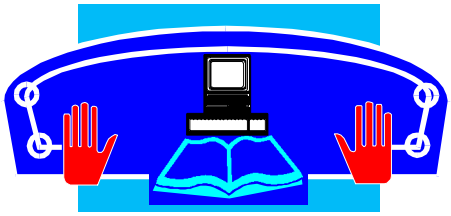

Fresh Fish For Yellowknife - An Economic Assessment Of The Economic Viability Of A Small Business Serving The Local Market

Fisheries, Great Slave Lake Fishery

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FRESH FISH FOR YELLOWKNIFE

An economic assessment of the economic viability of a small business serving the local market

Prepared for the:

Department of Economic Development ‘and Tourism

by:

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SUMMARY

This report presents findings of a feasibility assessment for a small business serving the Yellowknife market with fresh and fresh frozen fish products from Great Slave Lake.

The minimum market for local fish products in Yellowknife was based on one serving of fish per person per month. Initial sales of a trial marketing effort showed results when projected for a year would realize sales of 33,600 lbs./year. Only modest growth is required for the minimum market rate to be realized by the end of year 3.

The local market accepted the products offered at the prices charged during the trial period which combined with volumes showed projected gross annual sales to exceed $130,000.

The costs of production were based on:

- the seasonal cost of fish at FFMC prices paid to commercial fishermen adjusted for filleting losses,
- the cost of labour - two full time jobs earning minimum wage in this family business,
- the cost of power, heat and water,
- the costs of packaging materials and equipment maintenance based on studies and cost reported by others, and
- the cost of debt servicing and capital replacement.

Capital requirements were estimated for three different ventures:

- mobilizing an 800 ton barge with electrical generating and refrigeration equipment of questionable reliability in place,
- mobilizing the barge but replacing the electrical generating and refrigeration equipment with new systems scaled to the volume demand in the market,
- a Yellowknife based retail storefront operation.

All would operate under certification of Territorial Health.

Each venture showed a positive cash flow for every month of year 1 with improvements in years 2 and 3. Annual operating surpluses for year 1 shown by the financial performance assessment were:

- $22,000. for the barge with existing systems,
- $25,000. for the barge with new systems, and
- $10,000. for the storefront operation.

The proponents of this scheme have demonstrated that there is a reliable market for fresh fish in Yellowknife that will support a small business serving it. Care must be taken to keep capital costs in check so that the operation has the flexibility necessary to meet and match serious competition should it develop either seasonally or permanently.

Introduction

This report is prepared at the request of the Department of Economic Development and Tourism for the benefit of Archie Buckley. The question being examined is the economic feasibility of operating a small mobile fish processing plant on Great Slave Lake. The products produced in this plant would be kitchen ready boneless fillets marketed only in the NWT. These products would be additional to the dressed fish produced by Archie Buckley's commercial fishing operation for sale to FFMC.

Archie Buckley is one of the major producers of dressed fish on Great Slave Lake selling in excess of 100,000 lbs. to FFMC annually. He has been a commercial fisherman here since the 1950's. In that time he has also been selling fresh and fresh frozen fish to the local market in Hay River - private sales directly to households as well as to the local grocery store.

Background .

A commercial fishery has operated on Great Slave Lake continuously since 1945 when the first fish plant was established at Gros Cap at the northwest entrance of the East Arm. By 1948 the quota was 9 million pounds and the commercial fishery was active in all parts of the lake. In recent years markets for fish from Great Slave Lake have been unable to absorb all the product that could be delivered to FFMC who has begun a program of "bonuses" to producers who collectively agree to reduce overall production. This approach applies to both whitefish and lake trout. FFMC'S reduction program has two major effects on the fishery and fishermen participating in it:

1. the larger fishing operations cannot use their equipment to its full potential, and

2. production quotas are underutilized representing lost income to the overall fishery.

While the fishery was concentrating on producing for the export market, little attention was given to the opportunity of serving the local markets around Great Slave Lake with high quality fresh and fresh frozen fish. It is this local market that is the focus of this assessment.

Project Description

This is a very simple project. Its short term goal is to establish the capability to provide a high quality fresh fish product for the local market in the communities around Great Slave Lake. It would take a small portion of the day to day catch of Archie Buckley's commercial fishing operation and prepare fresh boneless fillets and market these locally. While this is easily done for domestic consumption, it is not as simple when serving a sophisticated retail market that insists on consistent high

standards of product quality and in some cases inspection certificates for facilities from appropriate health authorities.

In this venture, freshly caught fish will be selected from the daily catch of Archie Buckley's commercial fishing operation. Fish will be gutted (as with all fish caught for the FFMC export market) and put on ice. The fish destined for the local market will be taken to the filleting site and prepared in facilities that are certified for food processing under the Public Health Act (GNWT). After filleting, the product will either be put into the fresh fish market directly (on ice) or fast frozen for short term storage. This latter treatment will be necessary during the shoulder season when ice is too weak in the fall for a daily catch of fresh fish, or in the spring when the lake ice is breaking up and nets cannot be set in the commercial fishing zones of the lake.

Also there are periods during the year that coincide with ice conditions that the fish plant in Hay River does not accept fish. The closing dates in the recent past have been:

December 19	-	January 3	(16 days)
March 28	-	June 9	(74 days)
September 27	-	November 9	(44 days)

Providing fresh and fresh frozen fish fillets for the local market during these periods (134 days in all) will bring the added benefit of income during otherwise inactive periods without income.

This venture will take advantage of the seasonal change and the logistics these force on a commercial fishing operation. In summer fishing activities will occur within reach of the FFMC station at Wool Bay. Fresh fish for the Yellowknife market will be shuttled to town from delivery trips to Wool Bay. In winter fishing operations will be land based and shift locations with the growth of the ice on the lake,. starting in the North Arm and moving out from there as the ice sheet over the lake grows in area and thickness.

The assessment that follows is based on the assumptions described regarding the size of the market; discussions with Territorial Health officials and Inspection Branch of DFO; an inspection of accessible portions of the barge in question; and the data presented. No assessment was made on the profitability of Archie Buckley's current commercial fishing operation. It is assumed that it will continue in future as it has in the past and so will be a reliable source of fresh fish for the local retail and wholesale market.

Regulations

Two sets of regulations govern local sales of fresh fish by commercial fishing operations in the NWT. The federal Department of Fisheries and Oceans regulate fishing quotas and processing plants whose product is exported. The GNWT regulates the processing and preparation of foods within the NWT with the Public Health Act through the "Eating or Drinking places Regulations". The general style of

the Public Health Act addresses the qualitative aspects of serving food and beverages rather than measurable design specifications to be met by food producers and producer/processors as is envisaged by the Buckleys. The federal regulations provide design specifications that processing plants for export fish products must meet. These include numerous operational considerations as well as several specific design features. In summary these are:

1. All surfaces (floors, walls, ceilings) in wet working areas must be of impervious materials.

2. All water must have an E. coli count of less than 2 ppm. and for that reason all water and ice used should be chlorinated.

3. Freezing capacity must enable a fresh block of fish to be chilled to -21°C in 2 hours or less.

4. Fish in storage must be kept at -18°C.

The new facilities and equipment recommended for this venture are capable, under proper management of meeting federal specifications. his is done knowing that they exceed requirements of the GNWT "Eating or Drinking Places Regulations".

Resource management considerations are addressed in the federal Fisheries Act. Any licensed commercial producer is allowed, under the terms of the commercial licence, to sell fish in the local market. It is the responsibility of the commercial fisherman to maintain current records of all fish sold and make these records available to a Fisheries Officer on request for purposes of resource management and quota administration.

There are also regulations governing the tug/barge nature of this venture. There are no regulations "that explicitly regulate the operation of tug and barge operations." (correspondence with Canadian Coast (Ward, 10 November, 1993) Stability Standards in the Hull Construction Regulations require a level of stability of the towing vessel in the event that "the aftermost compartment of the vessel is flooded". (same correspondence) If this venture proceeds it is recommended that Archie Buckley review his boat specifications with Canadian Coast Guard to ensure compliance with their regulations. Relevant portions of the Stability Standards are provided in Appendix II.

Market Area and Product Demand

The economic feasibility of this venture will he based on the market in the larger communities near Great Slave Lake - Fort Smith, Hay River, and Yellowknife. The combined population for these communities is 20,865 (Fort Smith - 2,480; Hay River - 3,206; Yellowknife - 15,179; Census Canada 1991 data). Fresh water fish products from Great Slave Lake have not been available consistently in the past and so a

conservative consumption rate of 1 serving (4 oz.) per person per month is considered to be the basic market demand for the initial years Of operations. This yields a volume of !5,216 lbs. (2,371 kg) of fillets per month.

Not included in this market population are the numerous work camps and mining operations that are expected to buy fresh fish on a regular basis as the cooks learn of the products available and work them into their menu rotations.

As the market becomes familiar and knowledgeable of the high quality products available from the Buckleys, the consumption rate of local fresh and fresh frozen fish products is expected to increase.

The Buckleys have tested the Yellowknife market in an informal way since the late summer 1993. Sales for the period of October 23 to November 22 were over 2400 lbs. of fresh and fresh frozen fillets. Customers included institutions, restaurants, retail stores and a growing number of "walk-in" customers. This volume equates to a consumption rate-of 2.5 oz. per person for the month. This was achieved by starting from "scratch" with no benefit of prior advertising or aggressive marketing.

Products and Prices

Marketable species in Great Slave Lake include whitefish, lake trout, pickerel, pike, burbot, and inconnu. The 1993 fall fishery operated by the Buckleys produced whitefish, pike, burbot and pickerel. Once stronger ice has developed over deeper water, lake trout will be added to the species brought up in gill nets and prepared for local sales.

To date all sales have been for fillets, both fresh and frozen. Volumes and prices (October 23 to November 22) for these products are as follows:

pickerel:	665 @ 6.00 /lb. 285 @ 5.00 /lb. wholesale (average of 5.70 used below)
whitefish:	950 @ 4.00 /lb.
pike:	300 @ 3.25 /lb.
burbot:	200 @ 2.50 /lb.

Pickerel, like lake trout, is a seasonal species and it is assumed all the pickerel that is caught can be sold fresh in the local market. Lake trout fillets will be priced at 4.00 /lb. There is also a demand for dressed lake trout which will sell at 2.00 /lb. For those months in which both species are available projections will show trout and whitefish with equal market share. (An average price of 3.47/lb. for lake trout is used in

calculations below.)

Additional products that can be marketed in the future include cheeks, tongues and caviar. (Pickerel cheeks are sold now at 8.00 /lb.) There may also be a market for smoked inconnu. These are products that can be developed which will add revenues in the future. These additional products are not used in the feasibility assessment calculations of this review.

Projections - Annual sales volume

The volume of fillets sold in the local market will be supplemental to Archie Buckley's sales of dressed fish to FFMC. The projections that follow are based on the sales recorded in October/November 1993 and adjusted for estimated lake trout sales as indicated above.

Table 1

Projected volumes (lbs) of fresh and fresh frozen fish sold into the Yellowknife market in year one.

Month	Pickerel	Trout *	Pike	Whitefish	Burbot	Total
November	950	0	300	950	200	2400
December	950	0	300	950	200	2400
January	500	950 (250)	300	950	200	2900
February	500	950 (250)	300	950	200	2900
March	500	950 (250)	300	950	200	2900
April	0	950 (250)	300	950	200	2400
May	950	750 (250)	300	750	200	2950
June	950	750 (250)	300	750	200	2950
July	950	750 (250)	300	750	200	2950
August	950	750 (250)	300	750	200	2950
September	950	750 (250)	300	750	200	2950
October	950	750 (250)	300	750	200	2950

Total annual production for Yellowknife market: 33,600
(This is equivalent to 2.95 oz. per person per month.)

* Total monthly sales of lake trout includes volume sold dressed which is indicated in the ( ).

These overall sales volumes have held well through the fall and early winter period and so represent a reliable minimum volume upon which to base sales in the initial years of operations.

A growth factor for years two and three will be appiied to take the consumption to 4 oz per person per month for year three. For year two the factor will be 1.2 for a consumption rate of 3.5 oz per person per month (annual production 40,320 lbs.). For year three the growth factor will be 1.15 to take the consumption rate to 4 oz. (annual production in year three wiii be 46,368 lbs.).

Projections - gross revenue

The gross revenue projections that follow are based on the individual product prices and sales volumes presented above.

Table 2

Gross revenue projections from fish sales in the Yellowknife market.

Species	Pickerel	Trout	Pike	Whitefish	Burbot	Total
Monthly revenues						
November	5415.	o	975.	3800.	500.	10,690.
December	5415.	0	975.	3800.	500.	10,690.
January	2850.	3300.	975.	3800.	500.	11,425.
February	2850.	3300.	975.	3800.	500.	1,425.
March	2850.	3300.	975.	3800.	500.	1,425.
April	o	3300.	975.	3800.	500.	8,575.
May	5415	2500.	975.	3000.	500.	2,390.
June	5415	2500.	975	3000.	500.	2,390.
July	5415.	2500.	975.	3000.	500.	2,390.
August	5415.	2500.	975.	3000.	500.	2,390.
September	5415.	2500.	975.	3000.	500.	12,390.
October	5415.	2500.	975.	3000.	500.	12,390.

Total gross revenues:

Year one	38,570.
Year two (year one X 1 .2)	66,284.
Year three (year two X 1.15)	91,227.

Production Costs

This venture depends on the existing operations of a “going concern” for a source of fresh fish. Therefore, rather than deveiop a “net-up” cost of production, the cost of fish will be the price per pound paid for each species by FFMC. This is a rigorous test for the venture to pass as it assumes that there are no operating surpluses in either the summer or winter commercial fishing operations. Using the price paid by

FFMC (Table 3) as the cost base for the raw material will include the following operating costs:

- cost of fish landed, and dressed;

- all costs of transporting dressed fish from fishing grounds to market, (the price paid to the fishermen is net after FFMC deducts 1.5 cents /lb. for transport from the FFMC receiving station to Yellowknife, another 4.5 cents from Yellowknife to Hay River, and a further 10 cents from Hay River to Winnipeg for a total of 16 cents /lb. for freight to market.)

Costs of the filleting operation that will be incremental to the normal commercial fishermen' cost of production will assess three different options:

1. An operation based in Yellowknife operating from a private residence or equivalent existing space..

2. An operation based on an 800 ton reefer barge that is available from Northern Transportation and put into service with existing electrical and refrigeration systems.

3. An operation based on the 800 ton barge offered for sale by NT and refurbishing it with electrical and refrigeration systems sized to the volume of fish to be marketed.

The cost of filleting, chilling and marketing for each option will be costed and include:

- labour for filleting; minimum wage (6.50 + 6% benefits = 6.89). This venture will require two new full time positions for processing and marketing fresh fish. This computes to a cost of $.853/lb.
  (6.89 X 40 hrs.per week X 104/ 33,600 lbs.= $.853/lb.)

Note on labour costs. As this venture is a 'family operation" where labour does not represent cash paid, all labour costs will be assigned the rate of minimum wage plus a benefits factor of 6% for a total of 6.89/hr.

- cost of packaging materials and supplies - estimated to be 1.3 cents **per pound. (data taken from report on cost of operations of FFMC Wool Bay fish packing plant). This is a very generous allowance considering that fresh fish will be stored in a cooler or on ice and go** out in plastic bags. Frozen fish will be stored in plastic bags and go out with the customer in that bag.

- cost of chlorinated water is based on Yellowknife costs -
  trucked services -14 cents/gal with a water use rate of 10 gallons for 50 lbs of fillets or 2.8 cents/lb;

water and sewer **from mains is 4 cents/gal. and** for the equivalent volume is .8 cents/lb.

- cost of power for refrigeration including ice maker
  in Yellowknife -7.5 cents/lb.

  on 800 ton barge as is -66 cents/lb.

  on 800 ton barge refurbished with smaller electrical capacity and refrigeration system - 26 cents/lb.

- cost of maintaining refrigeration equipment - 1 cent/lb.
  (costs based on GNWT maintenance records for community freezers; this value is doubled for the summer period when operating a power plant on a barge.)

- cost of capital;
  800 ton barge as is (190,000 loan)
  800 ton barge with new system (190,000 loan)
  Yellowknife retail store (280,000 loan)

Cost of fish

A major cost in this approach to the cost of the final product is the cost of fish. In order to test economic viability of this venture FFMC prices for 1991/92, 1992/92 and the current year - 1993/94 are reviewed.

Table 3

The cost of fish as reflected in FFMC prices paid to fishermen FOB Winnipeg. (data courtesy FFMC, Hay River)

Year	91 /92				92/93				93/94			
FFMC Pricing Season												
	N	J	A	M	N	J	A	M	N	J	A	M
Species												
Whitefish												
sml	**.288**	**.518**	**.288**	**.248**	.444	.444	.444	.324	.44	.44	.44	.35
med	.478	.788	.478	.448	.644	.944	.644	.544	.64	.94	.64	.54
kg	.518	.838.	.518	.478	.944	1.194	.944	.574	.99	1.24	.99	.64
jbo	.568	.888	.568	.488	.044	1.294	1.044	.584	1.09	1.34	1.09	.63
Pickerel												
sml	1.52	1.52	1.52	1.42	.15	1.15	1.15	.95	1.65	1.65	1.65	1.45
med	1.62	1.97	1.62	1.47	.25	1.60	1.25	1.00	1.75	2.10	1.75	1.50
kg	1.42	1.97	1.52	1.42	1.15	1.60	1.15	.95	1.65	2.10	1.65	1.45
Pike												
	.70	.70	.70	.40	.65	.65	.65	.60	.49	.49	.49	.47
Lake trout												
<4	.50	.50	.50	.44	.50	.50	.50	.44	.50	.	5.50	0 .44
4-8	.60	.60	.60	.54	.60	.60	.60	.54	.60	.60	.60	.54
>8	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50

Burbot **FFMC** does not buy burbot and so this is a by-catch species with a landing cost of O in this approach to economic cost of fish.

N - November/December prices
J - January - March prices
A - April prices
M - May - October prices

To establish a base cost of fish used for fillets we have broken the price down to a summer and winter price based on historic FFMC prices paid to fishermen. The

prices in 93/94 are similar or higher than 91/92 and 92/93 so 93/94 prices are the cost standard that will be used in the economic viability assessment that follows. It must be remembered that while the economic assessment of this venture is based on this rigorous cost base, Archie Buckley is using his own fish and so these values do not represent a cash outlay on his part. At worst this can be considered an opportunity cost for that period of the year when FFMC is receiving fish at Hay River.

Table 4

Season	**Winter**	**Summer**
Species		
Whitefish 1	.94	.58
Pickerel 2	2.10	1.61
Pike 3	.49	.48
Lake trout 4	.60	.54
Burbot	FFMC does not buy burbot and so this is a by-catch species with a landing cost of O in this approach to economic cost of fish.	

