of transportation pollutes the most. Regularly, it is less expensive to use an intermodal combination for the transportation of goods rather than a single mode (Prentice 2). The tires are the only portion of this freight that can be carried by a different mode of transportation. After a careful analysis and in order to reduce CO_2 emissions, I decided to request a quotation for the tires on rims for their transportation by train up to Edmonton. Once the quotations by truck and rail for tires were received and compared, it was identified that G-Logistics' client will be saving more than 50% in cost by moving the tires via rail (Appendix-VII) plus 6.3 tons of CO_2 emissions (Appendix-VIII).

In order to accomplish the project milestones, a well-designed plan with appropriated time of departure has been developed, to avoid travel restrictions, curfews and any mishap. In addition, ice roads availability and scheduling depend highly on weather conditions. A route survey has been performed to define the required services during transportation such as a bucket truck to remove power lines, multiple police escorts, pilot and pole car. The transit time from Decatur, IL to Edmonton, AB by truck is around 4-5 days for the chassis, 8-10 days for the body and by rail 14 days for the tires. Once all the freight has arrived in Edmonton, it will continue its journey up to Yellowknife transiting for two more days. Once it arrives in Yellowknife, it will be waiting on all Diavik Winter Road Cargo marshals at a yard in town, to

transit on the ice road. It takes approximately 1.5 days to get to Diavik once in transit. As we have scheduled a spot to transit on the ice road on March 2nd, the freight will be picked up from CAT on February 12th. It is important to remark that the proposed transit time (Table-2) is based on the consideration of possible contingencies.

Table-2. Milestones project tracker



Given the freight is moving by truck, there are multiple variables that are unforeseen and can cause delays. For that reason, I have considered extra days in the scheduling and transit, if needed for its planned arrival.

Truck and railcar selection plus loading plan

Body and chassis

The type of truck that will be used for the chassis is a 13-axle Removable Goose Neck Trailer. The body will be transported on a 10-axle Trailer up to the site by Tli Cho transport company (Appendix-IX). The types of trucks were chosen to meet required weight restrictions in the different states and provinces that the freight will be transiting through and to ensure its secure movement. The freight will be securely fastened on each trailer by using chains at approval lashing points. The CAT team who will oversee the loading on the trucks will indicate the correct lashing procedure. I made the selection of the trucking companies based on their capability and pre-qualifications of the CIFFA book “Questionnaire for Trucking Firms” on page 119.

Tires

First, we must select the type of railcar. The Solution Manager at CN advised that for this project the commodity classification will be under Machy&Mach New STCC:3599990. The CN-T0000001010037809 price reference was selected as it is applied for cars that can take a weight from 50,000-100,000 lbs, the total weight of the tires on rims is 54,800 lbs.

From the CAT factory to the Decatur CN train terminal, the six tires will be loaded laid down on two super-B trailers, three tires on each truck (Appendix-X). They will be secured by 6-inch belt straps with no dunnage under flat on deck of truck. The quotation provided by Arrow trucking company includes the loading at the CN Decatur container yard of the tires, in a 52’ gondola with 5’ sides for the loading. Three sets of two tires will be stood up side-by-side, floor is 4’ from track making the load height 17’ from tracks. The carrier had advised that after working

with the Railroad Association of Canada, the drawings (Appendix-XI) meet their securement rules as well as the rules of Association of American Railroads. Upon its arrival, the freight will be unloaded from the railcar using a mobile crane that can lift up to 300,000 lbs (Appendix-XII), at Arrow Yard Sherwood Park Alberta with tracking ID Clover Bar GB91 (CN rail). Then, reloaded on a super-B combination trailer, lead trailer is 32’ tridem axle and the pup trailer is 28’ tandem axle.

Permits and routing

Special permits and escorts will be required as this is an oversized cargo movement. Since it will be transiting through different states and provinces, over-dimensional permits that are valid from one region to another will be necessary (CIFFA 103). Those permits will be arranged by Tli Cho transport-company.

The US states where the freight will transit through include: Illinois, Iowa, South Dakota and North Dakota. The Federal law establish that the limit weight per single axle is 20,000 lb. The trucking company calculated the even distribution of the weight per axle, to avoid any penalties or fines. The border crossing will be US 52 North Portal ND/Saskatchewan. In Canada, the transit provinces will include: Saskatchewan, Alberta and the NWT. Alternatively, for the ice roads, instead of the weight, the considered measurements are based on the space per axle. As such, a Heavy Load Request-Ice Road will be submitted for each load (Appendix-XIII). For this movement, no Dangerous Goods Regulations apply.

Documentation and customs clearance

Export side

In order to ensure that the freight moves as planned (Table-2), I approached our overseas office to confirm all of the below required documentation has been gathered and complied with the required export formalities from the USA.

Documents	Truck (Body & Chassis)	Rail (Tires)
Commercial Invoice (CIV)	One	One
Packing List (PKL)	One	One
USMCA Certification of Origin	Blanket certificate of origin	
Truck Bill of Lading	One	N/A
CN Rail Manifest	N/A	One
Sales Contract	One for all freight	
Insurance Certificate	One	One

As its destination is Canada, an export declaration does not need to be filed through Automated Export System. The USMCA certificate will be required to claim a preferential tariff.

Import side

The three loads of this freight will arrive in Canada at different timing, due to its dimensions, weights and selected modes of transportation. For the truck portion of the transport, the full quantity of goods will be accounted for when the chassis arrives, and the body will be

processed on importation as ETA. A request will be submitted to the superintendent at the Canada Border Services Agency (CBSA) office prior to its arrival. It must contain the following:

- Reason for the shortage;
- name and BN of the importer;
- exporters name;
- unit of measure and quantity of goods;
- value of the goods;
- detailed description of the goods;
- country of origin;
- number of ETAs; and
- estimated date(s) of arrival including the completion date.

Before the goods arrive in Canada, an electronic transmission of the eManifest will be submitted, at least one-hour by truck and two hours by rail, including cargo information, conveyance, truck bill of lading, CN rail manifest and importer data to the CBSA (CIFFA 131). For customs clearance, the Canada Customs Invoice Form, B3 Customs Coding Form, Cargo control Document and the letter of authorization will be necessary. According to the Customs Tariff Schedule the Harmonized System (HS) code classification is 8704.10.00.10 for the body and chassis, while, 8708.70.19.00 for the tires. Our client will not need to pay duties as both HS codes are duty free under the UST preferential tariff.

Theft and insurance

Due to the oversize dimensions of the cargo and number of parties involved in the movement, these pieces are not prone to theft. Even with a lot of precautions being taken for the safe movement of this freight, there is always a risk of damage associated with its movement. For instance, the Canadian winter road infrastructure safety and effectiveness can be affected (The Canadian). Some ice roads breakthroughs are caused due to climate change (Appendix-XIV). The body and chassis cost around CAD$5 million and since they will be traveling for a couple of days. Given the transit time and nature of the climate at time of transit, accidents can happen. The highway transport liability is limited to CAD$4.41/kg, which means the total amount of reimbursement would be CAD$367,749. Under-price conditions, CN liability coverage is USD$25,000 and the 6-tires value are around CAD$255,000. After identifying the limitations of the transport liability, which is less than 10% of the total value of the goods, G-logistics recommends purchasing additional cargo insurance coverage for CAD$9,672.26 giving peace of mind to my client.

Job costing

Decatur ILL – Diavik NWT Budget Quote			
Description			Transport Rate (CAD)
Body & Chassis	Movement by Truck	Chassis	$ 155,250.00
		Body	$ 100,000.00
	Permits	Chassis and wire lifting estimate *	$ 172,500.00
		Body estimate *	$ 575.00
	Additional Rates	Rate- 13 axle Trailer	$ 45,000.00
		Rate- 10 axle Trailer	$ 40,000.00
		Pilot Car- Includes Operator	$ 20,100.00
		Supervision, Route study	$ 10,000.00
		Rate double drop/Highboy and Truck	$ 15,000.00
		Subsistence	$ 8,200.00
Tires	Movement by Truck	Six Tires on rims	$ 24,575.00
	Movement by Rail	Six Tires on rims	$ 10,334.00
	Additional Rates	Crane Fee	$ 4,620.00
		Pilot car & permits	$ 820.00
Total Transportation charges			$ 606,974.00

* City, county, state or provincial permits will be billed at cost + 10%, as well as the wire lifting

This freight will be transported as two different shipments; therefore, different insurance certificates will be issued for each transport mode.

Decatur ILL-Diavik NWT Insurance Quote			
Chassis & Body		Tires	
Description	Value (CAD)	Description	Value (CAD)
Goods Value	$ 5,000,000.00	Goods Value	$ 255,000.00
Freight Value	$ 566,625.00	Freight Value	$ 40,349.00
Insurance Value (10% added)	$ 6,123,287.50	Insurance Value (10% added)	$ 324,883.90
Insurance Sell (0.15 CAD Per $100 value)	**$ 9,184.93**	**Insurance Sell (0.15 CAD Per $100 value)**	**$ 487.33**

Summary

A well-designed logistics plan was developed to meet the timeframe established to transport via the ice-road and deliver a CAT-785D mining Truck to Diavik on March 5th, 2021. Over-sized dimensions of the required equipment were the main challenge and the key factor to determining the best mode of transportation to be used for this project haul. After careful analysis, I concluded that transporting by truck will be the only option to move this freight. However, an intermodal transportation plan for the tires was also proposed. Railcar transportation consumes 1/10 of the fuel, saving 6.3 tons of CO_2 emission for this move. Furthermore, by using an intermodal transportation mode our client will save more than 50% in shipping costs for the tires. This plan also accounted for my goal to reduce CO_2 transportation emission. CO_2 emissions have a big impact on global warming that ultimately affects the NWT's local environment and economy.

