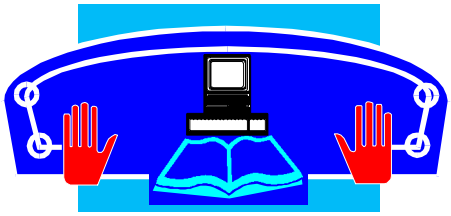

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Type of Study: Processing / Manufacturing
Author: Wayne Dilk Consulting
Catalogue Number: 3-6-8

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CHAR FISH PLANT

STEENSBY INLET, N.W.T.

DESIGN, CAPITAL ESTIMATES, FEASIBILITY

1985

Preamble: This report, along with the drawings, presents the complete details for a Char Fishery- Proposal. This facility is to be located at Steensby Inlet.

This study includes the parameters for design, actual design, proforma statements for operating costs, capital estimates and construction specifications.

Prepared by WAYNE DILK CONSULTING .LTD.

July, 1985

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A.

PLANT SIZING AND CAPACITIES

1. **GENERAL**

Given the general preliminary quota at 70,000 lbs. of round fish and the desired long range goals of the study to include quota changes, two sizes of plants and their respective capabilities were utilized in preparing capital costs, proforma statements, etc.

The two sizes selected were 50,000 lbs. round fish received per season and 100,000 lbs. round fish received per season. Utilizing these two sizes we are, for physical practical purposes able to cover the production range from approximately 40,000 lbs. per season to approximately 110,000 lbs. per season without significant change to the plant sizing and operating costs.

The primary difficulty in selecting the appropriate sizing would arise if initial volumes were in the 75,000 to 80,000 lbs. per harvest season as they would tax the maximum capability even on an emergency basis of the 50,000 lb. plant should large daily catches beyond the 2,000 lb. daily average occur for more than several days in a row. The effect would be detrimental to the freezing capabilities, ice production, holding freezer and finally to the fresh fish holding storage. This type of scenario would require:

(a) More frequent shipments to Hall Beach from site, possibly utilizing air transport. Daily loading of 1600 lbs. would be required.

(b) More frequent shipments from Hall Beach to market.

(c) And, finally, temporary closure of the fishery in the advent of bad weather delaying transport to Hall Beach.

You will notice safety margins for freezing capabilities in 11 and 111, items (8), as well the reserve capability in the storage freezer by utilizing walk space if necessary.

These reserve types of capability would disappear in approximately two to three days.

In a decision on plant sizing the seasonal run time must as well be taken into consideration. Please note season durations utilized in establishing average daily production levels.

It can be generally stated that with adjustments as noted the Design 1 50,000 lb. plant will be capable of handling up to 70,000 lbs. in a five week period.

It is expected in both cases that the facility at Hall Beach will hold on arrival a five day harvest and this poundage, i.e. 8,000 *or* 16,000 lbs. will be shipped to market, sold locally, etc. prior to the next shipment from the fish plant at Steensby.

In determining plant sizing, provided data must also be rationalized as to size and cost efficiency. With a preliminary quota of 70,000 lbs. and a desired range of production capability of 50,000 lbs. to 100,000 lbs. to be examined we have selected two plant sizes. The initial design, capital, and operating cost derivation is based on a 50,000 lb. round catch and the second sizing with the same parameters is based on 100,000 lb. round catch. Throughput, mechanical capabilities, etc. will not be adversely affected on the initial design (50,000 lbs.) should quantities of up to 70,000 lbs. be attained. However, it would be difficult to achieve 100,000 lbs. throughput on the initial design and plant sizing. Costs, etc. are adjusted accordingly for this volume in Part 111.

11. DESIGN 1, 50,000 LBS. STEENSBY INLET

GENERAL

To arrive at sizing of plant and costing it, assumptions and evaluations must be made. They are listed in the following Design Criteria.

DESIGN CRITERIA – PRODUCT

(1) Seasonal **volume - 50,000 lbs. round.**

(2) Seasonal duration - five (5) weeks.

(3) Daily volume - 2,000 lb. round, average.

(4) Dressed yield - 80%.

(5) **All fish to be received round dressed in plant, individually quick frozen, glazed, boxed and stored.**

(6) Amounts of fish received in excess of freezing capacity will be iced and stored for processing the next day.

(7) Sufficient ice will be provided for fishermen to take one quarter pound of ice per pound of fish on board the fishing boats with an additional half pound of ice per pound of fish for fresh fish storage if required. Based on this criteria a minimum of 1500 lbs. of ice production per 24 hours will be provided.