1. cost estimated for whitefish based on average monthly winter and summer prices paid by FFMC for medium size fish (see Table 3 above).

   (The local market prefers small and medium size fish; also because the local market does not offer a premium for larger fish, it would not make sense to put fish of greater economic value into the local market.)

2. cost estimated for pickerel based on average monthly winter and summer prices paid by FFMC for medium size fish (see Table 3 above).

3. cost estimated for pike based on average monthly winter and summer prices-paid by FFMC (see Table 3 above).

4. cost estimated for lake trout based on monthly average prices for summer and winter paid by FFMC for 4-8 lb fish (see Table 3 above).

Winter prices are taken from prices posted by FFMC for January, February and March.

Summer prices are taken from prices posted by FFMC for April, May and November.

Table 5

Cost/lb. for fish fillets by month and species estimated by adjusting 1993/94 FFMC dressed weight prices for weight loss due to filleting. (S) and (W) indicate average FFMC price base from Table 4.(1)

Month	Pickerel	Trout	Pike	Whitefish	Burbot
November (S)	3.22	0.98	0.96	0.97	0.00
December (S)	3.22	0.98	0.96	0.97	0.00
January (W)	4.20	1.09	0.98	1.57	0.00
February (W)	4.20	1.09	0.98	1.57	0.00
March (W)	4.20	1.09	0.98	1.57	0.00
April (S)	3.22	0.98	0.96	0.97	0.00
May (S)	3.22	0.98	0.96	0.97	0.00
June (S)	3.22	0.98	0.96	0.97	0.00
July (S)	3.22	0.98	0.96	0.97	0.00
August (S)	3.22	0.98	0.96	0.97	0.00
September (S)	3.22	0.98	0.96	0.97	0.00
October (S)	3.22	0.98	0.96	0.97	0.00

(1) Filleting recovery rates from dressed fish are used as follows:

Pickerel	50 %
Trout	5570
Pike	50 %
Whitefish	60 % (filleting recovery rates provided by DFO, Hay River)

Capital Requirements

The market for fresh fish in Yellowknife can be served in various ways. This assessment examined two that are based on the 800 ton barge as proposed by Archie Buckley. For comparison purposes, a third more conventional retail operation is assessed. Ail would have the same capacity to produce fresh and fresh frozen fish from Great Slave Lake as each depends entirely of the ongoing commercial fishing activity of Archie Buckley. Two would operate from barge mounted filleting stations while one would be based in Yellowknife. The level of capitalization is different for each. All would operate under a certificate from the GNWT Environmental Health Officer.

No assumptions are made regarding the Buckley's residence requirements. All options assume that the operation will work from a Yellowknife location for the winter months (November through June of every year). Territorial Health requires a physical separation between a certified facility and a domestic residence.

1. The 800 ton barge.

The Northern Transportation Company has offered to sell a large inactive reefer barge (34' x 168') for $50,000. This barge has an 800 ton load capacity and once transported frozen goods to all the communities on the Mackenzie River. It has a reefer capacity of 29,000 cubic feet in 8 separate waik-in (maybe drive-in) freezers. it is equipped with a self contained electrical system powered by 2 Caterpillar D320 gensets each with 50 kw output. It has a fuel tank capacity of 50,000 litres. The refrigeration system is evaporator coils run from 3 separate York compressors. Each walk-in freezer has individual controls. The cost of mobilizing this unit "as is" was estimated as part of this evaluation. NT examined the barge and power system and Butcher's & Packers Ltd. out of Grande Prairie inspected the refrigeration system. Since the power plants have not run for many years all inspections were done without a "load" on the system and have produced preliminary estimates on the basis of a worst case scenario where all major units of the systems would have to be replaced or overhauled. The preliminary cost estimates are as follows:

• seaworthiness inspection, inside and out -	4,800.
structural repairs (est. by NT)	10,000.
.overhaul, clean and load test aiternators-	2,400.
.test electrical circuits and equipment-	4,950.
.overhaul two caterpillar diesel engines-	10,800.
.replace (if necessary) refrigeration compressors	35,700.
Cost estimate to mobilize barge (without contingency)	68,650.

Note: It may be that the compressors and evaporators in the existing refrigeration system are sound and need not be replaced but only rearranged to meet new duties.

These estimates aiso assume that the electrical wiring in the barge will meet current codes and can be served by Northlands when tied up at Yellowknife for the winter.

Archie Buckley is confident that his commercial fishing boat is capable of controlling this barge and moving it from one location to another on Great Slave Lake.

Refurbishing barge for new duties.

The mobilised barge would be put into service as a fish processing plant and therefore require several modifications. The volume of fish to be produced for the local market can be served by a 10' X 12' waik-in freezer, an 8' X 8' blast freezer, and an 8' X 8' walk-in cooler (specifications prepared by Butchers and Packers Ltd.) These could all be built within the existing walk-in freezer (@ 430 square feet) adjacent to the engine room with sufficient space left in that room for ice storage and wet

working space for filleting.

New equipment and tankage could be set up in the existing engine room or in either of the rooms across the passage way. All loose paint would have to be removed and all surfaces in active use repainted. The existing insulated floor in the wet working area would be taken down to the steel deck for an impervious surface under all wet working areas. For work in winter it is recommended that the wet working area floor be insulated from below with rigid insulation. ($500. included in estimates to insulate 200 square feet to an R-24 value). A pressure system for chlorinated water would be installed. The water system would include a tank for storage in winter and for summer use of delivered water when the barge was tied up in Yellowknife in the vicinity of other barges, boats, float planes and contaminated run-off water which could taint the fish. The water system also includes a sewage holding tank and lift pump so that all tankage can be at floor level. An ice maker is required for chilling and storing fish and fillets.

The costs below do not include any renovations for retailing or merchandising. The retail strategy is very simple, the fillets go from cooler to customer with a brief stop on the scales.

Note: The costs below do not include renovations of any space on the barge not required for processing or storing fish in the monthly volumes indicated.

Costs of renovations and additions	
Sandblasting - rental and materials	5,000.
Exterior painting - materials	8,500.
Floor and wall renovations - materials/paint	6,000.
Labour - painting and renovations -400 hours	2,750.
Pressure system including tankage and chlorinator	6,000.
Space heater installed	1,000.
Ice maker 100 lbs/hr.	12,241.
back-up 50 lbs/hr. (est)	10,000.
Filleting table and sinks	3,415.
Vac packer (used)	3,895.
Electronic scales - counter	995.
floor	1,795.
Grinder	695.
Total renovations/additions	62,286.

Summary of capital costs:

Purchase cost	50,000.
Inspections and overhaul	68,650.
Renovations and additions	62,286.

Total (without contingency)	180,936.

The overall capital requirements (190,000) amortised over 15 years at current rates of interest (8%) yields a monthly payment of 1,801,49. If this cost is spread out over a yearly production of 33,600 lbs., as shown above for year one production, we find the cost of and debt servicing and capital replacement to be $.643/lb. (Canadian Mortgage Payments, Second Edition, Barron's).

The operating costs of this barge with the equipment in place is estimated on the following assumptions.

The power plants will run 50% of the time at 50% capacity or less consuming 14 litres per hour for a 100 day summer fishing season for a cost/lb. of $.66 for the summer production. For the remainder of the year the barge could be tied up at Yellowknife and be hooked up to the grid and be served by trucked. water and sewer whose costs are given above. The winter heating costs are estimated to be the equivalent of 75 gallons per month for 8 months or 5.8 cents/lb. The capital and operating costs of heating with fuel oil or propane are similar. The genset requires fuel oil storage and pumping and so a simple fuel oil space heater is recommended for supplying heat to the wet working space and mechanical room.

Summary of input costs ($/lb.) on 800 barge with existing systems:

summer (1 1,800 lbs.)	electrical (all systems)	.66
(July through October)	equipment maintenance (est)	.02
	filleting	.853
	packaging	.013
	water/sewer	0.00
	loan servicing/insurance (.643 + .015)	.658
	Total ($/lb.)	2.204
winter (21 ,800 lbs.)	electrical (cooler and ice maker)	.075
(November through June)	equipment maintenance	.01
	water/sewer (trucked)	.028
	filleting	.853
	packaging	.013
	heating	.058
	loan servicing/insurance (.643 + .015)	.658
	Total	1.695

As this venture would depend on borrowed capital, it would have to be insured. An insurance quote has been requested but cannot be provided on the barge without a sea worthiness inspection. An estimate of $500 per year or .01 5/lb. has been

included in the amount indicated above. (Estimate from Archie Buckley based on rates paid for boats).

Table 6 integrates these input costs with the cost of fish to provide a profit/(loss) estimate for each species on a month by month basis. Table 7 shows overall revenues based on profit/(loss) estimates and volumes from Table 1.

Table 7 shows a positive cash flow in every month of the year from a barge based operation using existing electrical and refrigeration systems.

Table 6

Monthly profit(loss)/lb. by species and month operating the barge as is with a $190,000 loan. These values are derived by subtracting the cost of fish fillets (Table 5) and the input costs, from Buckley's sale price for each species given above.

Month	Pickerel	Trout	Pike	Whitefish	Burbot
November	0.79	0.80	0.60	1.34	0.81
December	0.79	0.80	0.60	1.34	0.81
January	(0.20)	0.69	0.58	0.74	0.81
February	(0.20)	0.69	0.58	0.74	0.81
March	(0.20)	0.69	0.58	0.74	0.81
April	0.79	0.80	0.60	1.34	0.81
May	0.79	0.80	0.60	1.34	0.81
June	0.79	0.80	0.60	1.34	0.81
July	0.28	0.29	0.09	0.63	0.30
August	0.28	0.29	0.09	0,83	0.30
September	0.28	0.29	0.09	0.83	0.30
October	0.28	0.29	0.09	0.83	0.30

Table 7

Monthly and annual net operating revenue for the 800 ton barge as is estimated on the basis Of profit/loss per lb. (Table 6) multiplied by the monthly volume of fillet sales (Table 1).

Month	Pickerel	Trout	Pike	Whitefish	Burbot	Total
November	745.75	0.00	178.50	1,268.25	161.00	2,353.50
December	745.75	0.00	178.50	1,268.25	161.00	2,353.50
January	(97.50)	650.75	172.50	698.25	161.00	1,585.00
February	(97.50)	650.75	172.50	698.25	161.00	1,585.00
March	(97.50)	650.75	172.50	698.25	161.00	1,585.00
April	0.00	755.25	178.50	1,266.25	161.00	2,363.00
May	745.75	596.25	178.50	1,001.25	161.00	2,662.75
June	745.75	596.25	178.50	1,001.25	161.00	2,682.75
July	262.20	214.50	25.80	619.50	59.20	1,181.20
August	262.20	214.50	25.80	619.50	59.20	1,181.20
September	262.20	214.50	25.80	619.50	59.20	1,181.20
October	262.20	214,50	25.80	619.50	59,20	1,181.20
	3,739.-30	4,758.00	1,513.20	10,380.00	1,524.80	21,915.30

Total net revenues:

year one	21,915.30
year two (year one X 1.2)	26,298.36
year three (year two X 1.15)	30,243.11

2. The 800 ton barge with a new and smaller electrical/refrigeration plant.

This configuration assumes that the existing systems in the barge are too large for the scale of operation needed to serve the Yellowknife market and the mobilizing costs too unpredictable. Therefore it will be renovated as per the above description but be outfitted with new electrical and refrigeration systems that are sized to the volume of product to be handled. Like the system described above, it would have to carry its own backup systems. The capital requirements are given below.

Renovations/additions (same as above)	62,286.
Refrigeration system	
Cooler equipment	8,530.
Blast freezer equipment	14,370.
Walk-in freezer equipment	7,185.
Refrigeration system set up costs	15,000.
35 KW Genset with 20 KW backup (new) with accessories	25,000.
Barge - including inspection and repairs .	65,000.
Total - without contingency	197,371.

The overall capital requirements (200,000) amortised over 15 years at current rates of

operation with new gensets and refrigeration units.

Table 8

Monthly profit(loss)/lb. by species and month operating the barge with new electrical and refrigeration systems and a $200,000 loan. These values are derived by subtracting the cost of fish fillets (Table 5) and the input costs, from Buckley's sale price for each species given above.

Month	Pickerel	Trout	Pike	Whitefish	Burbot
November	0,75	0.76	0.56	1.30	0.77
December	0.75	0.76	0.56	1.30	0.77
January	(0.23)	0.65	0.54	0.70	0.77
February	(0.23)	0.65	0.54	0.70	0.77
March	(0.23)	0.65	0.54	0.70	0.77
April	0.75	0.76	0.56	1.30	0.77
May	0.75	0,76	0.56	1.30	0.77
June	0.75	0.76	0.56	1.30	0.77
July	0:64	0.65	0.45	1.19	0.66
August	0.64	0.65	0.45	1,19	0.66
September	0.64	0.65	0.45	1.19	0.66
October	0.64	0.65	0.45	1.19	0.66

Table 9

Monthly and annual net operating revenue for the 800 ton barge with new electrical and refrigeration systems estimated on the basis of profit/loss per lb. (Table 8) multiplied by the monthly volume of fillet sales (Table 1).

Month	Pickerel	Trout	Pike	Whitefish	Burbot	Total
November	713.45	0.00	168.30	1,235.95	154.20	2,271.90
December	713.45	0.00	168.30	1,235,95	154.20	2,271.90
January	(114.50)	618.45	162.30	685.95	154.20	1,486,40
February	(114.50)	618.45	162.30	685.95	154.20	1,486.40
March	(114.50)	618.45	162.30	665,95	154,20	1,486.40
April	0.00	722.95	168.30	1,235.95	154.20	2,281.40
May	713,45	570.75	168.30	975.75	154.20	2,582.45
June	713.45	570.75	168.30	975.75	154.20	2,582.45
July	609.90	489.00	135.60	894.00	132.40	2,260.90
August	609.90	489.00	135.60	894.00	132.40	2,260.90
September	609.90	489.00	135.60	894.00	132.40	2,260.90
October	609.90	489.00	135.60	894.00	132.40	2,260.90
	4,949.90	5,675.80	1,870.80	11,233.20	1,763.20	25,492.90

Total net revenues:

year one	25,492.90
year two (year one X 1 .2)	30,591.48
year three (year two X 1.15)	35,180.20

3. AYellowknife base

This approach would see capital investment in an existing commercial building (501 2-53rd St.) set up as a retail store with refrigeration equipment in place. The only additional hardware that would be purchased is an ice maker, grinder and vacuum packaging unit. All remaining requirements are in place.

Capital costs:

property	259,000.
ice maker	12,241.
grinder	695.
vac packer	3,895.
Total	275,831.

Yellowknife retail store as base of operations - input costs:

filleting	.853
packaging	.013
water/sewer	.008
electrical	.075
heat	.075
equipment maintenance	.01
property taxes/insurance (est.)	.24
loan servicing (280,000)	.948
Total	2.222

Insurance is estimated to cost 1,500/annum.

Table 10 integrates these input costs with the cost of fish to provide a profit/(loss) estimate for each species on a month by month basis. Table 11 shows overall " revenues based on profit/(loss) estimates and volumes from Table 1.

Table 11 shows a positive cash flow in every month of the year for a Yellowknife retail type operation.

Table 10

Profit/(loss)/lb. by species and month for an operation of a Yellowknife retail StOre with a $280,000 loan. These values are derived by Subtracting the cost of fish fillets (Table 5) and the input costs, from Buckley's sale price from each species given above.

Month	Pickerel	Trout	Pike	Whitefish	Burbot
November	0.26	0.27	0.07	0.81	0.28
December	0.26	0.27	0.07	0.81	0.28
January	(0.72)	0.16	0.05	0.21	0.28
February	(0.72)	0,16	0.05	0.21	0.28
March	(0.72)	0.16	0.05	0.21	0.28
April	0.26	0.27	0.07	0.81	0.28
May	0.26	0.27	0.07	0.81	0.28
June	0.26	0.27	0.07	0.81	0.28
July	0.26	0.27	0.07	0.81	0.28
August	0.26	0.27	0.07	0.81	0.28
September	0.26	0.27	0.07	0.81	0.28
October	0.26	0.27	0.07	0.81	0.28

Table 11

Monthly net operating revenue for the venture operating from a Yellowknife retail store. These values are estimated on the basis of profit/loss per lb. (Table 10) multiplied by the monthly volume of fillet sales (Table 1).

Month	Pickerel	Trout	Pike	Whitefish	Burbot	Total
November	245.10	0.00	20.40	767.60	55.60	1,088.70
December	245.10	0.00	20.40	767.60	55.60	1,088.70
January	(361 .00)	150.10	14.40	197.60	55.60	56.70
February	(361 .00)	150.10	14.40	197.60	55.60	56.70
March	(361 .00)	150.10	14.40	197,60	55.60	56.70
April	0.00	254.60	20.40	767.60	55.60	1,098.20
May	245.10	201.00	20.40	606.00	55.60	1,128.10
June	245.10	201,00	20.40	606,00	55.60	1,128.10
July	245.10	201.00	20.40	606,00	55.60	1,128.10
August	245.10	201.00	20.40	606.00	55.60	1,128.10
September	245.10	201.00	20.40	606.00	55.60	1,128.10
October	245.10	201.00	20.40	606.00	55.60	1,128.10
	877.80	1,910.90	226.80	6,531.60	667.20	10,214.30

Total net revenues:

year one	10,214.30
year two (year one X 1 .2)	12,257.16.
year three (year two X 1.15)	14,095.73

CONCLUSIONS

1. Archie Buckley has shown that there is a reliable market for fresh fish from Great Slave Lake in Yellowknife exceeding 30,000 lbs./year (gross sales of $138,000 in year 1) and that it can be sewed by an operator with a steady supply of fresh fish capable of producing high quality fillets in a certified facility on a sustained basis.

2. A modest capital investment for stainless steel filleting tables, an ice maker and basic refrigeration equipment set up in 500 square feet with a concrete floor and chlorinated water is needed for a certified facility by Territorial Health inspectors for preparing fresh fish for sale in Yellowknife.

3. An operation, based on a mobile barge, as outlined in this feasibility assessment can operate on a break-even basis but may be vulnerable in the event that another producer enters the market with products of similar quality but lower prices.

RECOMMENDATIONS

Archie Buckley should proceed with sufficient capital to establish an operation which has the capacity to produce fresh fillets on a sustained basis in a facility that meets Territorial Health standards.