Export Shipment Introduction

Freight forwarders are always looking for alternative routes to optimize shipping transit times. For instance, a historic solo voyage in 2014 via the Northwest Passage from Deception Bay in Northern Quebec to Dalian in China, reduced its transit time by 40% when using this Artic passage (Oskin). However, this passage continues to be extremely variable, as ice conditions continue to limit traffic from year to year. Access and use of the passage is subject to pollution-control regulations (Dawson 61).

In Nunavut, marine and air transportation are essential as there are no all-weather roads or ice roads that connects to southern Canada. Sealift is the usual way ocean carriers ship dry cargo to this province. Around 1,400 tonnes of containerized cargo and 214,000 tonnes of non-containerized cargo are part of the annual sealift. This method involves many handling movements such as the transfer of cargo to shore by barge, which can create a higher risk of damage or loss of cargo. This is, due to the rough water conditions that frequently prevail in the Iqaluit harbour area.

Nunavut is on the top list of diesel consumers in Canada consuming around 40 million litres of diesel per year (*The True Cost)*. This dissertation describes a crucial shipment for this remote community, where they rely on diesel power plants to get their electricity (Appendix-XV).

Sealift

The two principal carriers serving Iqaluit are Nunavut Eastern Arctic Shipping Inc. (NEAS) and Nunavut Sealink and Supply Inc. (NSSI). Annual sealift operations during the open-water summer months are particularly challenging since vessels must anchor in deep water, with goods transported to a beach holding area by barge. The unloading process can be done for only a few hours during each 24-hour period due to the occurrences of the high tides

(Appendix-XVI). As a result, this process may require several days involving costs in wages plus other expenses.

To overcome the above noted difficulties, the construction of a new deep-water port facility is in process to address the following needs:

- Facilitate the scheduling and handling of cargo
- Easier unloading process throughout the day, and
- Provide a secure holding area for sealift cargo with direct access by vehicles

Together, these will result in a significant reduction in the damage of the cargo and a major decrease in insurance costs, due to the safe working environment created. Moreover, it will contribute to a reduction by 80% of the time spent for unloading that will create savings of CAD$3.4 to $4.9 million annually. The construction of the harbour will be an essential element for the economy and future growth of Nunavut (Appendix-XVII). More direct employment will also be created by the increase usage of the Iqaluit deep-water port facilities (Lee). The new pier is expected to be completed by the end of 2021 shipping season; however, it will not be operational until 2022.

During the winter months, it is impossible to transit sea ice; therefore, the sealift shipping window is usually open from June to October. Nevertheless, the northern and southern Canadian communities are connected by the year-round mode of air transportation, though at a higher premium than by sealift.

Objective

To urgently bring a new Diesel Generator (Appendix-XVIII) to a hospital in Iqaluit, NU from the dealer’s location in Kingston, ON, after missing the last annual Arctic Sealift cut off.

Terms of sale

My client, the authorized Kohler distributor in Canada, has agreed with its buyer (Iqaluit hospital), that the Incoterm for this sales contract is Delivered at Place Unloaded (DPU) on dry shore land at Iqaluit Beach. The contract includes delivery to Iqaluit, NU latest by October 31st, 2020. Unfortunately, the generator production has been delayed by the manufacturer in the USA postponing its availability at the Kingston dealer until November 2nd, 2020. The contract (Appendix-XIX), further stipulates that in case of missing the last sailing of the Sealift season, the dealer would be liable to ship the generator by air at his expense. Therefore, the Incoterm 2020 would be then DPU Iqaluit Airport (YFB). It is important to mention that the buyer must arrange local delivery from the airport at his own expense.

Transportation overview

The initial transportation plan, shown on Table-3 below, was designed based on the advised readiness of the freight and the sealift availability. The below two schedules are the last sailing dates of the year 2020:

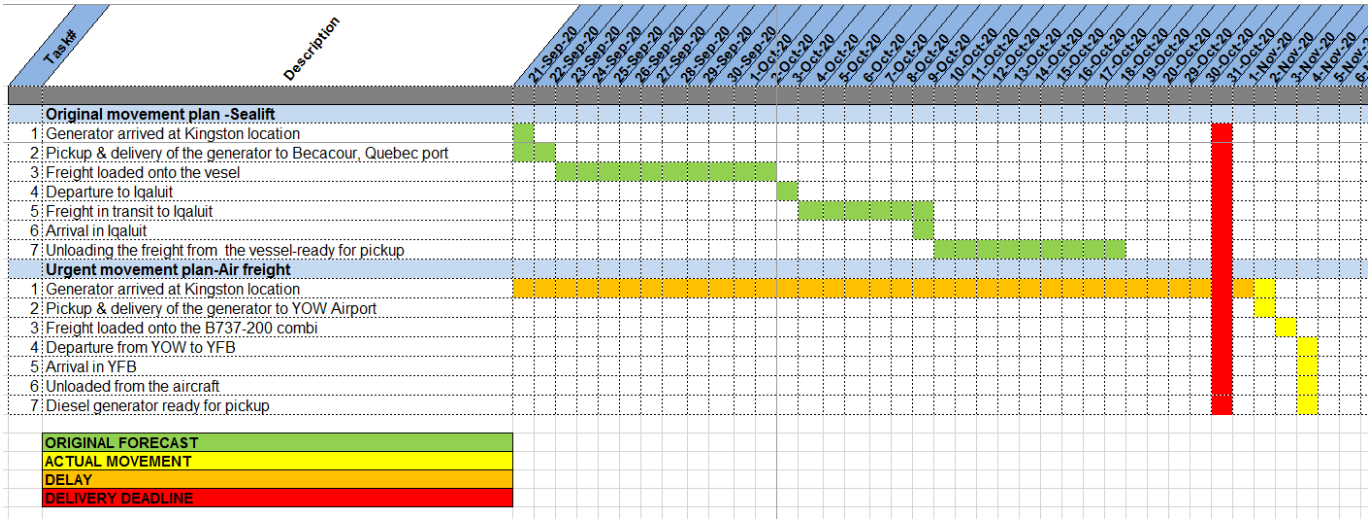
- NSSI departs on September 28th from Ste-Catherine port
- NEAS departs on October 3rd from Bécancour port

Freight needs to be tendered at least ten days before its departure, allowing the carrier to load all freight in a safe manner. The ETA is approximately 6-7 days to get to Iqaluit, but will depend on port rotation, weather and ice conditions. According to the expert carriers, freight could be unloaded at dry shore land at Iqaluit Beach by October 18th the latest. However, due to the manufacturing delay, it has become a time sensitive movement, as the last sealift cut off could not be met. The delivery is urgent as the generator must be delivered in Iqaluit as soon as

possible. The only available mode of transportation to meet the urgent deadline is via air. In Canada, there are three main carriers that provide southern connections to northern gateway airports, which are Air North, First Air and Canadian North.

The best airfreight option is a direct flight with Canadian North departing from Ottawa International Airport (YOW). This carrier operates on days 3 and 6 from YOW-YFB. If we tender the generator as soon as its available at the dealer location on November 2nd, it can catch the flight from day 3 allowing its arrival at YFB on November 4th. Table-3 also illustrates the air transportation milestones.

Table-3-Milestones project tracker



Packaging

The generator will be crated by the manufacturer for seaworthy ocean transportation. I suggest that the crate shouldn't be dismantled or replaced for air transportation, because it has been properly packed for its journey with a skid on the bottom, allowing easy handling with a forklift.

In addition, the skid can perfectly support its weight and has 4-inch clearance making it easy to manipulate (Appendix-XX).

Table-4: Diesel generator dimensions and weight

	Length (in)	Width (in)	Height (in)	Weight (Kg)
Diesel Generator on a crate with skid on bottom	94.49	47.24	70.87	1,525

Type of airplane

In remote communities like Nunavut, Canadian North primarily operates Boeing 737-200 combi (Appendix-XXI). It is an efficient, reliable and versatile aircraft that can cope with thin passenger traffic and essential cargo deliveries. Fortunately, my client's crate still fits on the unique pallet size (108"x88") used in this type of aircraft. Depending on cargo and/ or passenger volume requirements, that pallet/seating combination varies. The 108"x88" pallet allows for a small passage for the flight attendant between cockpit and rear passenger cabin. It's also an emergency passenger safety passage. Normally passengers board the 737 through the rear side door, while the pallets/containers are loaded via the large forward side door. Full large 767 freighters are only occasionally used for large full freight charter flights. Neither Canadian North nor First Air own or operate these large 767 freighters.