(8) **Blast freezer capability will be based on an 80% yield, or 1600 lbs. of frozen production per 24 hours. Maximum freezing time will be based on 14 hours per 24 hours, allowing some safety margin.**

(9) **Frozen** storage capacity will be based on shipping frozen product to Hall Beach a minimum of once every five days. This parameter requires a storage capacity of approximately 8,000 lbs. based on boat availability. Should daily aircraft be utilized the storage capacity may be minimized.

(10) Freshwater must be available for glazing frozen product.

DESIGN CRITERIA - PHYSICAL PLANT

(1) Overall physical dimensions will be 40 ft. by 30 ft. plus a 10 ft. by 14 ft. auxiliary building to house power generator.

(2) Buildings will have reinforced concrete foundations. Pilings, as located on drawings, will be hand dug as deep as possible. Spread footing may also be utilized if soil conditions allow, spread footing is preferred if site does not encounter bedrock.

(3) The process plant at Steensby Inlet and the frozen storage will be pre-engineered, insulated panel construction, including the roof structure. The roof will be flat and designed for appropriate snow loading, etc. The panels will be cam locked together and may be easily disassembled at a later date with no inherent damage if handled properly. Panels will have an approximate R value of 35. For purposes of establishing costs, shipping weights, etc. and particularly to meet the requirement for take down and reassembly capability, panel structures manufactured by 'Bally' Corporation were utilized.

The generator station will be metal construction un-insulated.

(4) Physical features of the plant are as indicated on the drawings.

(5) Pressure system is as described on equipment list. It is based on a maximum 30 ft. lift and 300 ft. run satisfactory for salt or fresh water at a flow rate maximum of 25 gallons/minute. Hot water system and chlorination system requires further investigation for the use of 'brackish' (salt) water.

(6) All piping will be PVC where water (fresh or salt) is utilized from external sources to pressure system.

Note: Mechanical systems specified are not receptive to salt water.

(7) **Electrical conduit will be galvanized, surface mounted with stand offs.**

(8) Concrete floor will be sloped to drain as indicated.

(9) Details for plant construction are issued separately under construction specifications.

111. DESIGN 2, 100,000 LBS. STEENSBY INLET

GENERAL

To **arrive at sizing and costing of plant, assumptions and evaluations must be made for this larger size. They are listed in the following Design Criteria.**

DESIGN CRITERIA - PRODUCT

(1) Seasonal volume - 100,000 lbs.

(2) Seasonal duration - Five (5) weeks.

(3) Daily volume - 4,000 lbs, round average.

(4) Dressed yield - 80%.

(5) All fish to be received, round and dressed in plant, individually quick frozen (IQF), glazed, boxed and stored.

(6) Amount of fish received in excess of freezing capacity will be iced and stored for processing the next day.

(7) Sufficient ice will be provided for fishermen to take one quarter pound of ice per pound of fish on board the fishing boats with an addition one half pound of ice per pound of fish for fresh fish storage if required. Based on this criteria, a minimum of 3,000 pounds of ice production per 24 hours will be provided.

(8) Blast freezing capability based on a 80% yield will be 3,600 lbs. of fish per 24 hours based on a 16 hour dwell time.

(9) Frozen storage capacity will be based on shipping frozen product every five (5) days. (Note change from 6 days to 5 days. If necessary man walkways could be filled on an emergency basis.)

(lo) Fresh water will be available for glazing frozen produce. Quantities required are about 100 gallons per day.

DESIGN CRITERIA - PHYSICAL PLANT

(1) Overall physical dimensions will be 50 ft. by 36 ft. nominal plus a 10 ft. by 14 ft. generator shed. Room dimensions additions are shown by dotted line on site drawing and on the mechanical drawing.

(2) **Balance of basic physical plant criteria is identical to Part 11 - Design Criteria, and is not repeated.**

B.

CAPITAL COSTS

GENERAL

Based on the data provided and the attached specifications we have arrived at capital costs based on certain criteria. That criteria includes the utilization of local labour at $10.00/hour for building erection and site preparation. It includes free freight from Hall Beach to site, of some type of front end loader available on site. It includes utilization of fresh water and most important it includes the utilization of a knowledgeable construction superintendent employed by the owner (Northwest Territories Government). If a general contractor is utilized a cost adder of from 5% to 10% plus expenses would be required.