Appendices

1. CONSULTATIONS
2. SUPPLIERS AND QUOTES
3. NWT HEALTH REGULATIONS
4. COAST GUARD TUG/BARGE REGULATIONS
5. NEW EQUIPMENT DESCRIPTIONS
6. ESTIMATES FOR REFITTING 800 TON BARGE

APPENDIX 1. CONSULTATIONS

Appendix 1

Consultations conducted in the **course of this evaluation**

Department of Fisheries and Oceans

Pat Bobinski - Hay River
George Low - Hay River
Burt Hunt - Yellowknife
Grant Pryznyk - Yellowknife

Department of Economic Development and Tourism

Paul Wiedrick - Hay River
Richard Zieba - Yellowknife
John Colford - Yellowknife
Roland Bailey - Yellowknife

NWT Department of Health

Jack MacKinnon - Yellowknife
Frank Hamilton - Yellowknife

NWT Department of Renewable Resources

Len Colosimo - Yellowknife

Northern Transportation Company Limited

Bob Grant - Hay River
Paul Preville - Edmonton

Freshwater Fish Marketing Corporation

Dave Bergunder - Hay River

Numerous suppliers as indicated in Appendix 2.

APPENDIX 2 SUMMARY OF SUPPLIERS AND QUOTES

Appendix 2 Sources of quotes for materials and equipment

Refrigeration, Filleting Tables, Grinder and Scales

Butchers and Packers Supplies
11449-98 Ave. Grande Prairie
Telephone 5380989
Fax 5328903

Blast Freezer Unit

HB317UL Hussmann 3 HP air cooled low temp. condensing unit with control panel and accessories R-22 220 single phase	5,895. ea.
KUC123CED Evaporators	1,335. ea.

Walk-in Freezer Unit

HB317UL Hussmann 3 HP air cooled low temp. condensing unit with control panel and accessories R-22 220 single phase	5,895. ea.
KUCI 23CED Evaporators	3,335. ea.

Walk-in Cooler Unit

H73VSK Hussmann 3/4 HP air cooled medium temp. condensing unit with control panel with accessories R-22 220 single phase	3,290. ea.
R775 Reconditioned Evaporators	525. ea.
Intake louvre 3' X 6' with exhaust fan and stat	900. ea
Installation of above equipment	15,000.

NOTE: costs estimated only one condenser and evaporator as backup for both walk-in and blast freezer.

Icemaker

FM2402AE32A Scottsmann 24001 b/24hr flaker with BH800 ARE bin	12,241.
50lb./hr. output estimate	10,000.

Vat-packer

To handle 12 **inch fillets (reconditioned unit)**	**3,895.**

Grinder

To handle 50 lb./hr.	**695.**

Scales

Counter (provides weight, price, total)	**995.**
Floor to handle 200 lbs.	**1,795.**

Filleting Table and accessories

3 compartment s/s sink with faucet, overhead spray and immersion heater	**1,895.**
SSBT9630 fish fillet table (30' X 96') with poly top and undershelf	**1,520.**

NOTE: Rough opening sizes for equipment should be requested of supplier of refrigeration equipment before freezer and cooler boxes are built.

Electrical Generators

Cummins Alberta
14755- 121A Ave.
Edmonton, Alberta

Telephone 4552151
Fax 4549512

35 KW Genset		
Model 35 DGBB	**budget price**	**10,902.**
20 KW Genset		
Model 20 DKAE	**budget price**	**9,937.**

Sandblasting and Painting

Sandblaster rental

Rentco
Peace River
Telephone 624-4646

sandblaster	1,640./month
abrasive	35./1 00 lb.
uses 100 lb. per hour.	
estimated 100 hrs for the job.	

Paint

Enduro Manufacturing
Edmonton
Telephone 451-4242

Paint that is regularly used on oilpatch equipment costs about $1.00 to $1.50 /square foot. There are roughly 7,000 square feet of exposed metal on the barge not including the roof. For the best results, 1 was told that three costs would be needed which would be good for 10 years of exposure to wind and weather.

Two coats of high quality general purpose paint will cost around 15 cents per square foot for material alone.

Tanks and pressure system

Bartle and Gibson
Yellowknife
Telephone 9202248

1000 gallon water tank	1,135.
1700 gallon sewer tank	1,980.
sewer lift pump with 30 gal. tank	580.
chlorinator	1,800.
pressure pump with controls, wash stand and accessories	500.

Space heater

JSL
Yellowknife
Telephone 8732856

Fawcet space heater, 33,500 BTU	760.
Chimney and fittings (est.)	240.

APPENDIX 3 NWT HEALTH REGULATIONS

CHAPTER P-14

PUBLIC HEALTH ACT

EATING OR DRINKING PLACES REGULATIONS

INTERPRETATION

1. In these regulations,

"approved" means approved in writing by a Health Officer; *(approuvé)* .

"common usc" means the use of an article or thing by more than one person without it being thoroughly cleansed and sterilized after each use: *(usage commun)*

"eating or drinking place" means any place, boat or vehicle where food or drink is prepared. cooked, stored, or served, with or without charge, except a private home; *(établissement de restauration ou débit de boisson)*

"employee" means a person who

(a) is employed in an eating or drinking place, and

(b) handles or comes in contact with any utensil or with food during its preparation, service or storage; *(employé)*

"operator" means a person who by himself or herself or an agent owns or operates an eating or drinking place; *(exploitant)*

"single service container" means a container or utensil that is to be used once oniy and then discarded; *(contenant jetable)*

"vermin" means rats, mice, cockroaches, flies, bedbugs and any other similar animals or insects. *(vermine)*

CHAPITRE **P-14**

LOI SUR LA SANTÉ PUBLIQUE

RÈGLEMENT SUR LES ÉTABLISSEMENTS DE RESTAURATION ET LES DEBITS DE BOISSON

DEFINITIONS

1. Les definitions qui suivent s'appliquent au présent règlement.

«approuvé» Approuvé par écrit par un agent de la santé. *(approved)*

«contenant jetable» Contenant ou ustensile qui n'est utilisé qu'une seule fois et qui est ensuite jeté. *(single service container)*

«employé» Personne qui :

a) est employée clans un établissement de restauration ou un debit de boisson;

b) manipule ou touche des ustensiles ou des aliments au tours de la préparation, du service ou de i 'entreposage de la nourriture. *(employee)*

«établissement de restauration ou débit de boisson» Tout lieu, bateau ou véhicule où des aliments ou des boissons sont préparés, cuits, entreposés ou servis, gratuitement ou contre rétribution, à l'exception d'une résidence privée. *(eating or drinking place)*

«exploitant» Toute personne qui possède ou exploite, elle-même ou par l'intermédiaire d'un agent. un établissement de restauration ou un débit de boisson. *(opera[or)*

«usage commun» L'usage d'un article ou d'une chose par plusieurs personnes saris que cet article ou cette chose ne soit soigneusement lavé ou stérilisé après chaque usage. *(common use)*

«vermine» Les rats, souris, blattes, mouches, punaises et tout autre insecte ou animal du genre. (vermin)

APPLICATION

2. These regulations apply to all eating or drinking places except an eating or drinking place

(a) that operates for a period of two weeks or less in any 12-month period in connection wish any fair, carnival, circus, sports day, public exhibition or similar gathering, and

(i) serves food or drink prepared and served in a manner satisfactory to a Health Officer,

(ii) serves beverages in original sealed containers or, except in the ease of milk, in single service containers filled from covered containers equipped with a faucet or pouring device satisfactory to a Health Officer,

(iii) serves food in single service containers; and

(b) that operates for a period in excess of two weeks in any 12-month period, if all food or drink is served in original sealed containers.

3. No person shall operate an eating or drinking place except an eating or drinking place referred to in section 2. unless the eating or drinking place meets with the requirements of these regulations.

Inspection

4. (1) A Health Officer may, at any reasonable time, enter any earing or drinking place and examine the premises and anything contained on the premises that is used in connection wirh the operation of the eating or drinking place.

(2) Where in the opinion of a Health Officer any provision of these regulations is not being observed. he or she may make such recommendations or issue such directions as are necessary in that connection.

(3) Where an operator at the request of a Health Officer fails [o bring the operation of his or her place within the provisions of these regulations or otherwise fails to observe any of the requirements of these regulations, a Health Officer shall make or cause to be made a report to the Commissioner and shall in

CHAMP D'APPLICATION

2. Ce règlement s'applique à tout établissement de restauration ou débit de boisson, sauf :

a) s' ii est exploité pendant au plus deux semaines au cours de toute période de 12 mois, à l'occasion d'une foire, d'un carnaval, d'un cirque, d'une journée sportive, d'une démonstration publique ou de tout autre rassemblement analogue

(i) s'il sert des aliments ou des boissons préparés et servis d'une façon que l'agent de la santé juge acceptable,

(ii) s' il sert des boissons clans des contenants scellés ou. sauf clans le cas du lait, clans des contenants jetables remplis à partir de contenants fermés munis d'un robinet ou d 'un bec verseur que l'agent de la santé juge acceptable,

(iii) s'il sert des aliments clans des contenants jetables;

b) s'ii est exploité plus de deux semaines au tours de toute période de 12 mois et que tous les aliments et boissons sent servis clans leur contenant original scellé.

3. H est interdit d'exploiter un établissement de restauration ou un débit de boisson qui ne satisfait pas aux exigences du present règlement, sauf s'il s'agit d'un établissement mentionné a l'article 2.

Inspection

4. (1) Un agent de la santé peut, à lout moment jugé raisonnable, entrer clans un établissement de restauration ou un débit dc boisson pour y examiner les lieux et tout cc qui est utilisé dans leur exploitation.

(2) Si l'agent dc la santé est convaincu que quelque disposition du présent règlement n'est pas observée, il peut faire des recommandations ou dormer les instructions qui s'imposent.

(3) Si, malgré la demande de l'agent dc la santé, un exploitant néglige dc sc plier aux exigences du present règlement, l'agent dc la santé doit faire ou faire faire rapport au commissaire et remetre une copie de cc rapport a l'exploitant.

such case furnish to the operator a copy of the report.

(4) A report by a Health Officer shall specify the manner by which the regulations have been violated together with a recommendation.

(S) In any eating or drinking place a Health Officer may, for a laboratory examination, as often as he or she considers necessary,

(a) Lake a sample of any food or drink;

(b) swab dishes, glasses, cutlery or utensils; or

(c) take samples of wash water.

5. At the request of an operator, a Health Officer shall examine an eaung- or drinking place and everything contained in the place, and if the Health Officer is satisfied that these regulations have been complied with, he or she shall issue to the operator a certificate to that effect.

Closing

6. (1) Notwithstanding section 4, where a local board or a Health Officer finds that any condition exists in any earing or drinking place that is or may become dangerous to health or may hinder in any manner the prevention, mitigation or suppression of disease, the local Board or a Health Officer may order the eating or drinking place to be closed from the date of the order until the condition has been rectified, and the eating or drinking place shall be closed without delay.

(2) As soon as practicable after issuing the order, the local board or a Health Officer shall give written notice of the order to the operator, together with the reasons for the closing.

(3) Where the owner or operator of the eating or drinking place considers the order of closure to be unjustified he or she may, within seven days of receipt of notice of the order, appeal in writing to the Commissioner.

(4) The Commissioner, on receipt of the appeal, shall consider it and may make such inspections and hear such representations as he or she considers advisable.

(4) Dans son rapport, l'agent de la santé doit préciser quelles SOIN les infractions et présenter dcs recommandations.

(5) Dans tout établissement de restauration ou débit de boisson, l'agent de la santé peut, aux fins d'examens en laboratoire et aussi souvent qu'il l'estime nécessaire :

a) faire des prélèvements d'aliments ou de boissons;

b) faire des prélèvements par écouvi llonnage sur les assiettes, les verres, la coutellerie ou ics ustensiles;

c) faire des prélèvements d'eau de lavage.

5. À la demande de l'exploitant d'un établissement de restauration ou un débit de boissons, l'agent de la santé doit examiner l'établissement et tout ce qu'il contient, et si l'agent dc la santé est convaincu que l'établissement se conforme au présent règlement, il doit remettre à l'exploitant un certificat qui l'atteste.

Fermeture

6. (1) Par dérogation à l'article 4, lorsqu'une commission locale ou un agent de la santé constate clans un établissement de restauration ou un débit de boisson quelque chose qui est ou peut devenir dangereux pour la santé ou qui peut faire obstacle de quelque manière a la prévention, au contrôle ou à l'enraiement de maladies, il peut ordonner la fermeture immédiate de l'établissement, et l'ordre demeure en vigueur jusqu'à ce que la situation ail été corrigée.

(2) Dès que possible après avoir donné l'ordre, la commission locale ou l'agent de la santé avise l'exploitant par écrit de la fermeture de son établissement et des raisons qui l'ont motivée.

(3) Si le propriétaire ou l'exploitant d'un établissement dc restoration ou un débit de boisson consldère i 'ordre dc fermeture injustifié, il peut, dans ics sept jours suivant réception de l'avis, interjeter appel par écrit devant le commissaire.

(4) Dès réception dc l'appel, le commissaire doit l'examiner, et il peut faire ies inspections et entendre ies interventions qu'il estime opportunes.

(5) The Commissioner may, in his or her discretion, affirm, amend or rescind the order of closure and the decision of the Commissioner is final.

Construction

7. Every eating or drinking place shall be so constructed that

(a) it is free from every condition that may
  (i) be dangerous to health,
  (ii) injuriously affect rhe sanitary operation of the place,
  (iii) injuriously affect the wholesomeness of the food or drink prepared, served or stored in it, or
  (iv) cause disgust:

(b) the floors and floor-coverings are tight, smooth and nonabsorbent in rooms where
  (i) food is prepared, served or stored.
  (ii) utensils are washed, or
  (iii) washing and toilet fixtures are located;

(c) the walls and ceilings of the rooms and passageways may be readily cleaned and maintained in good condition;

(d) all rooms and passageways are well-lighted and ventilated;

(e) no toilet-room, opens directly into any room used for the preparation or storage of food, and the toilet-rooms are fitted with full-length self-closing doors;

(f) all openings to the outside are screened or fitted with devices to repel or prevent the entrance of vermin: and

(g) any room where food is cooked is provided with adequate means for the escape to the exterior of the building of smoke, gases and odours.

Sanitary Facilities

8. Every eating or drinking place shall, to the satisfaction of a Health Officer, be provided with

(a) an adequate supply of water;

(5) Le commissaire peut, à sa discrétion, confirmer, modifier ou annuler l'ordre de fermeture, et sa décision est sans appel.

Construction

7. Tout établissement de restauration ou débit de boisson doit être construit de façon :

a) à ce qu'il ne s'y trouve rien qui puisse :
  (i) être dangereux pour la santé,
  (ii) compromettre la salubrité des opérations,
  (iii) porter atteinte à la salubrité des aliments ou des boissons préparés, servis ou entreposés dans l'établissement,
  (iv) susciter du dégoût;

b) à ce que les planchers et les couvre-planchers soient bien ajustés, lisses et non absorbants dans les pièces où :
  (i) les aliments sont préparés, servis ou entreposés,
  (ii) les ustensiles sont lavés,
  (iii) les installations sanitaires sont situées;

c) à ce que les murs et les plafonds des pièces et des couloirs puissent être facilement nettoyés et tenus en bon état;

d) à ce que toutes les pièces et les couloirs soient bien éclairés et aérés;

e) à ce qu'aucune salle de toilette ne communique directement avec une pièce utilisée pour la préparation ou l'entreposage des aliments et à ce que les portes des salles de toilette soient de pleine hauteur et ferment automatiquement;

f) à ce que toutes les overtures dormant sur l'extérieur soient munies de moustiquaires ou d'un autre dispositif permettant de chasser la vermine ou de l'empêcher d'entrer;

g) à ce que toutes les pièces utilisées pour la cuisson d'aliments soient équipées de bons systèmes qui permettent d'évacuer vers l'extérieur la fumée, les gaz et les odeurs.

Insulations sanitaires

8. Tout établissement de restauration ou débit de boisson doit, à la satisfaction d'un agent de la santé, avoir :

(b) an adequate number of toilets and urinals, or where no pressure water system is available, an adequate number of sanitary privies, chemical closets or other means for the disposal of human excreta for the use of the public, the operator and employees:
(c) separate hand-washing facilities for the public and the employees:
(d) notices, posted in each room in which *there is* a toilet, directing employees to clean their hands thoroughly after using the toilet and before commencing or resuming their work: and
(e) a sufficient number of garbage or refuse containers of watertight construction made of non-absorbent material and provided with close-fitting covers.

9. Every toilet-room and every place where hand-washing facilities are provided for the operator, employees or the public in any eating or drinking place, shall be
(a) conveniently located and easily accessible;
(b) without direct access to any room in which food is prepared or stored;
(c) equipped with full-length self-closing doors;
(d) free from any condition which may cause disgust:
(e) equipped with adequate lighting, either natural or artificial (of a rating of not less than 100 lx); and
(f) equipped with adequate ventilation and facilities for the removal of odour, to the satisfaction of a Health Officer.

10. Hand-washing facilities provided in any eating or drinking place shall consist of
(a) a basin:
(b) an adequate supply of water;
(c) a constant supply of soap in a suitable container or dispenser: and
(d) an adequate supply of clean towels for the use of each person using the hand-washing facilities and a suitable receptacle for used towels and waste material.

a) un approvisionnement en eau;
b) un nombre suffisant de toilettes et d'urinoirs ou, s'il n'existe pas de système de distribution d'eau, un nombre suffisant de cabinets d'aisance, de toilettes chimiques ou tout autre mode d'évacuation des excréments humains, à l'usage du public, de l'exploitant et des employés:
c) des lavabos distincts pour le public et les employés;
d) dans chaque pièce équipée d'une toilette, des affiches enjoignant aux employés de se laver les mains soigneusement après s'être servis de la toilette et avant de commencer ou de reprendre leur travail;
e) un nombre suffisant de poubelles ou de boîtes à ordures étanches faites d'un matériau non absorbant et munies de couvercles qui ferment bien.

9. Dans tout établissement de restauration ou débit de boisson, chaque salle de toilettes ou pièce équipée de lavabos à l'usage de l'exploitant, des employés ou du public doit être :
a) bien située et facile d'accès;
b) sans accès direct à une pièce où sont préparés ou entreposés des aliments;
c) équipée de portes pleine hauteur fermant automatiquement;
d) exempte de tout ce qui peut susciter le dégoût;
e) équipée d'un système d'éclairage adéquat, naturel ou artificiel (d'au moins 100 lx);
f) équipée d'un système d'aération et de désodorisation, à la satisfaction d'un agent de la santé.

10. Dans tout établissement de restauration ou débit de boisson, il faut prévoir *pour* les lavabos :
a) une cuvette;
b) un approvisionnement en eau suffisant;
c) un approvisionnement constant de savon dans un contenant ou un distributeur approprié;
d) une quantité d'essuie-mains propres suffisante pour tous les usagers des lavabos et un récipient approprié pour les essuie-mains utilisés et les déchets.