Transportation plan analysis

According to the manufacturer, the generator will be customs cleared and delivered at my client's location on November 2nd by 09:00 am EST. I have scheduled a pickup at 10:00 am and from there the freight will be taken to YOW airport to meet the cut off at 4:00 pm. Transit

time is approx. 2 hours. In case of any delays, we will have extra four hours to deliver the freight to its destination on time. By being precautious and considering contingencies, we can follow our transportation plan, and mitigate delays and extra charges, such as booking under a priority rate where my client will have to pay 20% more.

Road transportation

My client had advised that there isn't a dock at his location. Therefore, a straight truck with lift gate will pick up the freight with internal dimensions of 91"W x 89"H and payload of 15,000 lbs (Appendix-XXVII). I have requested an LTL pickup service and the driver will strap the generator to the inner tracking walls of the truck, for its delivery to YOW.

Air loading process

Once the crate has been loaded on the airplane pallet (Appendix-XXII), it will be strapped on before a net is placed over the cargo. Then the pallet will be loaded onto a dolly for its transportation to the airplane. Thereafter, it will be lift up automatically by the FMC Loader unit (Appendix-XXIII). Finally, the loading team will secure it on the 737 cargo hold locks.

CO_2 emissions calculation

The CO_2 calculations were obtained by using EcoTransIT platform and methodology (Appendix-XXIV), for air and sealift modes of transportation, as well as for the road portion of the journey. The distance from the dealer's location to YOW is 182 km, whereas, to Bécancour port is 440 km (Appendix-XXV). Therefore, for the road portion there is a considerable savings of 60% CO_2 emissions that will be achieved (Appendix-XXVI). Conversely, the main leg of the

journey will be done via air where the amount of emission will be 94% more than by the sealift option.

Customs clearance and documentation

The generator was Canadian Customs cleared when it crossed the border from the USA to Canada. The shipper will provide a commercial Invoice (Appendix-XXVIII) and packing list. It is not considered dangerous goods cargo, as it is a new diesel generator. According to the Special Provision A70 (Appendix-XXIX) this freight is suitable to be shipped by air as general cargo. The shipper will have to provide a Drain and Purge statement (Appendix-XXX) that will be attached with the paperwork as a proof that it has been purged. On the MAWB it will be stated that the generator can be shipped as general cargo (Appendix-XXXI).

Insurance analysis

By ocean

The cargo itself will be handled quite a bit, and typically the more times the cargo moves the risk of damage goes up. It will be received at the terminal, then loaded on board the ship. Once the vessel arrives at the destination anchorage it will be lowered by crane onto a barge. Then it will be moved to the high-water mark by loader to the beach where my client will retrieve the cargo. The general cargo can be handled up to four times during its transportation to Iqaluit by Sealift. If the generator falls off the barge into the sea, the maximum payout that the marine carrier’s legal limit of liability is CAD$ 2,775.00 per package or unit of cargo loss or damage.

By air

I have advised my client to add insurance as a precaution. The premium insurance on the air freight will be 0.17% on top of the total amount to be paid. The insurance rate is based on the commercial invoice value of the goods plus the cost of freight plus ten percent to cover additional expenses. For this project, airfreight insurance premium is less expensive than by sealift by approximately one-third. If G-logistics' client approves my proposal, they will have an all-risk insurance coverage in case of damages and losses.

Job costing

G-logistics' rates are all inclusive from the initial reception at the dealer's location until final delivery to the beach or airport. This movement is considered a domestic service and according to its destination, a 5% GST charge will apply for the freight transportation service.

AIR FREIGHT		
Kingston, ON - Iqaluit, NU Budget Quote		
Description	Transportation Rate (CAD)	
Pickup and delivery/ Collection Kingston, ON	$	375.00
Air Freight * 1525 Kg @ CAD 4.37	$	6,664.25
Cargo Screening Fee 0.15/Kg- Min 35* Lesser of (Max Rate CAD 250.00, Greater of (Min Rate CAD 35.00, 1525 Kilogram (s) @ CAD 0.15/Kg)	$	228.75
Export THC (Terminal Handling Charge) 0.15/Kg-Min 35 Lesser of (Max Rate CAD 250.00, Greater of (Min Rate CAD 35.00, 1525 Kilogram (s) @ CAD 0.15/Kg)	$	228.75
Handling- Export Base Rate CAD 50.00	$	50.00
Inland Fuel Surcharge - 20 %	$	75.00
Subtotal	**$**	**7,621.75**
GST (5%)	**$**	**381.09**
Total amount	**$**	**8,002.84**
Remarks: Air Export rate quoted Door to Airport excluding insurance, Brokerage and Local Duties and Taxes. Also excluding any storage charges. Insurance quote will be available upon request		
5% (GST) in Alberta, British Columbia, Manitoba, Northwest Territories, Nunavut, Quebec, Saskatchewan, and Yukon		

OCEAN FREIGHT	
Kingston, ON - NEAS Marine Terminal Budget Quote	
Description	Transportation Rate (CAD)
Pickup and delivery/ Collection Kingston, ON	$ 475.00
Ocean Freight break bulk* $290.43 per R.T. (2.074 R.T)	$ 602.35
SOLAS Fee	$ 20.00
Handling- Export Base Rate CAD 50.00	$ 50.00
Inland Fuel Surcharge - 20 %	$ 95.00
Subtotal	**$ 1,242.35**
GST (5%)	**$ 62.12**
Total amount	**$ 1,304.47**

Remarks:
Ocean Export rate quoted Door to Dry shore land excluding insurance, Brokerage and Local Duties and Taxes. Also excluding any storage charges. Insurance quote will be available upon request

5% (GST) in Alberta, British Columbia, Manitoba, Northwest Territories, Nunavut, Quebec, Saskatchewan, and Yukon

As discussed, there are many potential risks that exist during various modes of transportation and cargo insurance is highly recommended. Cargo insurance ensures peace of mind that my client will be reimbursed in any event of damage or loss of the cargo. Below the two insurance calculations are shown.

Airfreight Insurance Quote	
Diesel Generator	
Description	Value (CAD)
Goods Value	$ 18,000.00
Air Freight Value	$ 8,002.84
Insurance Value (10% added)	$ 28,603.12
Insurance Sell (0.16 CAD Per $100 value)	**$ 45.76**

Sealift Insurance Quote	
Diesel Generator	
Description	Value (CAD)
Goods Value	$ 18,000.00
Ocean Freight Value	$ 1,304.47
Insurance Value (10% added)	$ 21,234.92
Insurance Sell (0.75 CAD Per $100 value)	**$ 159.26**

Summary

This transportation project exemplifies a time sensitive movement to deliver a generator to a hospital in Iqaluit, NU. This community relies on diesel generators to get their electricity, making this freight very valuable. A delay in the manufacturing changed the delivery plan. The selection of the fastest route to get the freight to its final destination was challenging, because limited carriers serve the remote destination. The airplane type that flies to the region is a B737-200 combi, where the generator can be loaded to perfectly fit in the type of pallet (108”x88”) used by this carrier. It is important to mention that a reduction of CO_2 to deliver the freight in YOW will be of 60% less in comparison with its delivery to the port. The proposed plan in this project reflects immediate actions to be executed upon the generator availability notice, giving the best delivery date after original agreed date.

Conclusion

Many mineral explorations projects are taking part in the Canadian northern communities. Freight forwarders need to overcome many transportation challenges, to deliver the necessary equipment to keep these remote communities in constant development. Many of the challenges become more unpredictable due to the climate changes. A well-designed manufacturing and transportation plan are required in order to avoid risks and meet the specified deadlines. Doing so successfully also means the transportation plan, can contribute to minimizing any negative environmental impact.