Pricing provided is budgetary and is dependent upon competitive bids, availability of local expertise, etc. In our pricing we have provided for expertise on site for the following:

- Site Supervisor/labour (one person) - building erection.
- Site Supervisor/labour (one person) - concrete, plumbing.
- Refrigeration Mechanic (one person).
- Electrician (one person).

All additional labour to be provided by local personnel, with wages considered in the proposal.

Local personnel will also be required to assist in the installation of the refrigeration and electrical services where permitted by applicable codes.

NOTE: Building permits, licensing, land acquisition are not considered.

ITEMIZED CAPITAL COSTS

ITEM	*50,000* LBS.	100,000 LBS.
(1) Panel structure, complete with steel	**$48,800.00**	$60,800.00
(2) **Foundations, including cement, reinforcing, and site preparation. (using free front end loader).**	**18,200.00**	**23,000.00**
(3) Mechanical costs	**17,000.00**	18,500.00
(4) Electrical cost (including generator set).	48,000.00	56,000.00
(5) **Refrigeration**	**82,000.00**	**104,000.00**
(6) Generator shed and storage, concrete floor.	5,500.00	**5,500.00**
(7) **Hall Beach storage facility (12' X 14')**	**48,000.00**	***48,000.00***
(8) Freight allowance to Hall Beach from Montreal.	10,000.00	**12,000.00**
Sub Total	$277,500.00	***$327,800.00***
Miscellaneous process equipment, i.e. tables, racking,pallets for freezing, rollers, etc.	15,000.00	15,000.00
TOTAL	$292,500.00	$342,800.00

Note 1 **Within the context of the above pricing structure the following allowances are made for skilled personnel.**

Lodging - $5,800.00
Travel to Hall Beach - $10,000.00

Note 2 Local labour to be provided within the pricing context for construction of the plant amounts to about 800 man hours at $10.00/hour gross. This figure could vary depending upon local expertise at Hall Beach.

Note 3 **An on-site allowance of $3,000.00 has been allowed for utilization of a front end loader and gravel fill.**

Note 4 Freight allowances from Montreal to Hall Beach are not confirmed but are based on anticipated poundage of material to site.

Note 5 No travel costs are attached from Hall Beach to site for skilled personnel.

C.

PLANT OPERATING COSTS

Attached is an analysis of the costs utilized in preparing a Pro-forma schedule of operations. In our analysis we utilized a base price of $2.00 per pound paid to fisherman landed. This reflected in the operating loss indicated. The last line indicates what would have to be the landed price, dressed, to fishermen in order for the plant to break even provided the product F.O.B. Montreal could be sold at $3.00 per pound.

Any downward pressure on posted Char prices at point of market, (we utilized Montreal)would again affect the posted price. Since the balance of the operating costs would stay relatively constant the two main impacts on operating cost recovery are the posted price to the fishermen and the posted price at the market condition.

Should the market condition drop by $.50 to $2.50 per pound, money available to fishermen in Case A would drop to $.34 per pound and to $.98 per pound in Case B.

NOTE: Amortization of required capital is not reflected in the statement. Therefore actual capital costs of construction do not impact the operating costs of the plant except for repairs and maintenance. This value ($6,700.00) is based on utilizing relatively maintenance free construction, i.e. pre-engineered metal building, concrete and simplistic mechanical systems.

STEENSBY INLET FISH PLANT

PRO-FORMA SCHEDULE OF OPERATIONS

	CASE A	CASE B
	50,000 lbs. round	100,000 lbs. round
Sales - pounds	**40,000**	***80,000***
Sales	**$120,000.00**	$240,000.00
Variable Costs:		
Fish purchases	$ 80,000.00	$160,000.00
Shipping	21,300.00	42,500.00
Direct labour	8,000.00	16,000.00
Packaging	3,200.00	6,400.00
Sub Total	**112,500.00**	224,900.00
Gross Margin	**7,500.00**	**15,100.00**
Overhead		
Supervisor	**13,000.00**	**13,000.00**
Trainee	**8,100.00**	**8,100.00**
Bunkhouse expenses	**4,000.00**	**4,000.00**
Repairs and maintenance	6,700.00	**6,700.00**
Supplies	**3,000.00**	**3,000.00**
Insurance	**3,000.00**	**3,200.00**
Diesel fuel (heat, power)	7,200.00	**9,800.00**
Storage, Hall Beach	600.00	**600.00**
Start-up and close-down	2,400.00	**2,400.00**
	48,000.00	**50,800.00**
Administrative		
Accounting	**2,000.00**	**2,000.00**
Telephone	**1,000.00**	**1,000.00**
Working capital interest	**3,000.00**	**3,000.00**
	6,000.00	**6,000.00**
PROFIT (LOSS)	**($46,500.00)**	**($41, 700.00)**
Fishermen's price for plant to break even	$0.84/pound	$1.48/pound