11. No person shall provide a single or roller towel for common use.

12. Notwithstanding paragraph 10(d), any apparatus for drying the hands may be substituted for an adequate supply of clean towels, where [he apparatus is approval by a Health Officer.

Equipment

13. Every eating or *drinking* place shall be provided with

(a) equipment and facilities for the cleansing and sterilizing of utensils, including an ample supply of hot and cold water, as follows:

(i) mechanical equipment so designated and operated that all utensils are adequately cleaned and sterilized, or

(ii) manual equipment consisting of at least three sinks or containers of non-corroding metal or porcelain of *sufficient size* to ensure thorough cleansing and sterilizing, and draining racks of non-corrodible materials;

(b) suitable racks, cabinets, shelves or drawers for the safe storage of food, placed not less than 250 mm above the floor, for protection against contamination;

(c) adequate refrigerated space for the safe storage of perishable food or drink, provided with removable racks or trays and maintained at a temperature not higher than 10°C;

(d) unless electric refrigeration is used, a means to discharge waste water from refrigerated equipment into a properly trapped and sewer connected open sink or drain, except that where sewer connections are not available a clean and adequate watertight drip pan may be used; and

(e) suitable enclosed racks and shelves or drawers for the storage of crockery, cutlery and other containers *or* utensils used for the preparation, cooking, serving or storage of food or drink, or used in eating or drinking, and placed not less than 250 mm above *the* floor for protection against contamination.

11. Il est interdit de fournir une seule serviette ou une serviette à rouleau pour usage commun.

12. Par dérogation aux dispositions de l'alinéa 10d), tout appareil pour sécher les mains, approuvé par un agent de la santé, peut être substitué à une quantité d'essuie-mains propres suffisante.

Équipement

13. Tout établissement de restauration ou débit de boisson doit avoir :

a) de l'équipement et des installations pour nettoyer et steriliser les ustensiles, ainsi qu' un bon approvisionnement en eau froide et chaude, soit l'une ou l'autre des deux possibilités suivantes :

(i) de l'équipement mécanique dent la conception et l' utilisation assurent une stérilisation et un lavage adéquats des ustensiles,

(ii) de l'équipement manuel comprenant au moins trois éviers ou contenants, en metal inoxydable ou en porcelaine, de dimensions suffisantes pour permettre une stérilisation et un lavage complets, ainsi que des égouttoirs faits d'un matériau inoxydable;

b) des rayons, des placards, des étagères ou des tiroirs pour entreposer les aliments, situés à au moins 250 mm au-dessus du sol pour éviter la contamination:

c) de l 'espace réfrigéré suffisant pour la conservation des aliments ou des boissons périssables, aménagé de grilles ou de tiroirs amovibles et maintenu à une température d'au plus 10 °C;

d) pour tout système de réfrigération ne fonctionnant pas à l'électricité, un dispositif qui permette d'évacuer l'eau dans un évier ouvert ou un tuyau pourvu d'un siphon adéquat et relié aux égouts, ou, s' il ne peut y avoir raccordement aux égouts, dans un bac étanche, propre et adéquat;

e) des tablettes et des rayons recouverts ou des tiroirs appropriés pour le rangement de la vaisselle, de la coutellerie et des autres récipients ou ustensiles servant à la préparation, à la cuisson, au service, à l'entreposage ou à la consummation d'aliments ou de boissons et situés à au

moins 250 mm au-dessus du sol pour éviter la contamination.

14. Every item of furniture and equipment, and every utensil and apparatus used in the preparation, cooking, storage, serving or consumption of food or drink, shall be

(a) so designed and constructed as to be easily cleaned;

(b) of sound and tight construction and in good repair; and

(c) free of breaks, corrosion, open seams, cracks and chipped places.

14. Tout le mobilier et l'équipement ainsi que les ustensiles et appareils utilisés pour la préparation, la cuisson, l'entreposage, le service ou la consummation d'aliments ou de boissons doivent être :

a) conçus et construits de façon à pouvoir être facilement nettoyés;

b) construits solidement, être bien ajustés et être en bon état;

c) exempts de cassures, de corrosion, de fentes, de craquelures et d'écornures.

15. Where drinking fountains are used in any eating or drinking place they shall be of an approved angle jet type.

15. Les fontaines d'un établissement de restauration ou d'un débit de boisson doivent être d'un type à jet incliné approuvé.

16. No cask, water cooler or other receptacle shall be used for storing or supplying drinking water to the public or to the operator or to employees unless

(a) it is covered and protected so as to prevent persons from dipping the water from it or contaminating the water; or

(b) it is equipped with a faucet or other suitable device for drawing water.

16.1 Il est interdit d'utiliser des tonneaux, des distributeurs d'eau ou d'autres récipients pour conserver ou servir de l'eau potable au public, à l'exploitant ou aux employés, sauf:

a) s'ils sont couverts ou protégés pour empêcher quiconque d'y puiser de l'eau ou de la contaminer;

b) s'ils sont munis d'un robinet ou d'un autre système adéquat pour en tirer de l'eau.

Maintenance

Entretien

17. All furniture, equipment and appliances in any room in which food is prepared, served or stored shall be

(a) so constructed and arranged as to permit thorough cleansing: and

(b) maintained in a clean and sanitary condition.

17. Tout le mobilier, l'équipement et les appareils de chaque pièce utilisée pour la préparation, le service ou l'entreposage d'aliments doivent être :

a) construits et agencés de façon à pouvoir être nettoyés a fond;

b) maintenus clans un état de propreté et de salubrité.

18. All wash basins and toilet facilities shall be washed and treated with a suitable disinfecting solution at least once in every 24 hours and more often if necessary and shall be maintained in a sanitary condition.

18. Toutes les installations sanitaires doivent être lavées et traitées avec une solution désinfectante adéquate, au moins toutes les 24 heures ou plus souvent s'il le faut, et elles doivent être maintenues clans un état de salubrité.

19. Every room where food is prepared, cooked, served or stored shall be kept free from materials and equipment not regularly used in that room.

19. Toute pièce servant à la préparation, à la cuisson, au service ou à l'entreposage d'aliments doit être libérée de tout matériel et équipement qui n'y est pas courammcnt utilisé.

20. No person shall

(a) use any room where food is prepared, Cooked, served or stored for sleeping

20. Nul ne doit :

a) dormir dans une piece où des aliments sont préparés, cuits, semis ou entreposés;

purposes: or

(b) permit any live animal, live bud or live fowl in any room in which food is prepared.

21. In every eating or drinking place,

(a) all food and drink brought into the premises shall be clean, wholesome and free from spoilage;

(b) no prepared food shall be stored in direct contact with shelves or walls:

(c) food or drink which is readily susceptible to spoiling and the action of toxin-producing organisms shall be kept under refrigeration;

(d) all food and drink shall be so prepared as to be safe for human consumption;

(e) all food 'or drink served to any person and not consumed by him or her shall not afterwards be served in any form as human food but shall be discarded:

(f) fresh milk shall be served in or from
(i) the original sealed container, or
(ii) the original sealed container quipped with an automatic dispensing device:

(g) only icc from a source approved by a Health Officer shall & used for any use in an eating or drinking place and the ice shall be handled at all times in a sanitary manner;

(h) single service containers and utensils. cones and straws shall be covered or kept in such manner and place as to prevent contamination;

(i) single service containers shall be used only once:

(j) no drinking glass, cup or other utensil shall be provided for common use by the public;

(k) table-cloths, napkins and serviettes used shall be clean and in good condition;

(1) no napkin or serviette shall be used at any time unless it has been laundered before each use;

(m) cloths and towels used for washing, drying or polishing utensils shall be
(i) of suitable material,
(ii) in good condition,
(iii) clean, and
(iv) used for no other purpose:

(n) garbage or waste shall be placed without delay in suitable containers which shall

b) tolérer la présence d'animaux, d'oiseaux ou de volailles vivants dans une pièce utilisée pour la preparation d'aliments.

21. Dans tout établissement de restauration ou débit de boisson :

a) tous les aliments et boissons introduits sur les lieux doivent être propres, sains et exempts de toute trace de deterioration;

b) les aliments préparés ne doivent pas être entreposés en contact direct avec les étagères ou les murs;

c) les aliments ou les boissons qui peuvent facilement se gâter ou devenir toxiques, doivent être réfrigérés;

d) tous les aliments et boissons préparés doivent être propres a la consummation humaine;

c) les aliments ou boissons servis mais non consommés ne doivent en aucun cas être reservis sous quelque forme à des humains et ils doivent plutôt être détruits;

f) le lait frais doit être servi clans ou à même :
(i) soit le contenant original scellé,
(ii) soil le contenant original scellé muni d'un verseur automatique;

g) seule la glace provenant d'une source approuvée par un hygiéniste peut être utilisée et elle doit toujours être manipulée de façon hygiénique;

h) les contenants et les ustensiles jetables ainsi quc les comets et les pailles doivent être reconverts et tenus à l'abri de toute contamination:

i) les contenants jetables ne doivent être utilisés qu'une seule fois;

j) aucun verre, tasse ou autre ustensile ne doit être mis à un usage commun;

k) les nappes et serviettes doivent être propres et en bon état;

l) aucune serviette de table m, doit être réutilisée avant d 'avoir été préalablement lavée;

m) les linges utilisés pour laver, sécher ou polir les ustensiles doivent être
(i) d'un tissu approprié,
(ii) en bon état,
(iii) propres,
(iv) utilisés a cette seule fin:

be *removal* from the premises as often as may be necessary to maintain a *sanitary* condition;

(o) garbage containers shall be kept in such a place and manner as to preclude odours; and

(p) garbage containers shall be washed at intervals frequently enough to prevent any insanitary condition.

n) les déchets ou rebuts doivent être placés sans tarder dans des récipients adéquats qui doivent être sortis aussi souvent qu'il le faut pour maintenir la salubrité des lieux;

o) les poubelles doivent être tenues d'une manière et à un endroit tels qu'elles ne dégagent pas d'odeurs;

p) les poubelles doivent être lavées assez souvent pour éviter l'insalubrité.

Cleansing and Storage of Containers and Utensils

Lavage et rangement des contenants et ustensiles

22. Subject to sections 24 and 25, except in the case of a single service container or utensil, every dish, glass or utensil which is used by any person in consuming food or drink, shall after each use be washed, rinsed and sterilized as provided in these regulations and stored in such a manner as will prevent its contamination.

22. Sous réserve des articles 24 et 25, sauf s'il s'agit de contenants ou d'ustensiles jetables, tous les verres, assiettes ou ustensiles utilisés pour la consommation d'aliments ou de boissons doivent, après chaque utilisation, être lavés, rincés et stérilisés comme il est décrit ci-après et être rangés de façon à éviter la contamination.

23. Where manual equipment is used for the cleansing and sterilizing of dishes, glasses or utensils, they shall be

(a) washed in the first sink, containing detergent solution which is

(i) capable of removing grease and food particles, and

(ii) maintained at a warm temperature (at least 44°C and not more than 60°C);

(b) rinsed in the second sink in warm clean water; and

(c) sterilized in the third sink by immersion

(i) in boiling water, or

(ii) for at least two minutes in a warm chlorine solution of not less than 100 mg/ℓ available chlorine, or

(iii) for at least two minutes in a warm solution containing a quaternary ammonium compound having a strength of at least 200 mg/ℓ.

23. Dans les établissements qui font le lavage et la stérilisation à la main, les assiettes, les verres et les ustensiles doivent être :

a) lavés dans un premier évier contenant une solution détergente qui :

(i) peut enlever la graisse et les particules d'aliments,

(ii) est maintenue à une température se situant entre 44 °C et 60 °C;

b) rincés dans un deuxième évier, dans une eau chaude propre;

c) stérilisés par immersion dans un troisième évier de l'une ou l'autre des façons suivantes :

(i) dans de l'eau bouillante,

(ii) pendant au moins deux minutes dans une solution chaude contenant un compost de chlore actif, dans une proportion d'au moins 100 mg/l,

(iii) pendant au moins deux minutes dans une solution chaude contenant un compost d'ammonium quaternaire, dans une proportion d'au moins 200 mg/l.

24. (1) Where mechanical equipment is used for the cleansing and sterilizing of dishes, glasses or utensils, they shall be

(a) washed in a detergent solution which is

(i) capable of removing grease and food particles, and

24. (1) Dans les établissements qui font le lavage et la stérilisation à la machine, les assiettes, les verres et les ustensiles doivent être :

a) lavés dans une solution détergente qui :

(i) peut enlever la graisse et les particules d'aliments,

(ii) maintained at a warm temperature (at least 44°C and not more than 60°C); and

(b) rinsed in clean water at a temperature of at least 77°C for at least [wo minutes, but where the temperature exceeds 77°C the time may be reduces, providing bacterial results comply with the standards referred to in section 25.

(2) Mechanical equipment shall be equipped with thermostatic control of the temperature of the rinse water and thermometers in both rhe wash and rinse water lines and in such locations as are readily visible.

2S. The cleansing and sterilizing of utensils shall meet recognized public health standards, and the plate count shall not exceed 100 bacteria for each utensil when tested in accordance with the standard plate test, utilizing the swab technique.

26. Where any chemical is used in the sterilization of utensils.

(a) the operator shall use suitable testing equipment and shall make tests often enough to ensure that the correct amount of chemical is in the solution used: and

(b) the sterilizing solution shall be completely changed often enough to prevent soiling of the utensils.

(ii) est maintenue à une température se situant enue 44 "C et 60 "C;

b) rincés clans de l'eau propre à une température d'au moins 77 "C pendant au moins deux minutes; mais si la température est supérieure à 77 'C, le temps d'immersion peut être réduit pourvu que les résultats dcs tests bactériologiques soient conformes aux normes de l'article 25.

(2) Toute machine doit être munie d'un thermostat contrôlant la temperature de l'eau de rinçage et de thermomètres indiquant les températures des eaux de lavage et de rinçage, et ces instruments doivent être situés a dcs endroits où ils sent faciles à voir.

25. Le lavage et la stérilisation des ustensiles doivent être conformes aux normes d'hygiène publique reconnues, et un ustensile ne doit pas compter plus de 100 bactéries au test par écouvillonnage.

26. Si les ustensiles sent stérilisés chimiquement :

a) l'exploitant doit sc servir du matériel d'analyst approprié et effectuer lea tests aussi souvent qu'il k doit pour s'assurer que la solution de stérilisation contient la bonne quantité de produits chimiques;

b) la solution de stérilisation doit être changée complètement aussi souvent qu'il le faut pour éviter les taches sur les ustensiles.

Health of Employees

27. No operator shall permit an employee to enter his or her eating or drinking place or engage in the preparation, cooking, storage or serving of food or drink during such time as he or she has cause to believe or suspect that such employee has a communicable disease or that such disease exists in the employee's place of residence.

28. Every employee who believes or suspects that he or she has a communicable disease or that such disease exists in his or her place of residence shall notify a Health Officer of his or her belief or suspicion without delay and shall refrain afterwards from handling or preparing food or drink until a

Santé du personnel

27. L'exploitant d'un établissement de restauration ou d'un débit dc boisson doit interdire à un employé d'entrer dims son établissement ou de participer à la preparation, a la cuisson, a l'entreposage ou au service d'aliments ou de boissons, s'il a des raisons dc croire ou dc soupçonner quc cet employé est atteint d'une maladie transmissible ou habite avec quelque personne atteinte d'une telle maladie, et ce, pour toute la période où il entretient de tels soupçons.

28. Tout employé qui sc croit atteint d'une maladie transmissible ou qui habite avec quelque personne qu'il croit atteinte d'une telle maladie doit en aviser aussitôt un agent de la santé et s'abstenir de manipuler ou dc preparer dcs aliments ou dcs boissons jusqu'à cc qu'il soit jugé exempt de toute

'ealth officer is satisfied that the employee is free .om any communicable disease.

29. Every operator and every employee of every eating or drinking place shall

(a) *be* clean;
(b) use all reasonable means to avoid contact directly with food or drink;
(c) wear clean, washable garments and keep his *or* her hands clean at all times while engaged in handling food, drink, utensils or equipment; and
(d) submit to such medical examination and tests as a Health Officer may require.

30. No carrier, contact or person infected with a communicable disease or having a disgusting condition shall prepare, serve or handle any food or drink intended for sale.

maladie transmissible par l'agent de la santé.

29. Tout exploitant ou lout employé d'un établissement dc restauration ou d'un debit de boisson doit :

a) être propre;
b) éviter clans toute la mesure du possible les contacts directs avec les aliments ou les boissons;
c) porter des vêtements propres et lavables, et avoir les mains constamment propres lorsqu'il manipule les aliments, les boissons, les ustensiles ou l'équipement;
d) se soumettre aux examens médicaux et aux tests que l'agent de la santé peut exiger.

30. Il est interdit a quiconque qui est infecté par une maladie transmissible ou qui est sujet, contact ou porteur d'une maladie transmissible ou dent l'état provoque le dégoût, de préparer, de servir ou de manipuler des aliments ou des boissons destinés à la vente.

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APPENDIX 4. COAST GUARD TUG/BARGE REGULATIONS

Canadian Coast Guard / Garde côtière canadienne
Marine / Marine
Ship Safety / Sécurité des navires

Phone: (604) 666-3636
Pax: (604) 984-7893

Suite 101 - 260 West Esplanade
Vancouver, B.C.
V7M 1A4

Your file / Votre référence

Our file / Notre référence

10 November, 1993

Dear Mr. Hubert,

Tug/Barge Combination

With respect to your enquiry concerning tug and barge operations at Yellowknife, we do not have regulations that explicitly regulate the operation of tug and barge combinations.

However there are a number of regulations which implicitly govern the safe manning and operation of vessels, and these will apply to your vessels at all times when they are underway. These include the Collision Regulations which regulate, the navigation of vessels and specify the type and number of light and sound signals to be carried on both barge and towing vessel.

The Hull Construction Regulations and the associated Stability Standards require that vessels used for towing have certain levels of stability and these must be met with the assumption that the aftermost compartment on the vessel is flooded.

There are also regulations governing the standard of accommodation in towboats, and because of the nature of the towing operation and the added risk to towing vessels, the requirements for emergency escapes are more rigorous than those required for fishing vessels for example. It is also your responsibility to ensure that the vessels used for towing have sufficient power and manoeuvrability for their intended operation and that they are equipped with appropriate towing facilities and safety devices.