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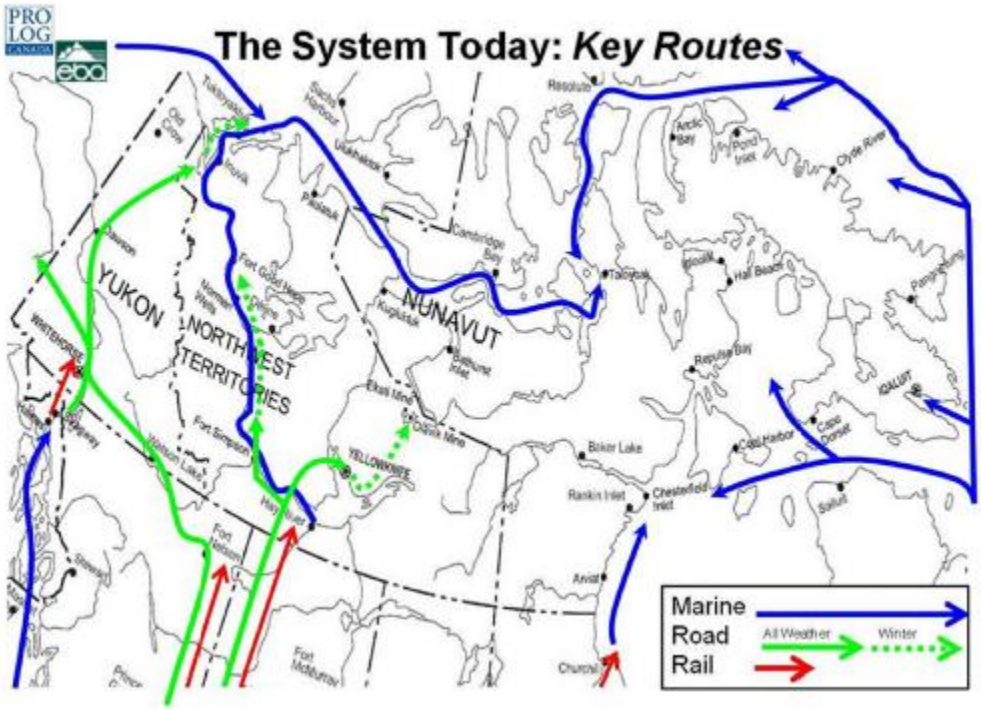
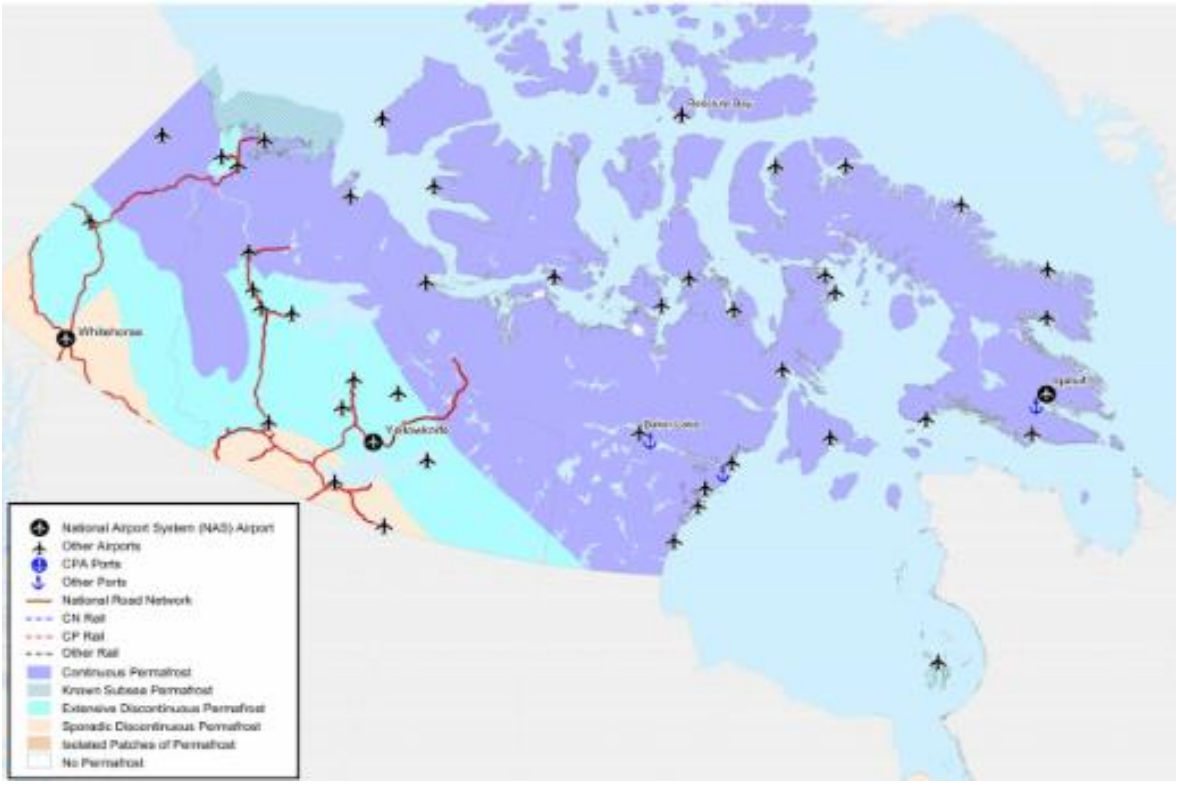
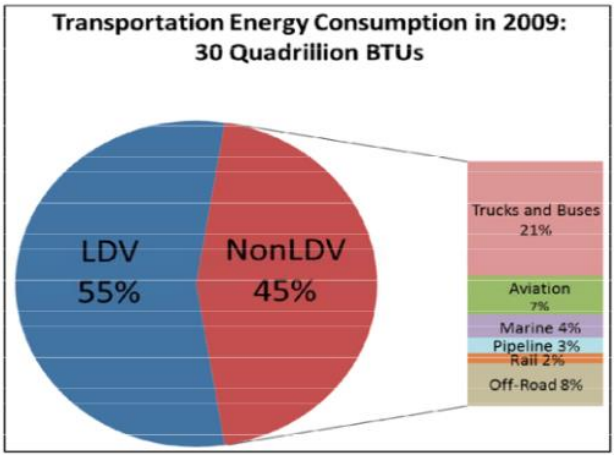
Appendices



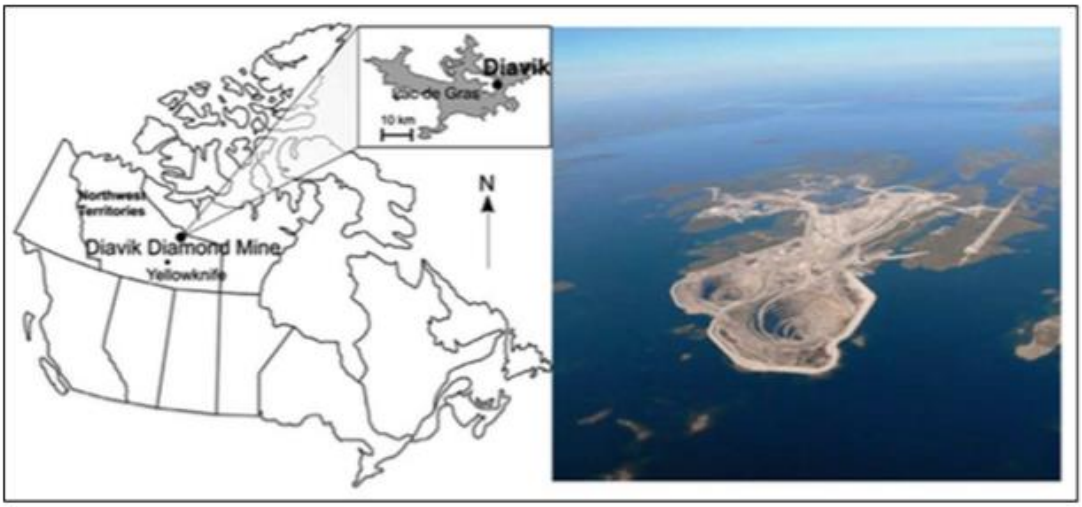
Appendix-I: Map of transportation networks (The Northern 4) & Map of principal transportation infrastructure in northern Canada. (Palko 32).



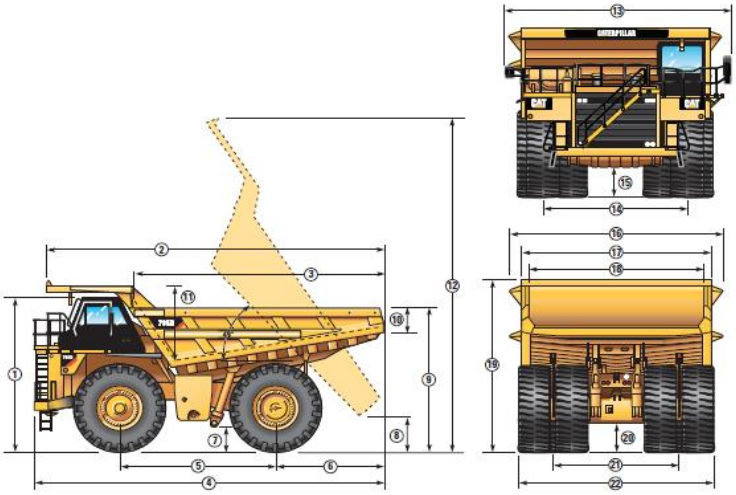
Appendix-II: The Tibbitt-to-Contwoyto winter ice road (*Diavik* 43).



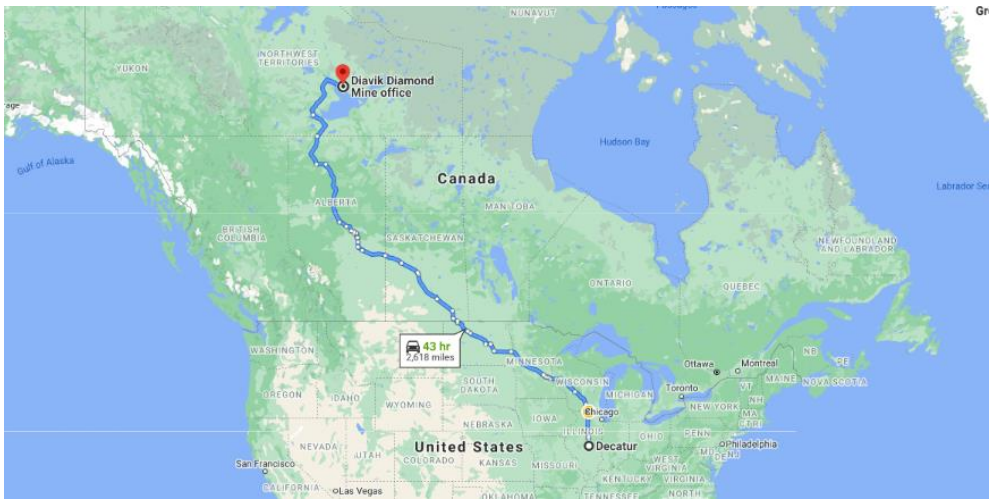
Appendix-III: Transportation energy (Gianopoulos 4).