STENSBY INLET FISH PLANT PROJECTED SCHEDULES OF OPERATIONS

STATEMENT OF ASSUMPTIONS

1. **BASIS FOR PROJECTIONS**

The projections are preliminary projections for an Arctic Char freezing plant to be located at Stensby Inlet, Northwest Territories. The projections are predicated on information supplied to us by the Department of Economic Development. Where data was not available we have projected costs based on our 1982 review of the operations of the Issatik Food Plant and generated data using current industry standards.

To reiterate, the projections are preliminary projections only. The analysis does not include an in depth review of capital cost recovery and are not impacted on the pro-forma schedule.

2. EXPLANATION OF ANALYSIS

In the **pro-forma schedule of operations, we consider the operations of the proposed fish freezing plant at two levels of production, (50,000 lbs. round and 100,000 lbs. round). We assume that the fishermen will be paid $2.00 per pound for dressed catch and calculate projected losses for the operation. We then calculate the fishermen's price that would enable the plant to break even, i.e. recover operating costs only.**

3. SALES

Sales pounds are calculated by converting round weight to dressed weight using a conversion factor of 1.2 (dressed to round).

4. **SALES VALUE**

Based on a selling price of $3.00 per pound as provided.

5. **FISH PURCHASE PRICE**

The fish purchase price is set at $2.00 per pound, based on our rough estimate of what the fishermen will require.

6, SHIPPING COSTS

Shipping costs are calculated at a rate of $0.42/pound as supplied **to Montreal.**

7. DIRECT LABOUR

Direct labour is calculated at $0.20/pound based on the wage rate of $6.00/hour. At this rate our rough estimate for labour cost is $0.20/pound. This assumes a reasonable degree of efficiency.

8. PACKAGING

Packaging is calculated at $0.08/pound for carbonizing product for shipment.

9. SUPERVISOR

Supervisor's wages are calculated at $12,000.00 plus 8% benefits as supplied.

10, TRAINEES

Trainees' wages are calculated at $7,500.00 plus 8% benefits as **supplied, (one only utilized).**

11. BUNKHOUSE

As supplied, applies to Supervisor and trainees only.

12. REPAIRS AND MAINTENANCE

Repairs and maintenance at $6,700.00 as calculated by Wayne Dilk **Consulting Ltd., based on building design in attached** Construction **Specification.**

13**. SUPPLIES**

Our preliminary estimate for the operation.

14, INSURANCE

Calculated at $0.60 per $100.00 of capital cost plus $1,000.00 for liability. This assumes favorable rates to the Govemement of the Northwest Territories. The rate should be verified.

15. DIESEL **PUEL**

Case A
Consumption of 11,300 litres at $0.56/litre plus $900.00 for freighting. (Hall Beach to site.)

Case B
Calculated on the basis of 15,200 litres at $0.56/litre plus freighting of $1,250.00. (Hall Beach to site.)

16. START-UP AND CLOSE-DOWN

Start-up and close-down includes labour for five persons for ten days.

17. ACCOUNTING

Estimated at $2,000.00 based on our experience.

18. TELEPHONE

Our best estimate based on Rankin Inlet.

19. WORKING CAPITAL INTEREST

The working capital interest essentially is the cost of holding the product for the season to the point of sale. We estimate working capital interest on the basis of $59,000.00 at 11% for forty-five days.

D.

CONSTRUCTION SPECIFICATIONS

Construction specifications listed in Sections (1) to (X) were developed in conjunction with workable, useable information and the specific requirements for the area intended. They do not extend supplier preference where listed but rather a standard that is a minimum that must be met.

Primary details, where minor, are subjective to a bid proposal and are open to discussion. It is not intended to be sufficiently detailed to be a bid document but rather to be of sufficient design to establish a budgetary capital cost.