Without precise details of your proposed operation it is difficult to be more specific. I suggest you write to our regional office and give details of your proposed operation, size of barge, type of processing plant, types of vessels to be used for towing, including names and dimensions if known, and detailing certification of crews. They will then be able to provide you with an authoritative answer to your questions which will enable you to plan your operation with more confidence. Please write to:

Ron Wilson,
Senior Surveyor, Technical,
Canadian Coast Guard, Ship Safety Branch,
800 Burrard Street, Suite 1140,
Vancouver, B.C.
V6Z 2J8
Telephone: (604)631-3853 Fax: (604)631-3858

Yours sincerely,

M. W. Harrison
for
M. R. Ghoshal
Senior Surveyor
Vancouver District, Ship Safety

MWH/pg

STANDARD: STAB 3

INTERIM STANDARD OF STABILITY FOR SHIPS BUILT OR COWERTED FOR TOWING

1 As an interim measure while research is continuing, the following minimum intact stability criteria are to be used in the approval of stability data for the above vessels.

VESSELS BUILT OR CONVERTED FOR TOWING:

2(i) The area under the righting lever (GZ) curve should not be less than 0.055 metre-radians up to 30 degrees angle of heel and not less than 0.09 metre-radians up to 40 degrees or the angle of downflooding if this angle is less than 40 degrees.

Additionally, the area under the righting lever (GZ) curve between the angles of heel of 30 degrees and 40 degrees or between 30 degrees and the angle of downflooding, if this angle is less than 40 degrees, should not be less than 0.03 metre-radians.

(ii) The righting lever (GZ) should be at least 0.20 metres at an angle of heel equal to or greater than 30 degrees.

(iii) The maximum righting lever should occur at an angle of heel preferably exceeding 30 degrees but not less than 25 degrees.

(iv) The initial metacentric height (GM) should not be less than 0.55 metres.

3 With regard to the Lightship condition specified in the Hull Construction Regulations, this condition is not considered to be an operating condition. Therefore, the above criteria are not applicable and the standard to be attained in this condition is a positive GM. (The Lightship condition is defined as the condition of a vessel ready for sea with no stores, consumables, fluid ballast, or crew on board).

NOTE: 0.055 METRE RADIANS = 10.34 FT-DEG.
0.09 " " = 16.92 " "
0.03 " " = 5.64 " "

0.20 METRES = 0.656 FT
0.55 " = 1.80 FT.

FROM: CANADA SHIPPING ACT
REGULATION 28 - HULL CONSTRUCTION

(4) Notwithstanding subsection (2), where a ship is a new Safety Convention ship one of the means of communication shall be by engine room telegraph.

(5) Where a ship has wheelhouse control, at least one of the means of communication shall provide communication from the bridge direct to the main engine emergency control position.

—PART VIII—

SHIPS BUILT OR CONVERTED FOR TOWING

interpretation

100. In this Part,

"approved" means approved by the Board or, in the case of a ship under 100 feet in length, approved by the steamship inspector in charge of steamship inspection for the region in which the ship is inspected; (approuvé)

"bow section" means the foremost

(a) one-third length of a ship, in the case of a ship 50 feet in length or under,

(b) 17 feet of a ship, in the case of a ship over 50 feet but under 70 feet in length, and

(c) one-quarter length of a ship, in the case of a ship 70 feet in length or over;

(partie avant)

"breadth" means the maximum breadth of a ship, measured amidships,

(a) in the case of a ship with a metal shell, to the moulded line of the frame, and

(b) in the case of a ship with a shell of a material other than metal, to the outer surface of the hull;

(largeur)

"certificate" means a Cargo Ship Safety Construction certificate or a certificate issued by a steamship inspector pursuant to section 384 of the Canada Shipping Act; (certificate)

"clear opening" means an opening of any shape through which the largest sphere that may be passed is one of a diameter equal to the dimension specified for the opening; (ouverture libre)

"engine room" means all the main propelling machinery space of the ship; (chambre de machines)

"existing ship" means a ship that is not a new ship; (navire existant)

"exterior" means in direct contact with the weather; (extérieur)

"forecastle means a continuous superstructure extending aft from the bow; (gaillard)

"interior" means not in direct contact with the weather; (intérieur)

"length" has the same meaning as in Part VII; (longueur)

"main deck" means the uppermost weathertight deck extending from side to side of the ship and includes any stepped portions thereof, but does not include *any part* of a superstructure deck where the deck next beneath the superstructure deck extends from side to side of the ship, is weathertight and is not stepped down inside the superstructure; (pont principal)

"new ship" means

(a) a ship the keel of which was laid on or after April 1, 1972,

(b) a ship, other than a Canadian ship, the keel of which was laid before April 1, 1972, and that is registered or licensed in Canada on or after that date, and

(c) a ship declared by the Board to be a new ship pursuant to section 102;

(navire neuf)

"superstructure" means a decked weathertight structure

(a) extending from side to side of a ship, or

(b) with the side plating not being inboard of the shell plating by more than four per cent of the breadth of the ship,

the tops of the deck beams of which are not less than 6 feet vertically above the tops of the deck beams of the deck on which the structure is set; (superstructure)

"tow" means to pull or push any floating object; (remorquer)

"watertight compartment" means, in respect of a ship, a space below the main deck that is enclosed by the shell, watertight bulkheads and decks, or by watertight bulkheads and decks and into which direct access from the main deck is gained by means of a hatch or entrance through which downflooding could occur; (compartiment étanche)

"weathertight" means capable of preventing the passage of water from exterior space to interior space in any weather condition. (étanche aux intempéries)

Application of Part

101. (1) Subject to this section, this Part applies to a ship that is a steamship of more than 5 tons, gross tonnage, built or converted for the purpose of towing, but does not apply to such a ship that, when used for towing, is used only for salvaging logs.

(2) Sections 115 to 132, 138 to 141 and 143 do not apply to an existing ship until

(a) in the case of a ship for which on April 1, 197,2 there is a certificate in force, the first day on which the certificate is due for renewal; or

(b) in the case of a ship for which on April 1, 1972 there is no certificate in force, April 1, 1972.

(3) Where an existing ship requires modification to comply with any of sections 115 to 132, 138 to 141 or 143, the modification work shall

(a) begin on or before the date on which those sections come into force with respect to the ship;

(b) if not completed at the time those sections come into force with respect to the ship, be resumed at intervals, not exceeding one year, that are satisfactory to a steamship inspector; and

(c) be completed by April 1, 1976.

(4) Where the modification work referred to in subsection (3) does not begin on or before the date required by that subsection or where at any time after that date the proportion of that work completed is less than a proportion that is satisfactory to a steamship inspector, the ship shall not be used for towing until the proportion of that work completed is a proportion that is satisfactory to a steamship inspector.

102. Where an *existing* ship is modified and the modification work begins on or after October 1, 1971 and if, in the *opinion of the* Board, it is reasonable and practicable for the ship to comply with all of this Part, the Board may declare the ship to be a new ship.

Equivalents

103. Upon consideration of the class of voyage and type of operation on which an existing ship is engaged, the Board may, if it is satisfied that the standard of safety required by this Part is not lowered thereby, accept any constructional arrangement on that ship as complying with these Regulations.

* Stability

104. Every new ship with openings in the main deck aft of the engine room that are capable of causing down flooding shall be designed and constructed so that, in any operating condition, positive buoyancy and stability are retained and no part of the main deck is submerged when any one watertight compartment aft of the *engine* room is flooded.

105. Subject to section *107*, no ship shall be used for towing until its stability characteristics have been approved by the Board.

106. (1) Subject to section 107, the owner of a ship shall

(a) arrange for an inclining experiment to be conducted on the ship in the presence of and to the satisfaction of a steamship inspector;

(b) submit to the Board in respect of the ship the following basic stability data:

(i) hydrostatic curves,

(ii) *cross curves* of stability,

(iii) a capacity plan showing the capacities of all tanks and cargo spaces and the related vertical and longitudinal centres of gravity,

(iv) tank sounding tables,

(V) draught mark locations, and

(vi) the results of the inclining experiment referred to in paragraph (a) ; and

(c) submit to the Board, in respect of the ship, the developed stability data computed for each of the following conditions:

(i) light ship condition,

(ii) departure from port with 100 per cent fuel, fresh water and stores,

(iii) worst intact stability condition, and

(iv) arrival in port with 10 per cent fuel, fresh water end stores.

(2) The results of the experiment · ref erred to in paragraph(l) (a) shall be taken into account when computing

(a) the developed stability data referred to *in* paragraph (c) of that subsection; and

(b) the stability data referred to in subsection 108(1) in the case of a new ship.

(3) The free surface effect of liquid in tanks shall be taken into account when computing a righting lever curve or a metacentric height for the purposes of

(a) the developed stability data referred to in paragraph (1)(c); and

(b) the flooded conditions referred to in paragraphs 108(l)(b) and (c).

(4) Every righting lever curve shall show the angle at which the edge of the main deck submerges.

(5) Subject to the approval of the Board,

(a) the immersed volume of any structure provided with weathertight closing appliances, or

(b) the immersed volume of any structure up to the level of the bottom of the lowest exterior opening not closed by a weathertight closing appliance,

may be taken into account when computing a righting lever *curve.*

(6) The owner of a ship shall provide on the ship, *for* the use of the master, stability information in respect of the ship in the form of a booklet approved by the Board.

(7) The *Board* may, on application by the owner of a ship, dispense with the inclining experiment referred to in paragraph (1)(a) in respect of the ship if the stability characteristics of a sister ship have been approved as required by section 105.

107. (1) Sections 105 and 106 do not apply to an existing ship unless

(a) the main propelling machinery *of the* ship is changed for machinery developing greater brake horsepower;

(b) the main propelling machinery of the ship is changed and the difference in weight between the new and the old installation is, in the opinion of the Board, sufficient to adversely affect *the* stability of the ship; or

(c) the ship is modified to such an extent that, in the opinion of the Board, its stability is adversely affected.

(2) Where the Board is of the opinion that modifications made to a ship adversely affect its stability within the meaning of paragraph (1)(c), the owner of that ship shall submit such of the stability data described in section 106 as the Board may request.

108. (1) In the case of a new ship, the owner shall, subject to subsection (2), submit to the Board in respect of the ship the following stability data:

(a) the forward and aft draughts when the watertight compartment aft of the engine *room* that would cause the greatest reduction in freeboard is completely flooded;

(b) the metacentric height when the watertight compartment aft of the engine room that would cause the greatest reduction in the metacentric height is completely flooded; and

(C) the metacentric height when the watertight compartment aft of the engine room that would cause the greatest reduction in the metacentric height in a partly flooded condition is flooded to that condition.

(2) Subsections 106 (2) to (5) apply when computing the stability data referred to in subsection (1).

Subdivision of the Hull

109. (1) In the case of a new ship, the ship shall be fitted with

(a) a collision bulkhead in an approved location; and

(b) a watertight bulkhead at the forward end and at the aft end of the main propelling machinery placed as close together as is practicable.

(2) Where the forward bulkhead of the engine room of any ship is fitted in an approved location, it may be approved as the collision bulkhead.

(3) Where, in the opinion of the Board, it is reasonable and practicable, every new ship that is propelled by steam engines shall be fitted with a watertight bulkhead between the boilers and the main engines.

Openings in Watertight Bulkheads

110. In the case of a new ship, where an access opening is fitted in the watertight boundary bulkhead of a watertight compartment referred to in section 104 or in any bulkhead referred to in section 108, the access opening shall, unless it is a tank manhole, be

(a) made as small as practicable;

(b) placed as near to the top of the bulkhead as is practicable, except in the case of an access opening between machinery spaces or to a shaft tunnel;

(c) reinforced so that the strength of the bulkhead is not reduced by the opening; and

(d) fitted with a watertight closing appliance that conforms to the requirements of section 111.

APPENDIX 5. NEW EQUIPMENT DESCRIPTIONS AND QUOTES

m Butchers & Packers Supplies
11434 120 Street, Edmonton, Alberta T5G 2Y2 Phone (403) 455-4128 Fax (403) 452-0905
11449-98ave,Grande Prairie,AB T8V-5S5
PH: (403) 538-0989 FAX: (403) 532-8903

December 09, 1993

Hubert & Associates Ltd.

ATTENTION: MR: BEN HUBERT

Dear Sir:

RE: **HAY RIVER FISH BARGE**

We are pleased to quote the following;

BLAST FREEZER UNIT- 100% Back-up

(2) HB317UL Hussmann 3H.P. Air cooled low temp. Condensing Unit c/w Control Panel & Accessories, (R-22) 220V single phase . . . . . 2@ $5895.00 . . . . . $11790.0

(2) KUC123CED Evaporators . . . . . 2@ $1335.00 . . . . . $ 2670.0

WALK-IN FREZZER UNIT- 100% Back=up

(2) HB317UL Hussmann 3H.P. Air cooled low temp Condensing Units c/w Control Panel & Accessories (R-22) 220V single DBase . . . . . 2@ $5895.00 . . . . . = $11790.0

(2) KUC123CED Evaporators . . . . . 2@ $1335. 00 . . . . . $ 2670.0

WALK-IN COOLERUNIT- 100% Back-up

(2) H73VSK Hussmann 3/4 H.P. Air cooled medium Temp Condensing Units c/wcontrol Panel * Accessories (R-22) 220V Single Phase . . . . . 2@ $3290. 00 . . . . . $6580.00

(2) R775 Reconditioned Evaporators. .2@ $525.00 . . . . . $1050.00

(1) Intake Louver 3' x 6' c/w Exhaust Fan & Stat . . . . . -$ 000.00

INSTALLATION OF THE ABOVE . . . . . $15,000.

OPTIONAL EQUIPMENT

(1) FM2402AE32A Scottsmann 2400lb/24Hr. Flaker Ice Machine c/w BH800AEBIN. $12,241.0

(1) 3 compartment s/s Sink c/w Faucet,over head spray & emersion deater $1895.00

(1) SSBT9630 Fish Filet Table (30"x8'L) C/W Polly Top & Undershelf $1520.00

TOTAL PRICE F.O.B. EDMONTON G.S.T. Era . . . . . -$68.106.0

NOTE : **CUSTOMER TO BUILD BOXES**

Blast Frezzer 8' x 8'
Walk-in Frezzer 10' x 12'
Walk-in Cooler '8 x 8'

Compressor Room 12' x 8'

NOT INCLUDED IN OUR CONTRACT & LEFT FOR OTHERS:

All Electrical
All plumbing, excluding Condensate Drains
Holes irOpeningsinbuilding to receive equipment
Forklifts if necessary.
Holes or Openings for exhaust & louvers.

New equipment would be guaranteed for a period of One (1) Year against defects in material and workmanship. Reconditioned equipment would be guaranteed for Ninety *(90)* Days.

We have based or installation on a 40 hour work week, Monday to Friday, 8:00 a.m. to 5:00 p.m. Any overtime work required during the installation or warranty would be negotiated at such time.

We are not responsible for any product losses whatsoever.

Hoping the above meets with your approval, we remain;

Cordially youres,

Brent Groome
Service Manager
BUTCHERS & PACKERS SUPPLIES

BG/cg

B&P Butchers & Packers Supplies
114:14-120 Street, Edmonton, Alberta T5G 2Y2 Phone (403)455-41 28 Fax (403) 452-0905

January 20, 1994

Ben Hubert
Yellowknife, N.W.T.

We are please tosubmita quotation for the following:

To Supply Only, F.O.B. Edmonton, Alberta:

1 - Model HON200 Grinder, ½ H.P., 115 Volt	$ 695.00
1 - **Model X200 KOMET Reconditioned Vacuum Machine,** c/w Gas Flush **(115** Volt)	$ 3,895.00
1 - Model DS-430 DIGI Counter Scale, 15 KG, 115 Volt	$ 995.00
1 - Model BCF-200/CB **YAMOTO** Electronic Platform Scale, 200 lbs./90.7 KG (115 Volt)	$ 1,795.00
1 - Model CMS1402WE32B SCOTSMAN Ice Cuber, Water Cooled, 208/230/1 Phase, 1328 lbs./24 Hours	$ 6,050.00
1 - Model BH900E Bin, 750 lbs.	$ 1,510.00
1 - Model BH1360E Bin, 1320 lbs.	$ 3,475.00

NOTE : * **All the above prices G.S.T. Extra**
* **F.O.B. EDMONTON, Alberta**

New equipment wouldbeguaranteed for a period of One(1) **Year** against defects in material and workmanship. Reconditioned equipment would beguaranteed for Ninety (90) Days.

We are not responsible for anyproductlosses whatsoever,

Hoping the above is satisfactory,

Cordially yours,

Norman Forsland

Norman Forsland
Assistant Manager
BUTCHERS & PACKERS SUPPLIES

NF/cd

SENT BY: 12-17-93 ; 1:55PM ; CUMMINS ALBERTA→ 18733297;# 1/

Cummins Alberta

HEAD OFFICE
EDMONTON
14755 - 121A AVENUE
EDMONTON, ALBERTA
CANADA T5L 2T2
Telephone (403) 455-2151
Fax (403) 454-9512

FAX #1-403-454-9512

TELECOPIER QUOTATION TRANSMITTAL

DATE: DEC 17/93 TIME: ______ OPERATOR: E*E.

ATTENTION: BEN HUBERT

COMPANY: HUBERT AND ASS.

FROM: HANS EYKELENBOOM

SUBJECT: GENSET FOR FISH PLANT

We are Transmitting 6 Pages Plus this Transmittal Sheet.

QUOTE NO. 3750.

TO SUPPLY: ONE ONLY NEW CUMMINS/ONAN DIESEL GENERATOR SET MODEL 35 DGBB, RATED AT 35 KW @ 120/240 VOLTS, SINGLE PHASE SUPPLIED WITH OPTIONS AS PER ATTACHED BROCHURE

BUDGET PRICE - $ 10,902.00

UNIT CAN BE SUPPLIED IN AN OPTIONAL METAL WEATHERPROOF ENCLOSURE, C/W MOUNTED MUFFLER.

REGARDS

[redacted]

Cummins Alberta
HEAD OFFICE
EDMONTON
1475S - 121A AVENUE
EDMONTON, ALBERTA
CANADA T5L 2T2
Telephone (403) 455-2151
Fax (403) 454-9512

PAX #1-403,454-9512

TELECOPIER QUOTATION TRANSMITTAL

DATE: JAN 10/94 TIME: _____ OPERATOR: HANS EYKELENBOOM

Attention: BEN HUBERT
Company: HUBERT AND ASS.

From: HANS EYKELENBOOM

SUBJECT: GENSET FOR FISH PLANT

We are transmitting 10 pages plus this transmittal skin.

QUOTE NO: 3750-A

TO SUPPLY: ONE ONLY NEW CUMMINS/ONAN DIESEL GENERATOR SET MODEL 20 DKAE RATED AT 20 KW, SINGLE PHASE, 120/240 AS PER ATTACHED BROCHURE

BUDGET PRICE - $ 9937.00

PLEASE REVIEW OPTIONS AVAILABLE AND WE WILL PROVIDE A FIRM PRICE UPON YOUR SELECTION OF OPTIONS.

REGARDS

Prices Firm for 30 Days GST Extra @ 7 % F.O.B. EDMONTON
Delivery: 60 DAYS
TERMS OF PAYMENT - Net 30 Days on Approved Credit, Subject to our general conditions of sale.