Appendix-IV: Diavik location (*Diavik 7).*



Appendix-V: CAT-785D-truck.



Appendix-VI: Transportation route overview “CAT factory in Illinois to Diavik mine, NWT.” Map, Google Maps. Accessed 27 Nov. 2020.

Appendix-VII: Price comparison for the transportation of the tires by truck and train.

Cost Evaluation for Six tires on the rims, from Decatur, Illinois to Diavik, NWT				
Option	**Mode of Transport**	**Rates**	**Total cost**	**Transit Time**
1	**Truck** (two loads)	CAD $ 50, 500.00 x 2	CAD $101,000.00	3-4 days
2	**Rail** portion	USD $ 7988.00 + USD $45 Fuel surcharge (CAD $ 10,334.00)	CAD $ 40,349.00	20-22 days
	Truck portion	CAD $ 30,015.00		

Appendix-VIII: CN rates and CO_2 emission savings for the transportation of the six tires

Published Price(s)

Origin: Decatur, IL **Destination:** Edmonton, AB **Commodity:** Machy&Mach New **STCC:** 3599990

Available Price(s) Print Help

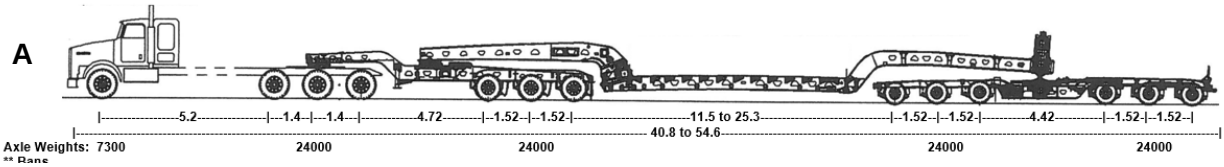
page 1 of 3 next

Price	Effective/Expiry Date	Publication # Item/Schedule	Price Reference	Equipment	Equipment Ownership	Route	Price	Price Conditions	Rail Miles	CO_2e Savings	Intermodal Price
○	2020-07-26 to 2020-12-31	CN T 001010 1060000	CN T0000001010037808	ALL CARS	All Equipment Ownership	CN	$7,728.00 USD per Car		1836	6.3 tons	
◉	2020-07-26 to 2020-12-31	CN T 001010 1060000	CN T0000001010037809	ALL CARS	All Equipment Ownership	CN	$7,988.00 USD per Car		1836	6.3 tons	

Appendix-IX: Type of trucks to be used for the chassis (A) and the body (B)

Steering 13 Axle Configuration:

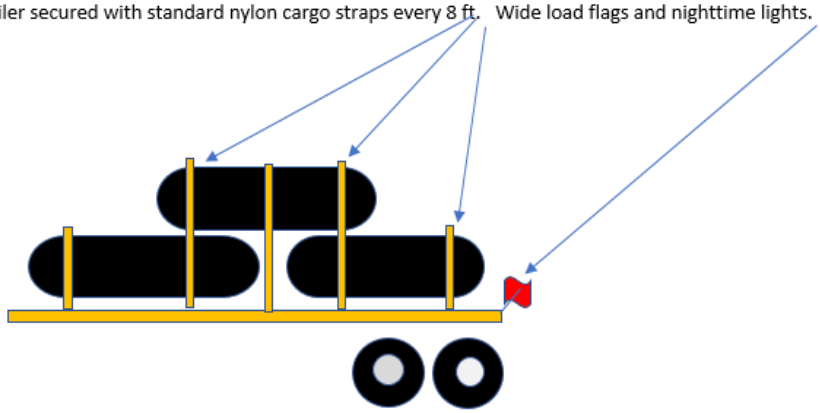
A



Steering 10 Axle Configuration:

B

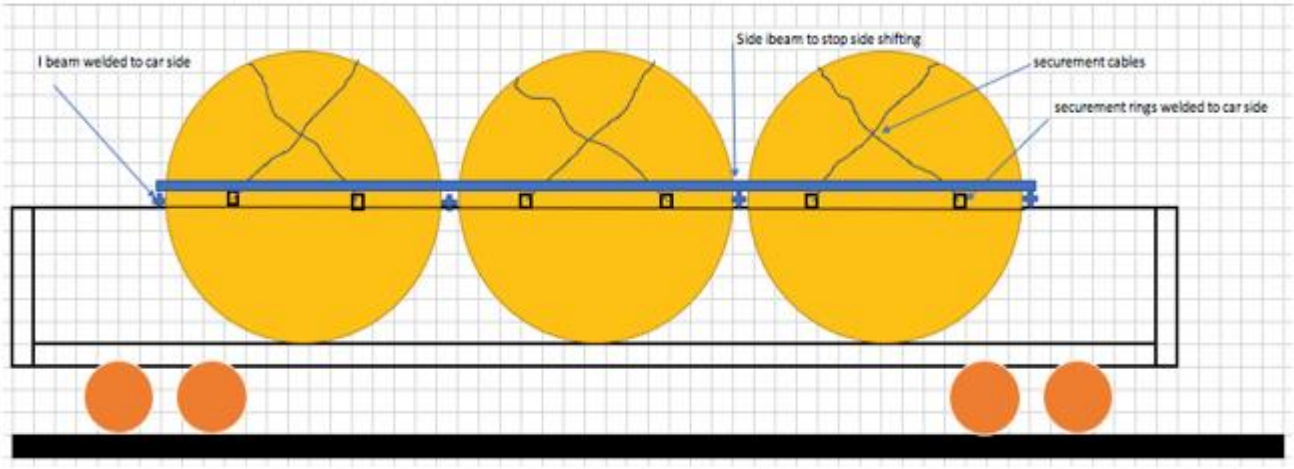
3 tires per trailer secured with standard nylon cargo straps every 8 ft. Wide load flags and nighttime lights.



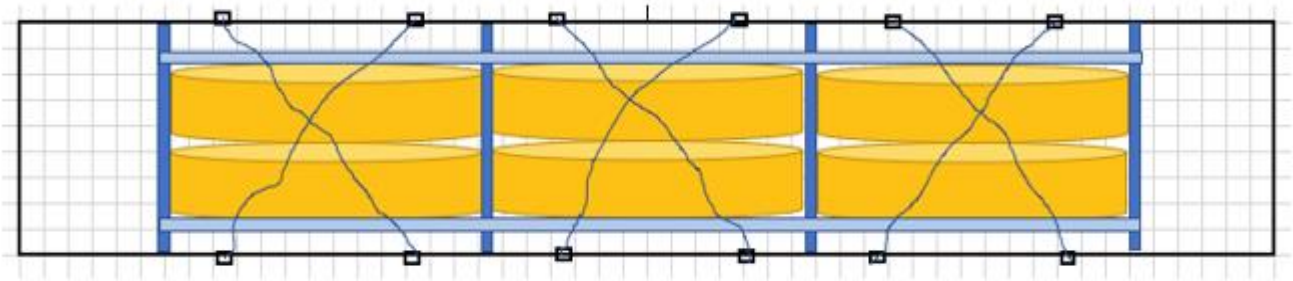
Appendix-X: Tires loaded and secured on the truck.

Appendix-XI: Tires in gondola securement side and top view

Tires side view



Tires top view



Appendix-XII: Crane for unloading the tires

Heavy Load Request - Ice Road (EXAMPLE)

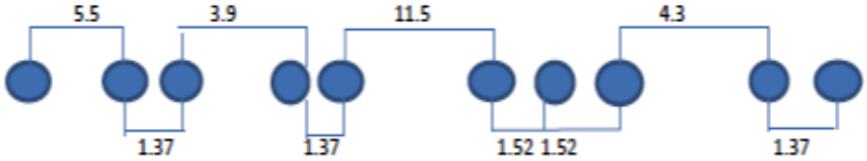
Proposed Move Date:	02-Mar	Date Submitted:	24-Feb (Tentative)
Proposed T-Time:	10:00	Time Submitted:	10:00 (Tentative)
Transport Company:	Tli Cho	Requested By:	Carrier company

Truck #	WR399
Trailer Type	10 Axle Deck

Commodity / Equipment:	785D Body
Payload (KG):	25,160
Destination:	Yellowknife to Diavik mine

Tractor & Trailer Combo	Tractor		Jeep	Trailer	Booster
	7,100	18,400	13,580	24,500	11,580