PIANT CONSTRUCTION SPECIFICATIONS

SECTION 1: GENERAL

1.1 The work, by contractors/suppliers, covered by this specification includes the submission of a design and build proposal for the construction of a fish processing plant as outlined in the attached drawings and following specifications. The specifications are intended as guidelines only. Alternatives and detailed methodology of construction are subject to the approval of the Government of the Northwest Territories. The intent of the specifications is to provide a removable or transportable building that also matches the requirements of the Federal Fish Inspections Regulations as administered by the Department of Fisheries and Oceans, Government of Canada, the National Building Code and the requirements as outlined by the owner, mmely the Government of the Northwest Territories.

1.2 The work includes the supply of material, concrete work, erection of a pre engineered building (for the fish plant), erection of a facility called generator shed, erection of a cold storage facility at Hall Beach, installation of refrigeration, water and electrical systems as outlined on the drawings, interior finishes and partitions as outlined, painting and finishing included.

1.3 All work is inclusive to site location because of the remote area. Local forces are available, skills available to be determined by the contractor. Where local skills are available they shall have priority depending upon price.

1.4 Materials are to be transshipped via Montreal, local site conditions require inclusion of such service equipment as temporary generation equipment for electrical tools, welding, lifting, and lodging. Local labour is to be utilized as much as possible. Lodging arrangements are to be made with Territorial Government personnel. As well, Territorial Government personnel can advise of local labour force expertise when applicable to local trades.

1.5 Hall Beach facility falls under all specifications listed and to be built when site located. Local power available. The nominal design is based on an exterior application of prefabricated urethane panels for wall construction, roof construction, doors, door sealants utilizing the design criteria of Bally Refrigeration of Canada Ltd. or equivalent.

1.6 **This specification calls for light fixtures, conduit, etc. that is acceptable for surface mounting on prefabricated panels as required.**

1.7 Due to **the location inclement weather may be encountered. However, the Territorial Government maintains the right on working conditions.**

1.8 **It is the responsibility of the General Contractor to provide total 'as built' drawings for the complete installation including mechanical, electrical and refrigeration.**

1.9 **All other general conditions should be discussed with the Territorial Government or the engineer.**

SECTION 11: SOILS AND FOUNDATION CONDITIONS

2.1 It remains the responsibility of the contractor or the Government of the Northwest Territories to determine final site conditions by undertaking site soil tests prior to issuing foundation specifications. No soil samples have been taken. We do not anticipate any moisture problems, however, depth to bed rock is indeterminate. Foundation plans are as per drawing, ie. grade beam on piles. Local conditions may change specifications, consult with the Engineer prior to construction.

2.2 Not withstanding Item 2.1 the requirements for compact fill gravel remain. It is the responsibility of the contractor to ascertain local site conditions to determine quantities and installation cost parameters to their own satisfaction.

2.3 All concrete utilized will be 3000 psi, if hand mixed it will be as per the following formula:

one (1) part cement
- five (5) parts gravel (pit run, not to exceed 3/4″ aggregate)
water as required (slump test may be required and will follow standard engineering practices)

All concrete mixes must be placeable in elevated forming and vibrated into place.

2.4 Anchor bolt location to be provided by building (pre-engineered insulated panel) supplier.

2.5 Reinforced concrete to utilize #3 rebar minimum unless otherwise specified. Consult drawings for rebar location, tie wires 15 roil.

2.6 This contract must provide for all forming.

SECTION 111: CONCRETE FLOOR AREAS

3.1 The cement slab **shall be as per specification. Slopes to drain are required by the Federal Fisheries Act and are mandatory. Slope to drain will be a minimum of 1/8 inch per lineal foot without exception.**

3.2 **Concrete grades are as per drawings, including piles. Pile dimensions are twelve (12) inches in diameter. Depth of pile to be determined by site conditions. Piles to utilize a minimum of 3/8 inch rebar. This applies to footing type of construction also.**

3.3 Cement floors including slopes, etc. are to be 'broom finish' to avoid slippery finish. Expansion joints are required and must be considered at floor edges where they can be covered by coving as necessary.

3.4 Reinforcing material to be #3 or 3/8 inch, or 9.3 mm wired together on grids as indicated. Piles and grade beams poured in place must utilize //3, 3/8 inch rebar or equivalent.

SECTION lV: PRE-ENGINEERED BUILDING

4.1 The building is to be 4“ Urethane prefabricated panel, Cam Lock type assembly, continuous steel memebers, Bally or equivalent. Suitable for exterior usage. It is intended that the interior walls, as noted on the drawing, are of the same reusable mode.