CALGARY
4887 - 35 ST. S.E.
CALGARY, ALBERTA
CANADA T2B 3C8
Telephone (403) 569-1122

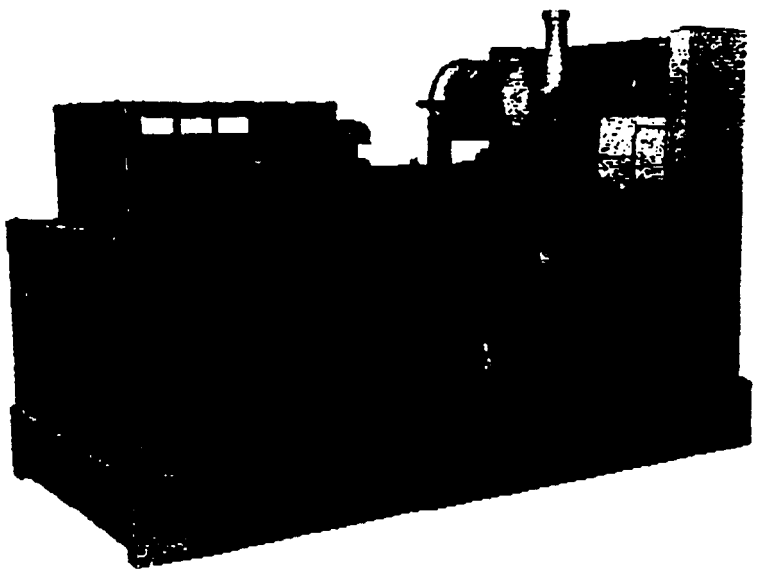
HINTON
135 VEATS AVENUE
BOX 1808, HINTON, ALBERTA
CANADA T7V 1S8
Telephone (403) 865-5111

LETHBRIDGE
240 - 24 STREET N.
LETHBRIDGE, ALBERTA
CANADA T1H 3T8
Telephone (403) 329-8144

20 DKAE 60 Hz
16 DKAE 50 Hz
Diesel-Fueled Generator Set

Onan

	STANDBY	PRIME
60 Hz	20 kW	18 kW
	25 kVA	23 kVA
50 Hz	16 kW	14.5 kW
	20 kVA	18 kVA



Generator Set Features

- **Single-source design,** manufacturing and testing 01 **all set components and accessories** *by* **Onan Corporation.**
- **Accepts 100% of nameplate kW rating** in **one step,** in **compliance** *with* *NFPA* 110, **Paragraph 5-13.2.6.**
- **Engine torque-matched excitation system** provides quick **recovery** from **transient speed dips.**
- Low **reactance generator design offers low waveform distortion with non-linear loads** *and* **provides excellent motor starting** capabilities.

Standard Equipment

ENGINE
Onan* 4-cycle *diesel* **engine.**

ALTERNATOR
Brushless Onan *AC* alternator **provides broad range reconnectible output.**

CONTROL PANEL
Vibration isolated control with analog **instrumentation.**

VOLTAGE REGULATOR
Electronic voltage regulator **utilizes** asynchronous **power transitor operation** that **provides** immunity **from SCR loads.**

COOLING SYSTEM
High ambient 122° F (SO" C) system.

SKID BASE
Supports the alternator and angina. Battery rack and **cooling system** mount to the **skid** base. **Integral** *ration **isolation.**

Generator Set Testing

The Prototype Test Support (PTS) program is our commitment to verifying the integrity of our designs and products.

Before the generator sets are put into production, prototype models are subjected to demanding tests with typical/atypical loads and transients anticipated in service.

Production models earn the PTS seal only after meeting the performance criteria established by the program.

Single-Source Warranty

All generator set components and systems are covered by a limited one-year warranty. Optional two and five-year extended programs are available.

CSA" Standard Models are CSA certified.

Generator Set Performance

Voltage Regulation
Under load from no load to 100% load will be within ± 2%.

Random Voltage **Variation**
For constant loads, from no load to 100% load will not exceed ±1% of its mean value.

Frequency **Regulation**
Under varying loads from no load to 100% load: 5% (Isochronous with optional electronic governor).

Random Frequency Variation
Will not exceed ± 0.5% of its mean value for constant loads from no toad to full load.

Electromagnetic Interference Attenuation
Meets requirements of most industrial and commercial applications.

AC Waveform Total Harmonic Distortion
Less than 5% total no load to full linear load, and less than 3% for any single harmonic

Telephone **Influence** Factor **(TIF)**
Less than 40 per NEMA MG1-22.43.

Telephone Harmonic Factor (THF) Less than 3.

Alternator Temperature **Rise**
At rated load is less than 125° C at standby rating, per NEMA MG1 .22.40, IEEE I 15 and IEC 34–1.

Radio Interference
Alternator and voltage regulator with optional RFI Protection Kit operate in compliance with MIL-STD 461 and VDE Level K.

Maximum Sound **Level** et 23 **ft. (7m)** full **load:**
60 Hz; 74 dBa 50 Hz; 73 dBa

Engine: Onan* V2203, 4-cylinder, indirect injection diesel

Design: 4-cycle, water-cooled, natural aspiration.
Bore: 3.4" (87 mm) **Stroke:** 3.6" (93 mm).
Platen **Displacement:** 134 cubic inches (22 liters).
Valves: Two per cylinder, single springs.
Crankshaft: Forged steel, integral counterweight-type.
Connecting Rods: Forged steel with I-beam design.
Compression Retire 231.
Starting: 12-volt. negative ground.
Cranking Current 350 amps at ambient temperature of 32° F (o'' C).
Battery **Charging** Alternator: 40-amp.
Cylinder Block: Cast iron.

Fuel System: Indirect injection, Number 2 diesel fuel; Fuel filters; Fuel/water separator; Automatic electric fuel shutoff; Distributor injection pump with integral mechanical governor.
Air **Cleaner:** Heavy duty with restriction indicator.
Lube oil **Capacity:** 10 us quarts (9.5 liters).
Lube **Oil Required:** API CD 10W -30.
Lube **Oil Filter:** Single spin-on, full flow.
Coding System: High ambient 122° F (50" C) radiator.

** Built for Onan to exacting standards of quality and performance.*

Alternator: Onan

Design:
Revolving field, single bearing. 4-pole, brushless, drip-proof construction. Standard 125° c temperature rise at standby power rating. Class H insulation system per NEMA MG1–1 .65 and 8S2757. The main alternator and exciter insulation systems are impregnated for operation In severe environments where sand, salt sea spray and chemical corrosion are installation factors.

Stator:
Skewed stator and 2/3 pitch windings minimize field heating and voltage harmonica.

Rotor:
Dynamically balanced assembly. Direct coupled to engine by a flexible drive disc. Complete amortisseur (damper) windings help minimize voltage deviations and heating effects under unbalanced loads. The rotor is supported by a pre-lubricated, maintenance-free ball bearing.

Phase Rotation: A (U), B (V) ,C (W)
Alternator Cooling: Direct drive centrifugal blower

Torque-Matched Voltage **Regulation:**
The voltage regulator provides torque-matched underfrequency compensation to optimize motor starting performance and assist the engine during transient load Conditions. Asynchronous power transistor operation provides immunity from SCR tracking when applied to non-linear toads. The brushless exciter armature powers the main alternator field winding through shaft-mounted, three-phase, full wave silicon diode rectifiers.

Shunt Excitation:
The excitation system derives its power from the main output of the generator, eliminating the need for a separate excitation power source. Thii excitation system, combined with the Onan low reactance generator. comprise a system that provides sufficient short circuit current for selective clearing of instantaneous overcurrent devices

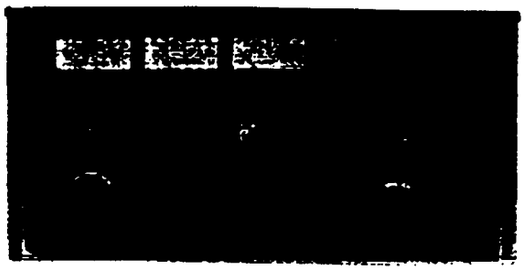
20 DKAE 60 Hz Operating Data

	80°C Alternator				105°C Alternator				125°C Alternator			
Voltage Ranges	120/208 Thru 139/240	120/208 Thru 139/240	120/240	347/600	120/208 Thru 139/240	120/208 Thru 139/240	120/240	347/600	120/208 Thru 139/240	120/208 Thru 139/240	120/240	347/600
* The broad range alternator can supply single phase output up to 2/3 of the set rated 3-phase kVA at 1.0 power factor.	240/416 Thru 277/480	240/416 Thru 277/480			240/416 Thru 277/480	240/416 Thru 277/480			240/416 Thru 277/480	240/416 Thru 277/480		
** The optional extended stack alternator can supply single phase output at full set rated kW at 1.0 power factor.	120/240**	120/240*			120/240**	120/240*			120/240**	120/240*		
Motor Starting												
Maximum Surge kW	20	20	20	20	20	20	20	20	20	20	20	20
Maximum kVA (Shunt) (90% Sustained Voltage)	87	87	69	87	87	69	56	69	87	69	58	69
Feature Code	B269	B257	B275	B305	B268	B256	B274	B304	B267	B255	B273	B303
Alternator Data Sheet Number	107	107	107	107	107	106	106	106	107	108	108	106
Full Load Current		120/208	127/220	139/240	240/416	254/440	277/480	347/600	139/240*	120/240**		
(Amps @ Standby Rating)		68	60	60	35	33	30	24	69	83		

Fuel		STANDBY				PRIME			
Fuel Consumption	Loed	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
	kW	5.0	10.0	15.0	20.0	4.5	9.0	13.5	18.0
	US gph	0.8	1.1	1.5	2.0	0.7	1.0	1.4	1.7
	L/hr	3.0	4.2	5.5	7.4	2.8	3.9	5.1	6A
Maximum Fuel Flow		3.5 US gph		13 L/hr		3.5 US gph		13 L/hr	
Maximum Inlet Restriction		2.0 in. Hg		51 mm Hg		2.0 in. Hg		51 mm Hg	
Maximum Return Restriction		5.8 in. Hg		147 mm Hg		5.6 in. Hg		147 mm Hg	
Cooling									
Heat Rejection To Coolant		1037 Btu/Min		1.7 MJ/Min		1411 Btu/Min		1.5 MJ/Min	
Heal Radiated To Room		360 Btu/Min		0.38 MJ/Min		320 Btu/Min		0.34 MJ/Min	
Coolant Capacity (with radiator)		2.7 US Gal		10 L		27 us Gal		10 L	
Coolant Flow Rate		14 Gal/Min		52 L/Min		14 Gal/Min		52 L/Min	
Maximum Coolant Friction Head		3.1 psi		22 kPa		3.1 psi		22 kPa	
Maximum Coolant Static Head		30 ft		9.0 m		30 ft		9.0 m	
Radiator Fan Load		1.5 HP		1.1 kw		1.5 HP		1.1 kW	
Air									
Combustion Air		59 cfm		1.7 cu m/min		59 cfm		1.7 cu m/min	
Maximum Air Cleaner Restriction		25 in. H2O		6.2 kPa		25 m. H2O		62 kPa	
Alternator Cooling Air		250 cfm		7.1 cu m/min		250 cfm		7.1 cu m/min	
Radiator Cooling Air		3900 scfm		110 cu m/min		3900 scfm		110 cu m/min	
Minimum Air Opening to Room		5.5 sq ft		0.51 sq m		5.5 sq ft		0.51 sq m	
Minimum Discharge Opening		3.5 sq ft		0.33 sq m		3.5 sq ft		0.33 sq m	
Max. Allowable Static Restriction		0.5 in. H2O		125 Pa		0.5 in. H2O		125 Pa	
Exhaust									
Gas Flow (Full Load)		170 cfm		4.8 cu m/min		160 cfm		4.6 cu m/min	
Gee Temperature		840 °F		449 °C		760 °F		404 °C	
Maximum Back Pressure		41 in. H2O		10.2 kPa		41 in. H2O		102 kPa	
Engine									
moss Engine Power Output		33 bhp		24 kWm		30 bhp		22 kWm	
BMEP		107 psi		738 kPa		97 psi		668 kPa	
Piston Speed		1091 ft/min		5.54 m/s		1091 ft/min		5.54 m/s	
Overspeed Limit		2100 ±50 rpm				2100 ±50 rpm			
Regenerative Power		7 k w				7 kw			
Derating Factors		Rated power available up to 800 ft (244 m) at ambient temperatures up to 77°F (25°C). Above 800 ft (244 m), derate at 4% per 1000 ft (305 m) and 1% per 10°F (2% per 11°C) above 77°F (25°C).							

Detector™ control System

- **Monitors engine performance and AC power output.**
- **Controls generator set start** *and* Shutdown.
- **Automatic** remote **start.**
- **DC panel lighting.**
- **Vibration isolators** protect **control panel electronics and circuitry** from **generator set vibration.**
- **Analog instrumentation** displays **performance trends** Rugged. **Non-fluctuating,** easy to reed
- **Gasketted control enclosure for environmental protection.**



Control panel shown includes optional AC Meters and 12-Light Monitoring System.

Standard Control Features

- Rumstop-remote switch
- -Remote starting, 12-volt, 2 wire
- -nt temperature gauge
- •Field circuit breaker
- •Engine preheat switch
- DC voltmeter
- •Oil pressure gauge
- Running time meter
- Fault reset switch
- •Lamp test switch
- •Cycle cranking
- nrna delay start/stop
- 7-light engine monitor with individual 1/2 amp relay signals and a common alarm contact for each of ale following conditions:

RUN (green light)
PRE-WARNING FOR LOW OIL PRESSURE (yellow light)
PRE-WARNING FOR HIGH COOLANT TEMP (yellow light)
LOW OIL PRESSURE SHUTDOWN (red light)
HIGH COOLANT TEMPERATURE SHUTDOWN (red light)
OVERCRANK SHUTDOWN (red light)
OVERSPEED SHUTDOWN (red light)

nO@onalt4FPA11012-U9M Monitor

Engine monitor with individual 1/2 amp relay signals and common external alarm contact for eaoh of the following conditions:

RUN (groan light)
PRE-WARNING FOR LOW OIL PRESSURE (yellow light)
PRE-WARNING FOR HIGH COOLANT TEMP (yellow light)
LOW OIL PRESSURE SHUTDOWN (red light)
HIGH COOLANT TEMPERATURE SHUTDOWN (red light)
OVERCRANK SHUTDOWN (red light)
OVERSPEED SHUTDOWN (red light)
SWITCH OFF (flashing rod light - indicates generator set nor In automatic start mode)
LOW COOLANT TEMPERATURE (yellow light)
LOW FUEL (yellow light)
TWO CUSTOMER SELECTED FAULTS (red light)

Optional AC Meter Package

Order with NFPA 110 monitor to meet code requirements.

- AC voltmeter (dual range)
- AC ammeter (dual range)
- •Voltmeter/ammeter phase selector switch with an off position
- Frequerrcy meter
- AC Rheostat (panel mounted) for ±5% voltage adjust

Generator Set Options

Engine

- ☐ 120-volt 1000 W coolant heater (thermostatically controlled)
- ☐ 240-volt 1000 W coolant heater (thermostatically controlled)
- ☐ Electronic governor

Alternator

- ☐ h f-condensation heater
- ☐ Extended stack (full single phase output)
- ☐ Full single phase output (Non-Reconnectible)
- ☐ 105° C Rise alternator
- ☐ trll"cl?imamemabx

control Panel

- ☐ wkurnonalarmre laymw 12 form C remote annunciation relays
- ☐ Run/common alarm relay package
- ☐ Low coolant level shutdown
- ☐ Control anti-condensation space heater
- ☐ Tachometer
- ☐ Emergency stop

Exhaust system

- ☐ Industrial-grade exhaust silencer
- ☐ Residential-grade exhaust silencer
- O Critical-grade exhaust silencer
- ☐ Set mounted critical - grade exhaust silencer

Generator Set

- ☐ Main line circuit breaker
- ☐ Battery charger, equalizer, float-type
- ☐ Batteries
- ☐ Spring Isolators
- ☐ Remote annunciator panel
- ☐ Weather-protective enclosure with mounted silencer
- ☐ 2-year standby warranty
- ☐ 2-year prime power warranty*
- ☐ 5-year standby power warranty
- ☐ Export box packaging
- ☐ 24 hr dual wall sub-base tank
- ☐ 48 hr dual wall sub-base fuel tank

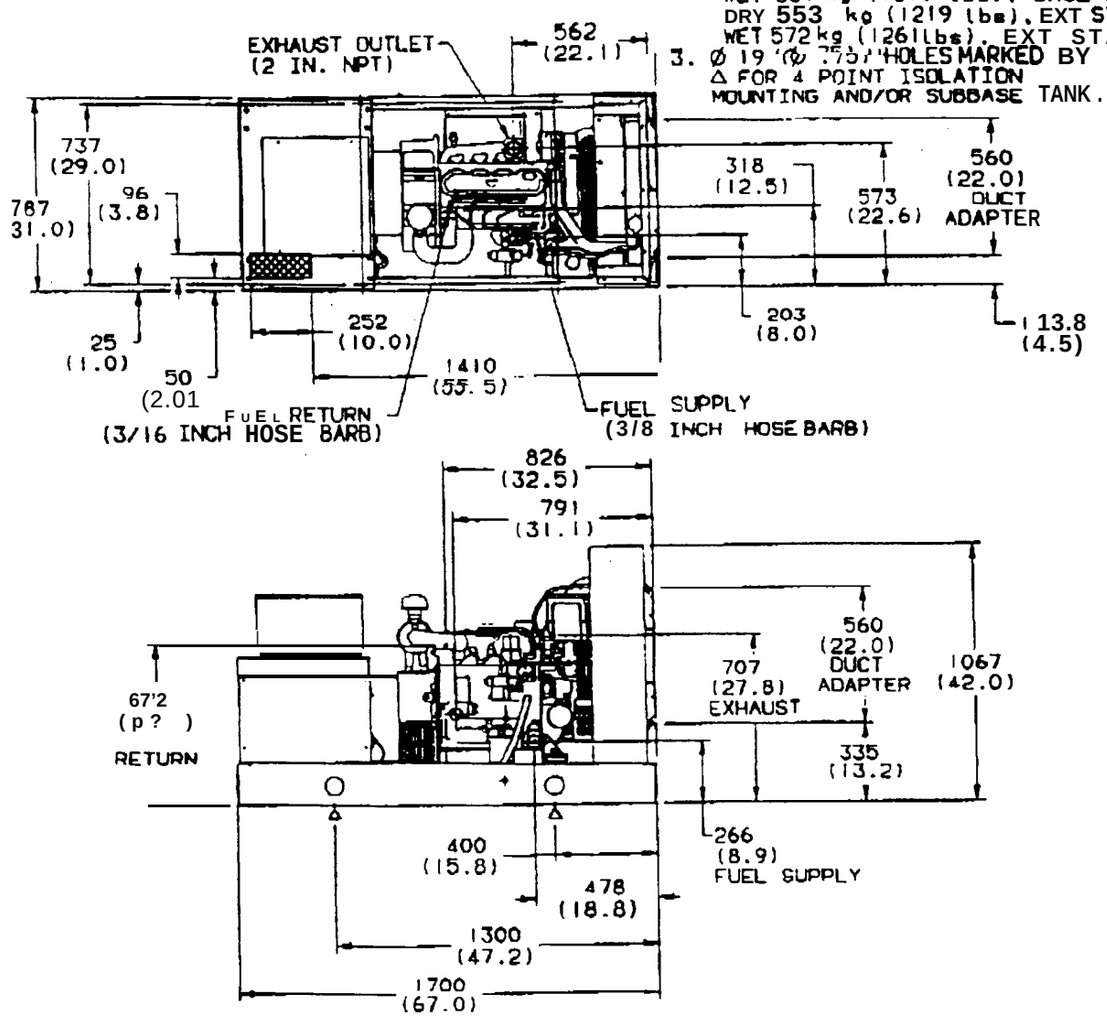
*Available in North America only.