AXLE CONFIGURATION - SHOW DISTANCE (M) BETWEEN AXLES AND WEIGHT (KG) PER AXLE

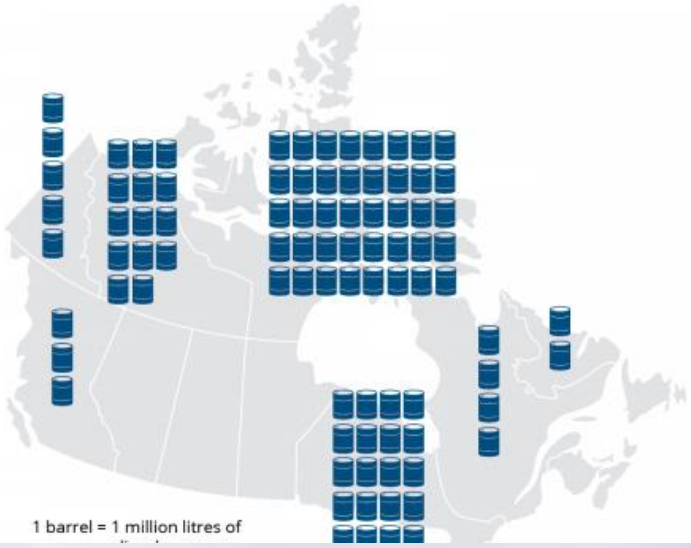


Permit #		Load Dimensions				
AB		Width	13.0	FT	3.96	M
NWT		Length	109.8	FT	33.47	M
Pilot Cars Req: #		Height	16.0	FT	4.88	M

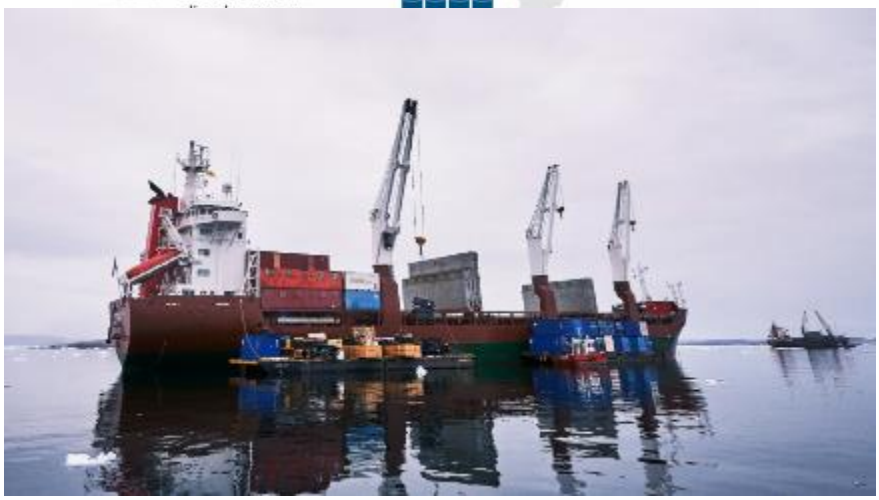
GVW	KG	75,160

Appendix-XIII: Example of a Heavy Load Request for the ice road

Appendix-XIV: Breakthrough in the NWT – ("Ice Road Truckers").



Appendix-XV: Diesel fuel consumption in Canadian communities (*The True Cost* 19).



Appendix-XVI: Sealift discharged method – (Darryl Walker-NEAS).

Appendix-XVII: Proposed Deep-water terminal facility (*Lee*).

Appendix-XVIII: Diesel Generator.

Appendix-XIX: Sales Contract

CONTRACT FOR THE MANUFACTURE AND SALES OF GOODS

This Contract for The Manufacture and Sales of Goods (the "Sales Contract") is made on **August 3rd, 2020**,

Between: Kohler Authorized Dealer (the "Seller"), a corporation organized and existing under the laws of Ontario, with its head office located at:

244 Dalton Avenue, Kingston, ON L5N 2W6

AND: Iqaluit Hospital (the "Buyer"), a corporation organized and existing under the laws of Nunavut, with its head office located at:

847 Mattaq Street, Iqaluit, NU, X0Z7H2

1. **DESCRIPTION OF MANUFACTURE AND SALE**

Seller agrees to manufacture and sell to buyer the following goods:

A brand-new Kohler diesel generator (the "goods")

2. **CONSIDERATION**

Buyer shall accept the goods and pay the sum of CAD$19,463.73 for the generator plus its transportation by sealift.

3. **PAYMENT**

Buyer agrees to pay for the goods as follows: 50% down within 7 days after execution of this agreement. Buyer shall make payment of the other 50% for the goods upon delivery before **October 31st, 2020**. The agreed Incoterm is DPU at Iqaluit Beach.

4. **DELIVERY SCHEDULE**

Seller shall send the manufacture order to his producer in the USA within one week following receipt of buyer's initial deposit. The generator shall be finished, crated and delivered on **September 17th, 2020** at the dealer's location in Kingston, ON. (Freight must be tender at port of Bécancour on **September 21st, 2020**).

Special remarks:

In case of missing the last sealift cut off, seller will be liable to ship the generator by air at his expense

Packaging Requirements

Corners of the crate should be protected by 1"x 4" wooden planks.

The thickness of the plywood must be at least ½ inch.

Wooden skids of 4" x 4" must be securely fixed (using screws/nails) under the crate to allow forklift handling. The wooden skids must cover the full length of the crate and steel straps must be placed at 4-foot intervals.

Appendix-XX: Example of the generator crated

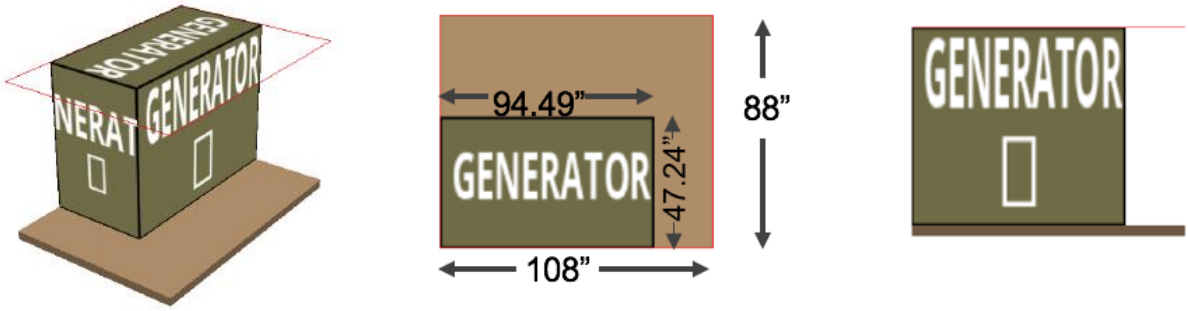
Boeing 737-200 Combi

Versatile and adaptable, the 737-200c can be configured in a variety of combinations and can land on gravel runways where other similarly-sized jets can't.

Passenger Capacity	112
Cargo Configuration	Up to 6 pallets
Combi-Configurations	112 seats / 0 pallets of cargo 76 seats / 2 pallets of cargo 60 seats / 3 pallets of cargo 34 seats / 4 pallets of cargo 24 seats / 5 pallets of cargo 6 seats / 6 pallets of cargo
Gravel Airstrips	Yes
Ice Strips	Yes
Special Features	N/A
Maximum Payload	13,600 kg (29,983 lbs)
Main Cargo Door Size	134 in x 84 in
Pallet Sizes	108 in x 88 in AAA or AAE

Appendix-XXI: Boeing 737 Combi aircraft specifications

Appendix-XXII: Different views of the crate loaded on the airplane pallet, showing length and width dimensions

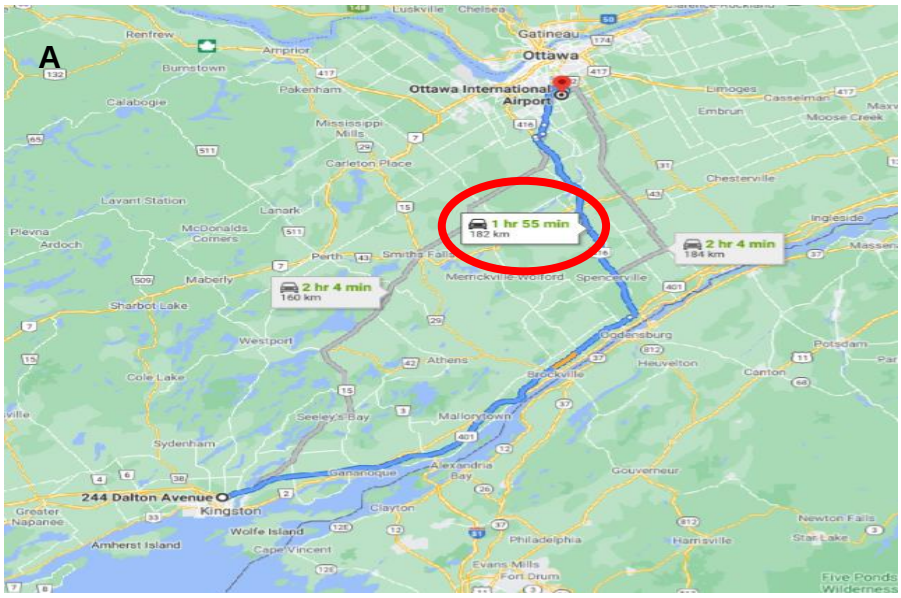


Appendix-XXIII: Image-A, dolly bringing cargo to the B737-200 combi cargo door. Image-B, FMC Loader unit with pallet (108” X88)