4.2 Any insulated panel considered must be foamed in place urethane and shall be complete with a Cam Lock system, bonded by metal from panel to panel as per 'Bally Refrigeration’ type panels. All joints must have a flexible vinyl gasket to ensure against air leaks.

The panels are to be a minimum of 22 gauge white enamel finished metal on the interior and 22 gauge galvanized finish on the exterior. This includes roof panels as provided.

4.3 The vendor will provide an installation drawing showing structural steel locations and finish as per painting specification.

4.4 Given the building design the vendor is required to ensure that the structural capability is sufficient to withstand snow loading for the area of installation.

4.5 All interior surfaces that are not white enamel finish, particularly exposed steel work,is to be red primed with rustoleum paint or equivalent and painted as per painting schedule (white epoxy).

4.6 Wall between process area and office storage area to be provided by contractor but as an optional cost subject to negotiation with owner.

4.7 Floor/wall joints between cold areas and warm areas are to be as per 'Bally' specification. Drawings enclosed. Deviation to this must be authorized prior to bidding final tender.

4.8 A pressure-relief port, as provided by the pre-engineered building supplier for the blast freeezer and the cold storage is to be utilized, size to be approved by the engineer.

4.9 Materials utilized in the building are to meet local and NBC fire code requirements. Probable fire test requirement is //3-162-67 for urethane panels.

4.10 All exterior doors to be metal, insulated doors, completed with weather stripping. At least four (4) doors including the compressor room to be equipped with ‘panic hardware’, including blast, cold storage, compressor room and one exterior door.

All doors to fit requirements of pre-engineered panel configurations. Sizes shown on drawings are nominal. Deviation from nominal must be indicated on bid and approved.

4.11 **Cold storage doors, ie. doors into the blast freezer and cold storage to have insulation value equivalent to walls and be heat traced as per supplier specification.**

SECTION V

5.1 **This section covers painting only, it is the intent that all surfaces in the mechanical system be painted except for: refrigerant piping, process equipment, unless not galvanized aluminum or stainless steel, wood surfaces, and other equipment external to the process plant. Any items in question should be referred to the owner or the engineer.**

5.2 In all cases an epoxy based paint such as 'Rustoleum' is to be utilized.

5.3 Paint used on interior surfaces is to be white, steel surfaces are to be suitably treated with primer before painting.

SECTION V1

This section covers internal plant equipment and must adhere to the following criteria:

6.1 **All** surfaces in contact with edible food products must be stainless steel, aluminum or food grade plastic, nylon or equivalent products such as Neoprene.

6.2 No galvanized material or painted surfaces are to be used in contact with food products.

6.3 **Dressing tables will utilize 16 gauge stainless steel table tops. Steel frames; galvanized or stainless steel will be acceptable.**

Note: **Galvanized material is not to be utilized if salt or 'brackish! water needs to be utilized for plant water source.**

SECTION V11: MECHANICAL

7.1 **GENERAL - Scope of this work will cover the water system, heating system and preliminary effluent disposal. We consider fresh water utilization only which requires the utilization of approximately three thousand gallons per day of fresh water storage pumpable only when the tide is out. The storage tank and appropriate intermittent or short time pumping system is a requirement under this specification. Review all criteria for total water usage.**

7.2 Hot **water heater to be utilized is 50 Imperial gallons complete with 4 KW heater or equivalent. No details are provided for water or electrical hook-up but must be serviced from the main control panel and must provide hot water source to points indicated on drawing.**

7.3 Water piping from source to plant is to be PVC, screwed fittings. Diameter as per drawing specifications. Internal plant water piping will be Type M copper. Diameters for both hot and cold water lines will be 3/4 inch in diameter from the pressure sYstems to the outlet locations, branch lines will be a minimum of 1/2 inch.

7.4 **Dual** hose bibb stations are to be utilized with mixing chamber located at indicated positions in the plant.

7.5 **Piping to be installed, surface mounted, to metal skin surface at a minimum of 4 feet off floor height. Metal 'stand offs' are to be utilized to keep pipe a minimum of 3/4 inches off wall. See mechanical drawing for detail. pipe may be installed at a higher height depending upon preference. Maximum distance between mounting points six feet for all pipe one inch or less, eight feet for pipe exceeding one inch.**

7.6 Free standing double compartment stainless steel hand washing facility is to be provided. Fibre glass or propylene 'laundry' type sinks may be substituted at the discretion of the owner.