Outline Drawing

60 Hz: 20 DKAE
50 Hz: 16 DKAE

'HIS DRAWING IS FOR INFORMATIONAL PURPOSES
NLY. FOR SPECIFIC (INSTRUCTION DETAILS.
BTAIN INSTALLATION OUTLINE DRAWING 500-2922
'ROM YOUR DISTRIBUTOR.

NOTES:
1. DIMENSIONS SHOWN IN( ) ARE INCHES.
2. GEN SET APPROXIMATE WEIGHT:
DRY 532 kg (1173 lbs). BASE GEN
WET 551 kg (1215 lbs). BASE GEN
DRY 553 kg (1219 lbs). EXT STACK
WET 572 kg (1261 lbs). EXT STACK
3. Ø 19 (Ø .75) HOLES MARKED BY △ FOR 4 POINT ISOLATION MOUNTING AND/OR SUBBASE TANK.



See your distributor for **more** information.

CUMMINS ALBERTA
14755 - 121A AVE.
EDMONTON, **ALBERTA**
T5L 2T2 PH: 455-2151

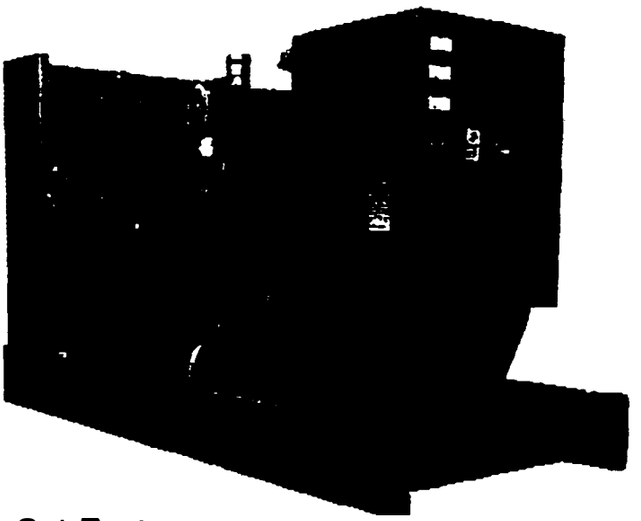
Onan

Onan Corporation
1400 73rd Avenue N. E.
Minneapolis, MN 55432
612-574-5000
Telex: 275477
Fax: 612-574-8087

35 DGBB 60-Hz
32 DGBB 50 Hz
Diesel-Fueled Generator Set

Onan

	STANDBY	PRIME
60 Hz	35 kW	32 kW
	44 kVA	40 I(VA
50 Hz	32 kW	29 kW
	40 kVA	36 kVA



Generator Set Features

- Single-sour'ce design, manufacturing end testing of all sat components and accessories by Onan Corporation.
- Accepts 100% of nameplate kW rating in one step, In compliance with NFPA 110, Paragraph 5-13.2.6.
- Engine torque-matched excitation system provides quick recovery from transient speed dips.
- Low reactance generator design offers low waveform distortion with non-! inear loads and provides ● xcallant motor starting capabilities.

Standard Equipment

ENGINE
Cummins 4-cycle diesel engine.

ALTERNATOR
Brushless Onan AC alternator provides broad range reconnectable output. Designed for service in severe environments.

CONTROL PANEL
Vibration isolated control with analog Instrumentation.

VOLTAGE REGULATOR
Electronic voltage regulator provides precise regulation and underfrequency compensation.

COOLING SYSTEM
High ambient 122° F (50° C) system.

SKII) BASE
Supports the alternator and engine. Battery rack and cooling system mount to the skid base. Integral vibration isolation

Generator Set Testing

The Prototype Test Support (PTS) program is our commitment to verifying the integrity of our designs and products.

Before the generator sets are put into production, prototype models are subjected to demanding teats with typical/atypical beds and transients anticipated in service.

Production models earn the PTS seat only after meeting the performance criteria established by the program.

Single-Source Warranty

All generator set components and systems are covered by a limited one-year warranty. Optional two. and five-year extended programs are available.

Standard Models are CSA certified.

Generator Set performance

Voltage Regulation
Under load from no load to 100% load will be within ±2%.

Random Voltage Variation
For constant loads, from no load to 100?. load will not exceed ±1% of its mean value.

Frequency **Regulation**
under varying loads from no load to 100% load: 5%

Random Frequency Variation
Will not exceed ± 0.5% of its mean value for constant toads from no load to full bad.

Electromagnetic Interference **Attenuation**
Meets requirements of most industrial and commercial applications.

AC Waveform **Total Harmonic Distortion**
Less than 5% total no load to full load, and fess than 3% for any single harmonic

Telephone **Influence** Factor **(TIF)**
Less than 50 per NEMA MG1-22.43.

Telephone Harmonic Factor **(THF)** Less than *3*.

Alternator Temperature **Rise**
At rated load Is fess than 105°C at standby rating, per NEMA MG1 .22.40, IEEE115 and IEC 34-1.

Radio **Interference**
Alternator and voltage regulator meet the provisions of 6S.800 and VDE Class G and N.

Engine: Cummins 4B 3.9 In-line, 4-cylinder, direct injection diesel

Design: 4-cycle, water-cooled, natural aspiration
Bore: 4.02" (102 mm) **Stroke:** 4.72" (120 mm)
Piston **Displacement:** 239 cubic inches (3.9 liters)
Two Valves per **Cylinder, Single Springs**
Forged **Steel, Integral Counterweight-Type** Crankshaft
Forged **Steel** Connecting Rods with **I-Beam** Design
Compression Ratio: 17.3:1
Starting: 24-volt, negative ground
Cranking Current: 400 amps at **ambient** temperature of 32" F (0° C).
45-amp Battery Charging **Alternator**
Cast **Iron Cylinder Block**

Direct **Injection Fuel** System: Number 2 diesel fuel:
Fuel filters; Automatic electric fuel shutoff; Fuel/water separator; Distributor injection pump with integral mechanical governor.
Dry-Element Air Cleaner, with Restriction indicator
Lube **Oil** Capacity: 12 US quarts (11 liters)
Lube Oil Required: API CD 15W-40
Lube Oil Filter: Single Spin-On, Full flow
Maximum **Lube** 011 Consumption:
25 US quarts (24 liters) – per 100 Hours
Cooling System
High Ambient 122° F (50 ° C) Radiator.

Alternator: Onan

Design:
Revolving field, single bearing, 4-pole, brushless, drip-proof construction. Standard 105° C temperature rise at standby power rating. Class H insulation system per NEMA MG1–1.65 and BS2757. The main alternator end exciter insulation systems are impregnated for operation in severe environments where aend, salt sea spray and chemical corrosion are installation factors.

Stator:
Skewed stator and 2/3 pitch windings minimize ritd heating and voltage harmonics

Rotor:
Dynamically balanced assembly- Direct coupled fo engine by a flexible drive disc. Complete .mortisseur (damper) windings hefp minimize voltage deviations and heating effects under unbalanced loads. The rotor is supported by a pre-lubricated, maintenance-free ball bearing.

Torque-Matched Voltage Regulation:
The voltage regulator provides torque-matched underfrequency compensation to optimize motor starting performance and assist the engine during transient load conditions. The brushless exciter armature powers the main alternator fii winding through shaft-mounted,three-phase, full wave silicon diode rectifiers. Semi-conductor surge suppressors protect the diodes from transient overvoltage induced by toad surges.

Shunt Excitation:
The excitation system derives its power from the main output of the generator, eliminating the need for a separate excitation power source. This excitation system. combined with the Onan low reactance generator, comprise a system that provides sufficient short circuit current for selective clearing of instantaneous overcurrent devices.

Phase Rotation: A (U), B (V), C (W)
Alternator Coding: Direct drive centrifugal blower

35 DGBB 60Hz Operating Data

Reactances (per unit, based on standby rating, with tolerance of ±10%)	Extended Stack 120/208 139/240 240/416 277/480	80°C Alternator 120/208 139/240 240/416 277/480	220/380	347/600	105/125°C Alternator 120/208 139/240 240/416 277/480	220/380	347/600
Synchronous	2 2 0 1.66	220 1 8a	1.74	1.58	2.64 1.98	2.06	1.77
Direct Axis Transient	0.15 0.11	0.15 0.11	0.12	0.11	0.19 0.14	0.15	0.13
Direct Axis Subtransient	0.10 0.07	0.10 0.07	0.08	0.07	0.13 0.10	0.10	0.09
Negative Sequence	0.10 0.07	0.10 0.07	0.08	0.07	0.12 0.09	0.08	0.08
Zero Sequence	0.07 0.05	0.07 0.05	0.065	0.05	0.08 0.06	0.07	0.06
Motor Starting	**Broad Range**	**Broad Range**	**380 V**	**600 V**	**Broad Range**	**380 V**	**600 V**
Maximum Surge kW	42	42	42	43	41	41	42
Maximum kVA (Shunt)	146	146	146	146	118	118	118
(90% Sustained Voltage) (PMG)	172	172	172	172	139	132	139
Alternator Data Sheet Number	202	202	202	202	201	201	201

Full Load current (Amps @ standby Rating)	120/208	127?S9	139/240	?20/380	240/416	254/440	277/480	347/600	120/240*	120/240**
	121	115	105	66	61	57	53	42	97	146

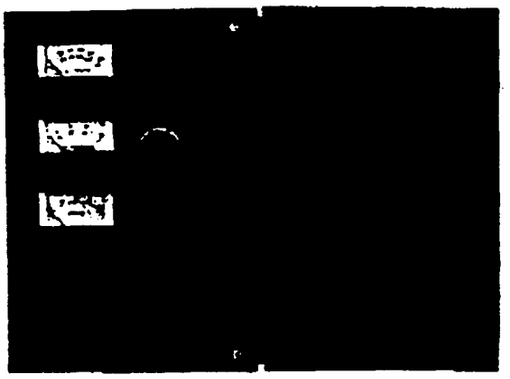
Fuel		STANDBY				PRIME			
Fuel Consumption	Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
	kW	9	18	26	35	8	16	24	32
	us gph	1.4	1.9	2.5	32	1.4	1.8	2.3	2.9
	L/hr	5	7	9	12	5	7	9	11
Maximum Fud Flow		12.0 US gph	45 L/hr			12.0 US gph	45 L/hr		
Maximum Inlet Restriction		4.0 in. Hg	102 mm Hg			4.0 m. Hg	102 mm Hg		
Maximum Return Restriction		20.0 in. Hg	S08 mm Hg			20.0 h Hg	508 mm Hg		
Cooling									
Heat Rejection To Coolant		2100 Btu/Min	2.2 MJ/Min			19s0 Btu/Min	2.1 MJ/Min		
Heat Radiated To Room		736 Btu/Min	0.8 MJ/Min			665 Btu/Min	0.7 MJ/Min		
Coolant Capacity (with radiator)		5.5 us Gal	21 L			5.5 us Gal	2 1 L -		
Coolant Flow Rate		46 Gal/Min	170 L/Min			45 Gal/Min	170 L/Min		
Maximum Coolant Friction Head		5.0 psi	34 kPa			5.0 psi	34 kPa		
Maximum Coolant Static Head		46 ft	14.0 m			46 ft	14.0 m		
Radiator Fan Load		2.5 HP	1.9 kW			2.5 HP	1 .9 kW		
Air									
Combustion Air		100 cim	2.8 cu m/min			100 drn	2.8 cu m/min		
Maximum Air Cleaner Restriction		25 in H2O	6.2 kPa			25 in H2O	62 kPa		
Alternator Cooling Air		572 cim	16.2 cu m/min			572 cim	16.2 cu m/min		
Radiator Cooling Air		4000 cim	113 cu m/min			4000 cim	113 cu m/min		
Minimum Air Opening to Room		7,2 sq ft	0.7 sq m			7.2 sq ft	0.7 sq m		
Minimum Discharge opening		5.8 sq n	0.5 sq m			5.8 sq ft	0.5 sq m		
Maximum Restriction at Radiator Discharge (static)		0.25 in H2O	62 Pa			025 In H2O	62 Pa		
Exhaust									
Gas Flow (Full Load)		310 cim	a.8 cu m/min			300 cim	8.5 cu m/min		
Gas Temperature		1120 °f	604 °C			1050 °F	566 °C		
Maximum Back Pressure		41 in H2O	10.2 kPa			41 in H2O	t 0.2 kPa		
Engine									
Gross Engine Power Output		66 bhp	49 kWm			60 bhp	45 kwm		
BMEP		103 psi	712 kPa			95 psi	653 kPa		
Piston Speed		1417 ft/min	720 m/s			1417 ft/min	7.20 m/s		
Overspeed Limit		2100 150 rpm				2100 ±50 rpm			
Regenerative Power		18 kW				18 kW			

Derating Factors

Rated power available up to 5700 ft (1739 m) at ambient temperatures up m 77°F (25°C). Above 5700 ft (1739 m), derate at 3% per 1000 ft (305 m) and 1% per 10°F (2% per 11°C) above 77°F (25°C).

Detector" Control System

- Monitors engine performance and AC power output.
- Controls generator set start and shutdown.
- Automatic remote start.
- DC panel lighting.
- Vibration Isolators protect control panel electronics and circuitry from generator set vibration.
- Analog instrumentation displays performance trends Rugged. Non-fluctuating, easy to read.



Control panel shown includes optional AC Meters and 12-Light Monitoring System.

☒ Standard Control Features

- •Run-stop-remote switch
- •Remote starting, 24-volt, 2 wire
- •Coolant temperature gauge
- •Field circuit breaker
- OC voltmeter
- Runntng time meter
- Larrtp teat switch
- •Oil pressure gauge
- •Fault reset switch
- •Cycle cranking
- •7-light engine monitor with individual 1/2 amp relay signals and a common alarm contact for each of the following conditions:

RUN (green light)
PRE-WARNING FOR Low OIL PRESSURE (yellow light)
PRE-WARNING FOR HIGH COOLANT TEMP (yellow light)
LOW OIL PRESSURE SHUTDOWN (red light)
HIGH COOLANT TEMPERATURE SHUTDOWN (red light)
OVERCRANK SHUTDOWN (red light)
OVERSPEED SHUTDOWN (red light)

☐ Optional NFPA 110 12-Light Monitor

Engine monitor with individual 1/2 amp relay signals and common external alarm contact for each of the following conditions:

RUN (green light)
PRE-WARNINGFOR Low OIL PRESSURE (yellow light)
PRE-WARNING FOR HIGH COOLANT TEMP (yellow light)
LOW OIL PRESSURE SHUTDOWN (red light)
HIGH COOLANT TEMPERATURE SHUTDOWN (red light)
OVERCRANK SHUTDOWN (red light)
OVERSPEED SHUTDOWN (red light)
SWITCH OFF (flashing red light – indicates generator set not in automatic start mode)
LOW COOLANT TEMPERATURE (yellow light)
LOW FUEL (yellow light)
TWO CUSTOMER SELECTED FAULTS (red light)

☒ Optional AC Meter Package

Order with NFPA 110 monitor to meet code requirements.