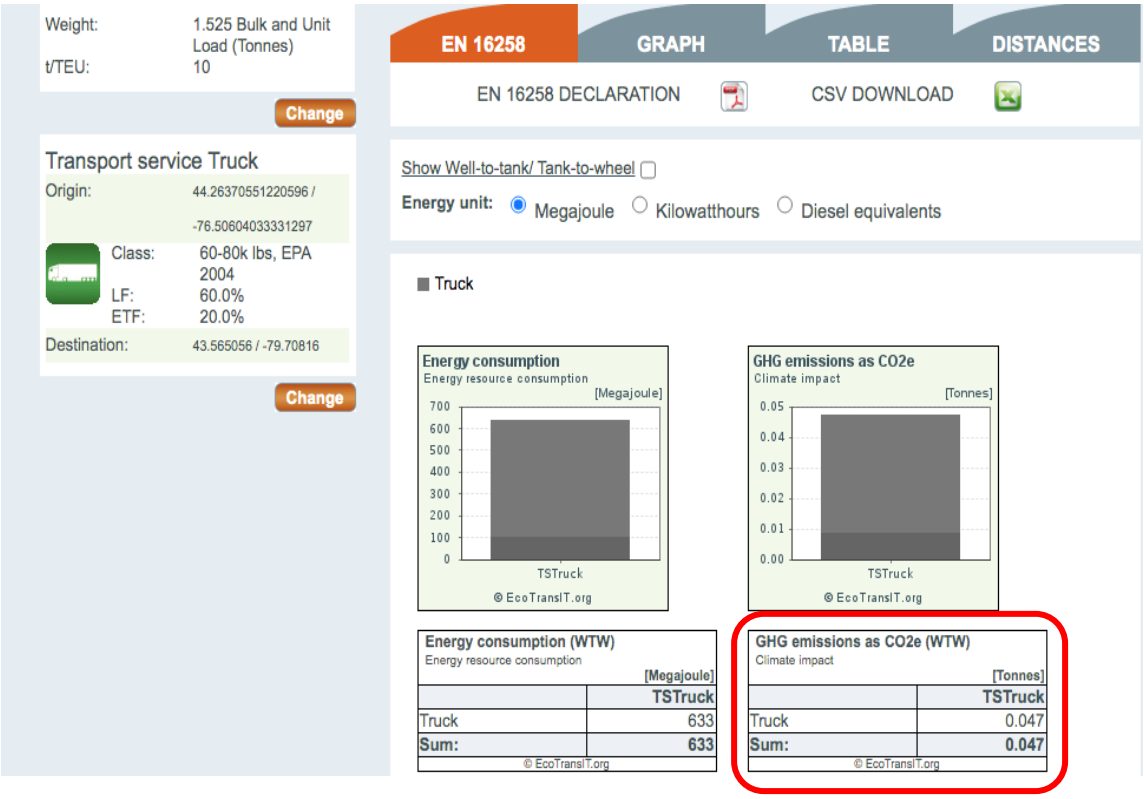
The principal calculation rule for the calculation of vehicle emissions is

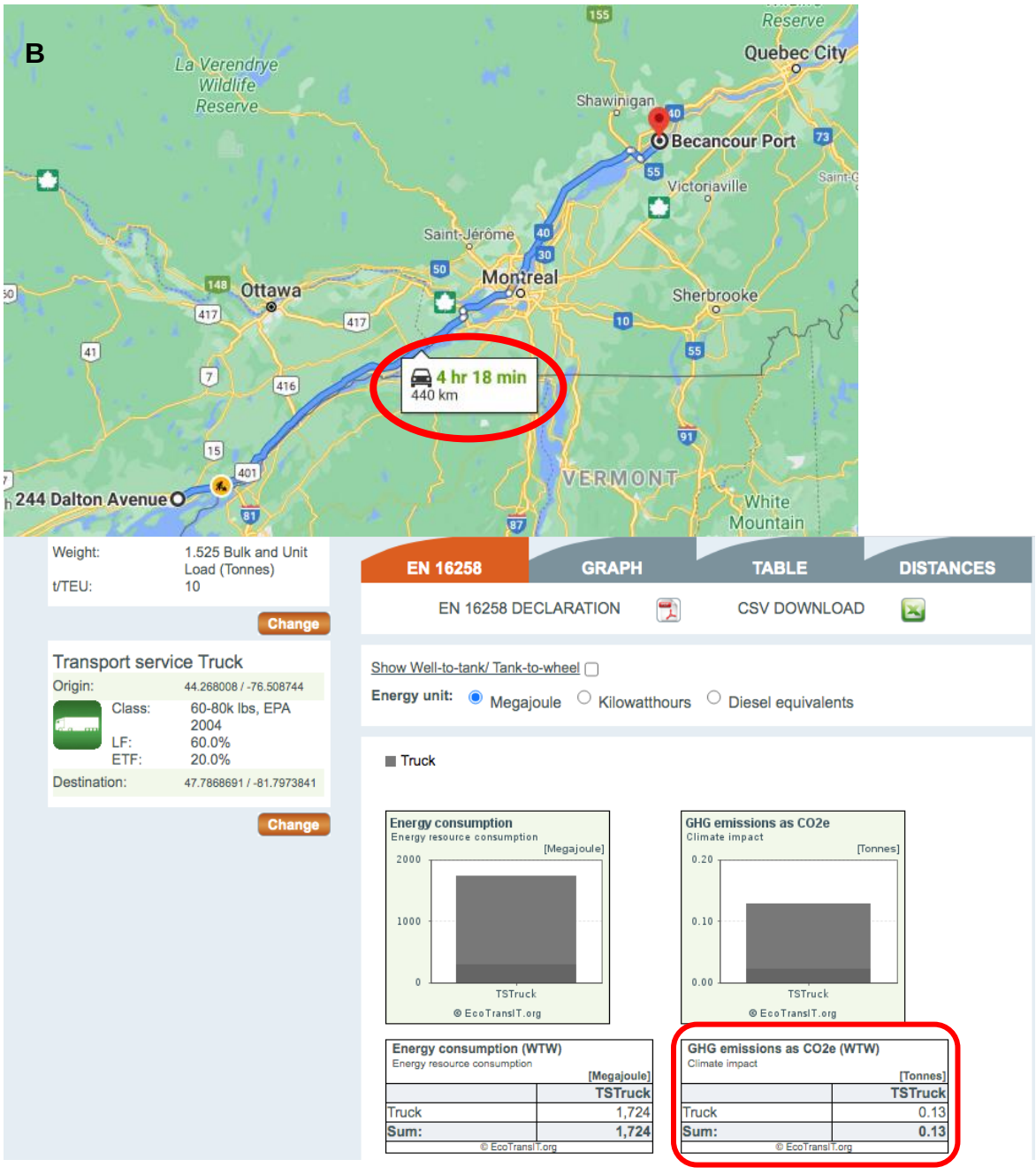
WTW energy consumption or emissions per transport =
Transport Distance
* mass of freight transported
* (TTW energy consumption or vehicle emissions per net tonne km
+ WTT energy consumption or emissions per net tonne km)

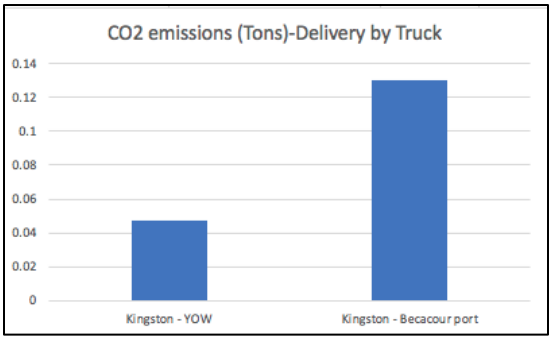
Appendix-XXIV: WTW calculation rule

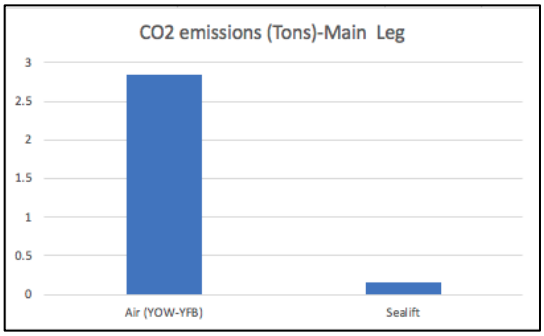


Appendix-XXV: Image-A: Transportation route overview and CO_2 emissions "Dealer location in Kingston, ON to Ottawa airport, ON." Image-B: Transportation route overview and CO_2 emissions "Dealer location in Kingston, ON, to Bécancour, Quebec." Map, Google Maps. Accessed 5 March. 2021.

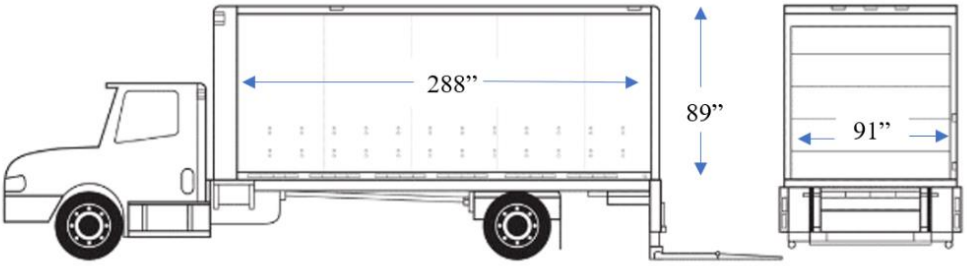








Appendix-XXVI: CO_2 emissions graphics.