- AC voltmeter (dual range)
- AC ammeter (dual range)
- Vottrneter/ammeter phase selector switch with an off position
- Dual scale frequency meter/tachometer
- AC Rheostat (panel mounted) for ±5% voltage adjust

Generator Set Options

Engine

- ☐ Heavy-duty air cleaner with safety element
- ☐ 120-volt 750 W coolant heater (thermostatically controlled)
- ☐ 120-volt 1500 W coolant heater (thermostatically controlled)
- ☐ 240-volt 750 W coolant heater (thermostatically controlled)
- ☐ 240-volt 1500 W coolant heater (thermostatically controlled)
- ☐ 120-volt 150 W lube oil heater
- ☐ 240-vdtlsowlutra OdhMllW
- ☐ Electronic governor

Cooling System

- ☐ Remote radiator cooling

Alternator

- ☐ Anti-condensation heater
- ☐ PMG Excitation
- ☐ Exmdfldatack (full single phase output)
- ☐ 80° C rise alternator
- ☐ 125° C rise alternator

Control Panel

- ☐ Remote fault signal dry contact relay package
- ☐ Run relay package
- ☐ Low coolant level shutdown
- ☐ Time delay start/stop
- ☐ Control anti-condensation space heater
- ☐ Oil temperature gauge
- ☐ Tachometer
- ☐ Wattmeter
- ☐ Power factor meter
- ☐ Panel mount engine speed control potentiometer
- ☐ Emergency stop
- ☐ Over/under voltage relay
- ☐ Over/under frequency relay

Exhaust System

- ☐ Industrial-grade exhaust silencer
- ☐ Residential-grade exhaust silencer
- ☐ Critical-grade exhaust silencer

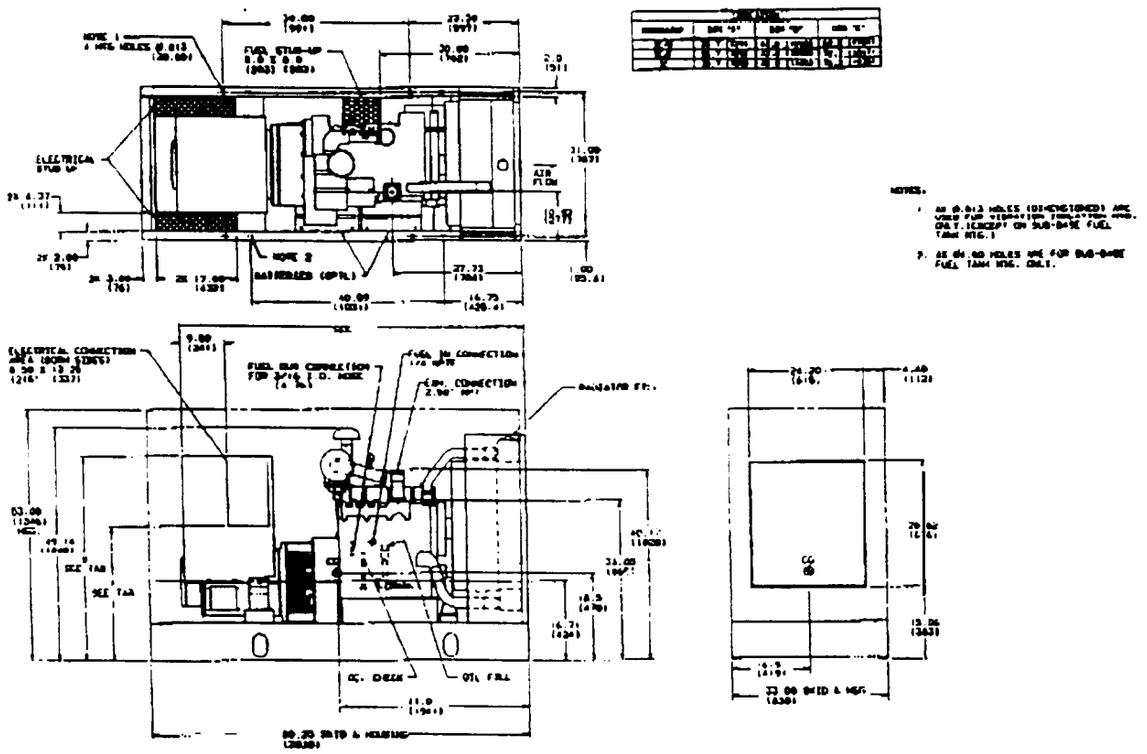
Fuef System

- ☐ 100 gallon (379 liter) Sub-base tank
- ☐ 8 gallon (30 liter) in-skid day tank
- •I Day tank rupture basin

Generator Set

- ☐ Main line circuit breaker
- ☐ AC entrance box
- ☐ Battery charger, equalizer, float-type
- ☐ Batteries
- ☐ Spring isolators
- ☐ Remote annunciator panel
- ☐ Weather-protective enclosure with mounted silencer
- ☐ 2-year standby warranty
- ☐ 2-year prime power warranty
- ☐ 5-year standby power warranty
- ☐ Export box packaging

tline Drawing
Hz: 35 DGBB
Hz: 32 DGBB



)btain Installation outline Drawing 500-2819

Dimensions in inches (MM)

drawing is for informational purposes only For specific struction details, obtain installation outline drawing from r distributor

Dry Weight	
Unhoused:	**1850 lbs./840 kg.**
Housed:	**2125 lbs./965 kg.**
Wet Weight	
Unhoused:	**1920 lbs./872 kg.**
Housed:	**2190 lbs./994 kg.**

See your distributor for more information.

CUMMINS ALBERTA
14755- 121A AVE.
EDMONTON, ALBERTA
T5L 2T2 PH: 455-2151

nan
in Corporation
) 73rd Avenue N. E.
neapolis, MN 55432
-574-5000
:x: 275477
: 612-574-8087

Backfeed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is opened.

APPENDIX 6. ESTIMATES FOR REFITTING 800 TON-IBARGE

Butchers & Packers Supplies

11434-120 Street, Edmonton, Alberta T5G 2Y2 Phone (403) 455-4128 Fax (403) 452-0905
11449 -98ave, Grande Prairie, AB T8V-5S5
PH: (403) 538-0989 FAX: (403) 532-8903

1993

Associate

bert;

Hay River I went over and did a visual inspection of the his system you have three 20 H.P. open drive York compre :- my opinion that all three compressors and drive motors built. The drive motors should be dismantled and the roughtly checked, Bob Grant has informed me N.T. would O this.
s the compressors; . I would have to send them to Edmonton tied and thoroughly checked.
ting to hear from factory (YORK) if parts are still t is very possible that it is more economical to replace rive compressors with semi-hermetic closed drive repairs on 20 H.P. drive motors, and compressors may ble.
also 3 water pumps, we could only turn one by hand. Bob ed me they could take care of fixing these. Thereare r shut-off valves that appear to be seized also.
em is completely out of gas, the system was charged with s the ozone depleting gas that is being phased out. I end you switch over to MP-39whichisthe replacement gas

found the shell & tube type condensers have had the end ved and there is a considerable amount of rust. Bob Grant' me N.T. would be able to fix these condensers.
repressors are in running order, the system would have to changed, evacuation &allvalvesin coolers would have balanced. We were not able to go inside coolers to look there is probably fan motors that would need to be ossible expansion valves.
having power to systemitisverydifficult to estimate repairing system. I would recommend all compressors be oughly before you should trust them with the large amounts hat would be stored in walk-ins.
ear back from factory on availablityof parts and possible lacements I will fax you.

the above meets with your approval. I look forward ouin the future.

James

ger

(KN) MENT

COMMERCIAL REFRIGERATION AIR CONDITIONING EQUIPMENT

ELECTRONIC COMPUTING SCALES

11/29/93
ement
have
. I
rs (if
netic
o find
them
from

northern transportation company limited

P.O. Box 2s0
Hay River, Northwest Territories, Canada XOE ORO
Telephone (403) 874-61 W Telecopier (403) 874-6158

Mr. Ben Hubert
Hubert and Associates Ltd.
Box 277
Yellowknife, N.W.T.
X1A 2N2

Dear Mr. Hubert;

In response to your letter dated November 9, requesting information pertaining to the NTCL *reefer barge,* I will answer each of your questions in turn.

1. A full seaworthiness inspection includes the following:
   (A) Lifting of reefer barge from the water using Northern Transportations Syncrolift at Hay River.
   (B) Complete external survey to assess steel damage, corrosion and general overall condition.
   (C) Open all tanks and gas free for safe entry.
   (D) Enter all tanks and do a complete internal inspection. An internal inspection includes the following: Frames, brackets, bulkheads, deep frames and shell plating.
   (E) Complete shell plating thickness test.
   (F) Close all tanks.
   (G) Carry out an air test on each tank for determination of leaks.
   (H) Submit a written report.

FIRM QUOTE: $4,800.00

2. To put the electrical system back into service will be divided into three sections.

   (A) Overhaul, clean and perform load tests on the two existing alternators.

ESTIMATE ONLY: $2400.00

(B) Perform operational test on all remaining electrical systems: motors, controls, generator paralleling, heating circuits and lighting circuits.
Perform meggertest on all electrical equipment and circuits.

ESTIMATE ONLY: $4950.00

(C) Overhaul two existing caterpillar diesel engines used for electrical generation.

ESTIMATE ONLY: $10,800.

* Please note: Where estimates are submitted, this is not to be considered a firm quote. Should this project proceed, every attempt will be made to carry out work within estimate guidelines.

3. Barge dimensions are as follows:

Length, overall = 168 ft.
Breadth, moulded = 34 ft.
Draft, light = 2 ft.
Length of house = 155 ft.

There are eight refrigerated cargo compartments in total. One forward which extends full width of the barge. Three on the port side, three on the starboard side with an eight foot walkway between and one aft.

The engine room is aft which contains the following equipment:
Two caterpillar generators of 50 kilowatt each; electrical switchboard; three refrigeration compressors; two refrigeration cooling water pumps; two refrigeration condensers and one fire pump.

4. The volume of each refrigerated compartment is as follows:

Forward compartment	= 5000 cu.feet
Three port compartments (3200 cu.ft.each)	= 9600 cu.feet
Three stbd. compartments (3200 cu.ft.each)	= 9600 cu.feet
Aft compartment	= 4400 cu.feet

5. The generators draw their fuel from #9 tank, port and stbd. Their is no data available for determining the volume which these two tanks will hold. If required, volumes can be ascertained at time of tank inspection.

6. The two generator diesels are manufactured by Caterpillar, Model D320. Serial numbers 63B2795 and 63B2828. They are directly connected to "Tamper" 60 kilowatt alternators. Fuel consumption curves for these units are not in my files.

As built drawings will be made available, should this project progress beyond the initial consulting stage.

Thank You

Robert Grant
Director, Marina Maintenance.

cc: Paul Preville.

DIESEL ENGINE

130 HP @ 2400 RPM

Series A

BASIC DESCRIPTION:

FOUR-CYCLE, COMPRESSION IGNITION **DIESEL**

4. **CYLINDER,** 4 **inch BORE,** S **Inch STROKE, 152 cubic inch** PISTON DISPLACEMENT

COMPRESSION RATIO 18.1

FLYWHEEL HOUSING. **Standard** ..... SAE No. 2

ROTATION — Counterelockwise when facing flywheel

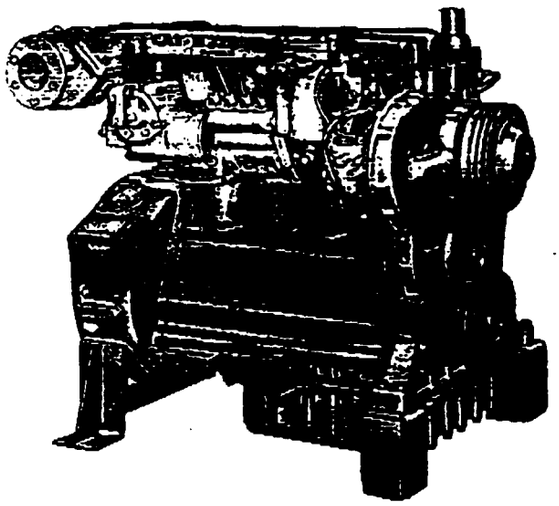
BASIC PERFORMANCE:

NORMAL WORKING RANGE ..... 1400-2400 RPM

LOW IDLE RPM, Standard 550

MAXIMUM **TORQUE** ..... 226 th. fL@MIOORPM (Lug from Intermittent BHP @ 2400 RPM)

TORQUE: The amount of turning effort, measured in lb. ft., developed by the ● ngnm Prom any given horsepower setting, increased torque can be expected from a Caterpillar engine as engine speed is lugged down by an application overload. Within the speed range of 2000 to 2400 RPM, the D320 engine is capable of producing 10% or greater torque rise at approximately ⅓ governed engine speed.



FEATURES:

AFTERCOOLER: Fresh or salt *water* aftercooled engine arrangements are available where maximum performance is desired. By cooling *intake* air, density is increased, providing additional air charge and permitting extra power to be developed.

FUEL: Burns No. 2 **Fuel Oil (ASTM Specifications D396-48T), often called No. 2 furnace or burner oil, with** a **minimum cetane rating** of 2S. **Many** of the new **economy** diesel **fuels are suitable, and while expensive so called premium quality diesel fuels can be used, they are not required.**

FUEL **SYSTEM: Caterpillar designed and manufactured** fuel system *features* **adjustment-free individual injection pumps and single orifice injection valves. Fuel is continuously filtered through replaceable cellulose filter elements. Gear-type** transfer pump provides 12 feet of lift.

COMBUSTION SYSTEM: Precombustion chamber system specially **designed** to provide complete **combustion** of a wide variety of fuels **under all operating** conditions of **speed** and **load.** Eliminates **objectionable smoke and odor characteristic** of many diesel **engines. Also prevents fouling and crankcase dilution** under **idling** or part **load operation.**

LUBRICATION: Positive *displacement* **gear pump** *and scavenge* pump **maintain** continuous **flow** of lubricant to 28° tilt in any *direction.* **Full-flow filtration is provided by replaceable cellulose filter elements. Water** cooled oil cooler is standard.

GOVERNOR: Caterpillar fly-ball type, spring balanced governor operates through entire speed **range. Standard speed regulation** is approximately 8% — 3% **optional.**

BEARINGS: Steel backed, corrosion **resistant, precision type** aluminum **alloy** — high load carrying **ability and exceptional fatigue strength** — tin plated for **smooth "break-in".**

CYLINDER **LINERS: Replaceable, full length** wet-type liners. **Chemically** treated for superior "break-in".

BALANCER: Dual-shaft harmonic balancer eliminates the natural unbalance characteristic of *four* **cylinder reciprocating engines.**

SERVICE **METER: Geared to record the equivalent of clock** hours @ 1667 **RPM.**

COOLING: Built-in. belt driven. centrifusal pump circulates jacket water. Water temperature is thermostatically controlled. Heat exchanger and pressure **tank or radiator cooling systems are available.**

STARTING: **Choice** of **electric,** air, **hydraulic or gasoline** engine **starting systems** is **offered.**

AUXILIARY **DRIVES: Two "B" size grooves are available on the crankshaft pulley** of the **basic engine. Two** additional "B" or two *"A"* **size groove pulleys can be bolted to front of crankshaft without** moving the **radiator.** Equipment such as **air compressor. raw water pump, etc. will** normally be belt **driven from the crankshaft.**

STANDARD ENGINE ALSO INCLUDES: **Crankcase** breather, **dry-type air cleaner, turbocharger, dry** exhaust manifold, fuel and lubricating oil pressure **gauges,** *water* **temperature indicator, lifting eyes** and mounting **supports.**

ATTACHMENTS: *Additional equipment* **such as combination** base-fuel **tanks,** tachometer% **mufflers,** safety **shut-offs** and **electric water heaters are available on order.**

CAPACITIES FOR LIQUIDS IN U.S. GALLONS:

Cooling System (engine only)	2.6
Cooling *System* with radiator)	6.2
Lubricating Oil ystem (refill)	3.5

OVER-ALL DIMENSIONS IN INCHES

-m.	46.5
Width	28.1
Height	34.8

WEIGHT IN FOUNDS: Net **Dry (approx.)**

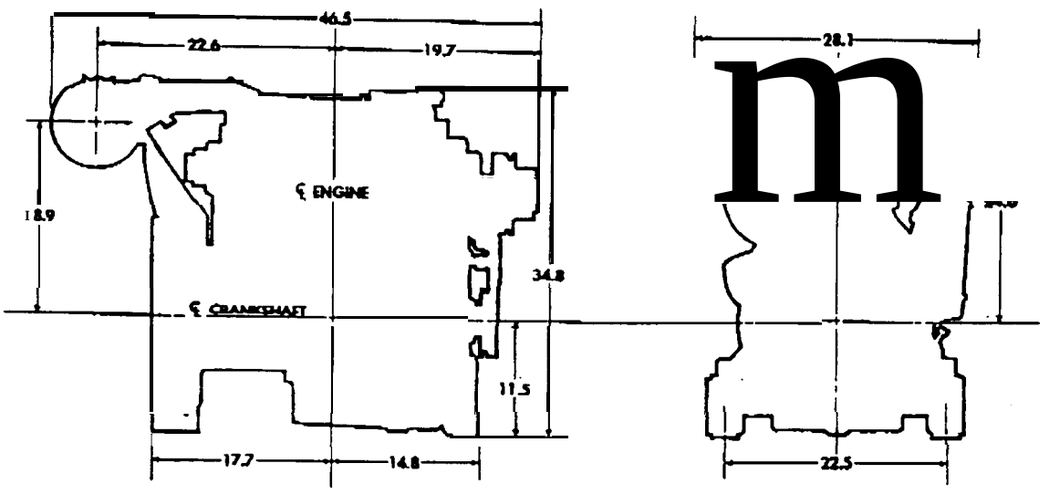
Standard Engine	1300

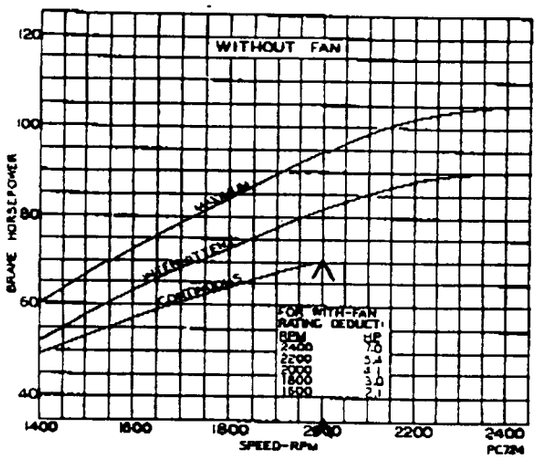
D320

DIESEL ENGINE

Series A

CONVERSION TABLE	
1 inch = 2.540 cm.	1 cu. in. = 0.0164 liters
1 pound = 0.4536 kg.	1 U.S. gal. = 3.785 liters
1 lb. ft. = 0.1382 m-kg.	1 U.S. gal. = 0.833 Imp. gal.
1 Br. or Am. BHP = 1.0139 Metric BHP	





WITH AFTERCOOLER (85° Water/Jacket Water) RPM

Maximum	130/120	2400
Intermittent	100/95	2400
Con	80/75	2000

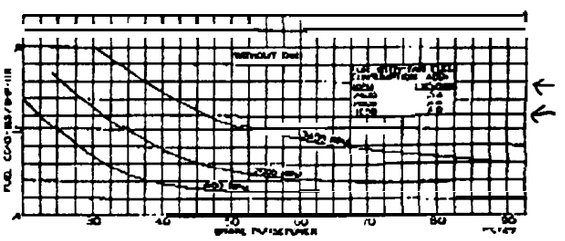
CATERPILLAR STANDARDS: All ratings are corrected to sea level *barometric* pressure (29.92 *in.* Hg.) and standard temperature (60° F.). Intermittent and continuous ratings *are* applicable to at least 2500 feet elevation and temperature (~. F.) before de-rating is necessary. Fuel consumption shown was *obtained with* fuel oil having a gross heat value of 19,500 BTU per pound. weighing 7.12 pounds per U.S. gallon. The given ratings *are baaed* on British and American BHP.

MAXIMUM EATING, is the horsepower and speed capability of the engine which can be utilised for about five minutes duration, followed by reasonable periods of operation at reduced output. A plus or minus factor *of* 5% is applied to ● ll maximum ratings to ● now for production tolerances. However, any engine built by Caterpillar can be made to produce its published rating under standard conditions.

INTERMITTENT RATING is the horsepower and speed capability *of the engine* which *ean* be utilised for about one hour, followed by about an hour of operation at the continuous rating. Many engine users elect to operate their engines continuously in this rating area, trading shorter maintenance periods for increased earnings.

CONTINUOUS **RATING** is the horsepower and speed capability of the engine which can be utilized without interruption or load cycling. This can extend for months or years of operation if the engine is equipped for nonstop lube oil and filter changes.

OTHER RATINGS: Ratings as published are intended to be a general guide for world-wide use in a broad range of applications. Other ratings, yielding gains in performance and economic return, are available to meet the requirements of particular applications when detailed information is submitted.



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