Appendix-XXVII: Straight Truck (with lift Gate) inside dimensions

COMMERCIAL INVOICE

Page No. 1 of 1 Pages

SHIPPER/EXPORTER Kohler Authorized Dealer 244 Dalton Avenue, Kingston, ON L5N 2W6, CA TE +1905-824-8400	DATE: Aug. 3rd, 2020 COMMERCIAL INVOICE NO: 8878724 CUSTOMER P.O. NUMBER: 8742 DATE OF EXPORT: Sept. 17th,2020 COUNTRY OF ORIGIN: USA B/L / AWB NUMBER:
CONSIGNEE Iqaluit Hospital 847 Mattaq Street Iqaluit, NU X0Z7H2, CA	FINAL DESTINATION: Iqaluit, NU EXPORT ROUTE / CARRIER: G-Logistics TERMS OF SALE: DPU, shore land at Iqaluit Beach TERMS OF PAYMENT: 50% Net 7
NOTIFY PARTY/ INTERMEDIATE CONSIGNEE Jonathan Caludjak TE +1867- 684 - 9808	FREIGHT: ☑ PREPAID ☐ COLLECT MARKS: ***Freight needs to be delivered before Oct. 31st, 2020**

QUANTITY	DESCRIPTION	H.S. NUMBER	UNIT PRICE	TOTAL PRICE U.S.$
1	Diesel Generator	8502.13.00	18,000.00	18,000.00

SUBTOTAL	18,000.00
HANDLING	
FREIGHT	1,463.73
MISC	
Total	19,463.73

"WE HEREBY CERTIFY THIS INVOICE TO BE TRUE AND CORRECT."

Jorge Alejandro Perez

THESE COMMODITIES, TECHNOLOGY OR SOFTWARE WERE EXPORTED FROM THE UNITED STATES TO: Canada
IN ACCORDANCE WITH THE EXPORT REGULATIONS. DIVERSION CONTRARY TO U.S. LAW PROHIBITED.

Amended Commercial Invoice will show the Incoterm as DPU Iqaluit Airport

Appendix-XXVIII: Commercial Invoice

A70 Internal combustion or fuel cell engines or machinery, being shipped either separately or incorporated into a vehicle, machine or other apparatus, without batteries or other dangerous goods, are not subject to these Regulations when carried as cargo or baggage **(see 2.3.5.12)**, provided that:

(a) for flammable liquid powered engines:

1. the engine is powered by a fuel that does not meet the classification criteria for any class or division; or
2. the fuel tank of the vehicle, machine or other apparatus has never contained any fuel, or the fuel tank has been flushed and purged of vapours and adequate measures taken to nullify the hazard;
3. the shipper has provided the operator with written or electronic documentation stating that a flushing and purging procedure has been followed; and
4. the entire fuel system of the engine has no free liquid that is subject to these Regulations and all fuel lines are sealed or capped or securely connected to the engine and vehicle, machinery or apparatus.

(b) for flammable gas powered internal combustion or fuel cell engines:

1. the entire fuel system must have been flushed, purged and filled with a non-flammable gas or fluid to nullify the hazard;
2. the final pressure of the non-flammable gas used to fill the system does not exceed 200 kPa at 20°C;
3. the shipper has made prior arrangements with the operator; and
4. the shipper has provided the operator with written or electronic documentation stating that the flushing, purging and filling procedure has been followed and that the final contents of the engine(s) have been tested and verified to be non-flammable.

Multiple engines meeting the provisions of this special provision may be shipped in a unit load device provided that the shipper has made prior arrangements with the operator(s) for each consignment.

When carried as cargo and this special provision is used, the words "Not Restricted" and the Special Provision number must be included in the description of the goods on the Air Waybill as required by 8.2.6, when an Air Waybill is issued.

Appendix-XXIX: Special Provision A70 – (IATA 409).

Kohler Authorized Dealer

DRAIN AND/OR PURGE STATEMENT

Commercial Invoice number: 8878724

Date: November 2nd, 2020

To whom it may concern

I certify that this Diesel Generator is brand new, unused and recent purchased. The Generator is free of all hazardous fluids, garbage and hazardous materials to include coolants, engine oil, transmission fluid, axle and differential oil, transfer case oil, batteries and any other fluids contained in this item.

The fuel tank of this diesel generator has been flushed and purged of vapors and adequate measures taken to nullify the hazard. This product accomplishes with what the Special Provision A70 specifies and it is suitable to be shipped by air as general cargo.

Logistic manager: Jorge Alejandro Perez

Signature: _____

E-mail: jorge.perez@KohlerAD.com

Phone: +1 905-840-7700

Appendix-XXX: Drain and purge statement

Appendix-XXXI: Master Airwaybill

518 YOW 11204712 518-11204712

Shipper's Name and Address
Kohler Authorized Dealer
244 DALTON AVENUE

KINGSTON, ON L5N 2W6 CA
TE +1905-824-8400

Shipper's Account Number

Not Negotiable
Air Waybill
Issued by CANADIAN NORTH LTD.
20 COPE DRIVE,
KANATA, ONTARIO, K2M 2V8, CANADA

Copies 1, 2 and 3 of this Air Waybill are originals and have the same validity.

Consignee's Name and Address
Iqaluit Hospital
847 MATTAQ STREET

IQALUIT NU, X0Z 7H2 CA
TE + 1867- 684 - 9808

Consignee's Account Number

It is agreed that the goods described herein are accepted in apparent good order and condition (except as noted) for carriage SUBJECT TO THE CONDITIONS OF CONTRACT ON THE REVERSE HEREOF. ALL GOODS MAY BE CARRIED BY ANY OTHER MEANS INCLUDING ROAD OR ANY OTHER CARRIER UNLESS SPECIFIC CONTRARY INSTRUCTIONS ARE GIVEN HEREON BY THE SHIPPER, AND SHIPPER AGREES THAT THE SHIPMENT MAY BE CARRIED VIA INTERMEDIATE STOPPING PLACES WHICH THE CARRIER DEEMS APPROPRIATE. THE SHIPPER'S ATTENTION IS DRAWN TO THE NOTICE CONCERNING CARRIER'S LIMITATION OF LIABILITY. Shipper may increase such limitation of liability by declaring a higher value for carriage and paying a supplemental charge if required.

Issuing Carrier's Agent Name and City
G-Logistics , MISSISSAUGA, ONTORONTO

Accounting Information

Agent's IATA Code
60-1 0560/0004

Account No.

Airport of Departure (Addr. of First Carrier) and Requested Routing
OTTAWA/ MCDONALD INTL ON YOW (YOW)

Reference Number
CCA072622

Optional Shipping Information

To	By First Carrier	Routing and Destination	to	by	to	by
YOW	W8		YFB			

Currency	CHGS Code	WT/VAL PPD	WT/VAL COLL	Other PPD	Other COLL	Declared Value for Carriage	Declared Value for Customs
CAD	PP	X		X		NVD	NCV

Airport of Destination
FROBISHER BAY APT

Requested Flight/Date
W8-470/4

Amount of Insurance
XXX

INSURANCE - If Carrier offers insurance, and such insurance is requested in accordance with the conditions thereof, indicate amount to be insured in figures in box marked "amount of insurance".

Handling Information W8470/4 PLEASE NOTIFY CONSIGNEE IMMEDIATELY ON ARRIVAL.
COMMERCIAL DOCUMENTS ATTACHED TO AIRWAY BILL.

SCI

No. Of Pieces RCP	Gross Weight	Kg lb	Rate Class / Commodity Item No.	Chargeable Weight	Rate / Charge	Total	Nature and Quantity of Goods (incl. Dimensions or Volume)
1	1525.00	K	Q	1525.00	4.37	6664.25	Diesel Generator DIMS 240x120x180 CM x 1 VOL 1.525 M3 NOT RESTRICTED SP A70
1	1525.00					6664.25	

Prepaid
Weight Charge
6664.25
Collect

Valuation Charge

Tax
333.21

Total Other Charges Due Agent

Total Other Charges Due Carrier
228.75

Total Prepaid
7226.21

Total Collect

Currency Conversion Rates

CC Charges in Dest. Currency

For Carrier's use only at Destination

Charges at Destination

Total Collect Charges

Other Charges

Shipper certifies that the particulars on the face hereof are correct and that insofar as any part of the consignment contains dangerous goods, such part is properly described by name and is in proper condition for carriage by air according to the applicable Dangerous Goods Regulations.

G-Logistics

G-Logistics , MISSISSAUGA, ON
Signature of Shipper or his Agent

Executed on (date)	at (place)	Signature of Issuing Carrier or its Agent
2-NOV-20	MISSISSAUGA	Ma. del Carmen Mora

518-11204712

Laser Air Waybill - CargoWise - www.cargowise.com
Resolution 606b (Effective 1 Jul 16) compliant

Original 3 - (for Shipper)