7.7 Pressure system to provide a minimum of 25 USGPM gallons/minute by drawing water from a remote source. Minimum pressure tank size (retention volume) to be 50 gallons minimum. Pressure to be a minimum of 40 psi at the pressure tank outlet.

Note: Type of pump, ie. submersible jet, etc., will be determined upon locating the fresh water source and distance to remote source. It is expected that it will be within 500 feet of plant.

7.8 Heating for plant is to provide a process room temperature of 50″F. No other area of the plant will be heated except the mechanical room and the office area. The office area will be electrically heated and is described in the electrical specifications.

Two methods of heating the process area are: waste heat utilizing compressor heat rejection and diesel fuel fired space heaters. A constant source of approximately 150,000 BtuH is available from the compression system. This system would be based on utilizing a hot water heat exchanger and circulating hot water system with a forced air hot water space heater mounted in the process area. Such available systems as Eco Saver are acceptable. Electrical heat may also be considered. Diesel fuel fired system to be considered only as an alternate.

7.9 Water system for use in the process area requires chlorination capability of chlorinating water at a minimum of 10 ppm (parts per million). However, residual chlorination of 1/2 to 3/4 PPm is acceptable at the outlet, i.e., the ice machine, drinking water, etc. but a requirement for 50 ppm of chlorine entering can be a requirement for clean Up or sanitizing water for plant clean up.

A batch type chlorinator, utilizing chlorine powder, tablets or hypochlorite tablets is acceptable with pump injection to the main water stream. Flow rate and retention time must be considered. Usually a Wallace and Teirnan type or equivalent batch chlorination system is acceptable, single action.

Note: Chlorine bottled cylinder applications are not required.

7.10 Effluent disposal system is as suggested with three compartment settling tank. See drawings for details. This method must receive approval by the Government of the Northwest Territories. Domestic type effluent is to be considered by utilizing outdoor installations and are not included in this contract.

SECTION V111: REFRIGERATION

8.1 **GENERAL**

The basic refrigeration system is single stage Freon both R12 and R502. Capacities for both sizes of plants and the storage facilities at Hall Beach are stated on the drawings. Alternates to equipment listed on the legends are acceptable with owners' approval provided they do not alter the construction schedule.

8.2 All electrical equipment will be either 230/208/3/60 or 110/1/10. A limited amount of 110 voltage will be available.

8.3 Compressors will be semi-hermetic remote air cooled. Hermetics are not to be bid.

8.4 All systems will be equipped with Freon storage capacity to provide for cold weather operation.

8.5 Remote condensers of appropriate capacity by suppliers such as Blanchard, Keeprite or Bohn are acceptable. The systems must be equipped with pressure controls for fan cycling. Ambient thermostat fan cycling systems are not acceptable. Each compressor on the system must be equipped with head pressure controls. Sporlan ORI or Alco type are acceptable.

8.6 Blast freezer coils not to exceed 5 fins per inch due to frosting conditions. Bohn, Blanchard of appropriate sizing are acceptable. All coils below 32°F have a design temperature differential not exceeding 10"F.

8.7 All coils to be provided with P traps on the suction line at the coil.

8.8 Each system to include replaceable core filter/driers, site glass, solenoid valve, Tx valve externally equalized, suction trap. One spare set of replaceable core filters to be provided.

8.9 Each system except ice machine system to have time clock and thermostat; blast freezer with two coils will only have one thermostat. The ice machine requires solenoid only wired into a pump down cycle.

8.10 Compressor supplier to provide motor contractors and electrical circuit drawing including control wiring to the electrical contractor prior to equipment arriving on site.

8.11 **Refrigerant piping to be Type L, ACR nitrogenized. Soft drawn annealed copper may be utilized for liquid lines only, half inch and under. All elbows to be long radius. All joints to be soldered utilizing silfos 85/15 type soldering element. Connections to compressors to be brazed.**

8.12 **Vibration on the system is to be eliminated by the following steps:**

- **Vibration pads such as 'corfon' pads to be utilized under all compressors.**
- **Suction and discharge line vibration absorbers to be utilized at the compressors, mounted horizontal crankshaft.**
- **All piping to be supported no more than 12 inches from a 90° bend on horizontal runs and 12 inches from a 90° run where the vertical run changes to horizontal run.**

8.13 Upon completion each system is to be pressure tested to 250 psi and held for a minimum of four hours. Upon pressure release the system is to be evacuated to 4 inches of vacuum and held for an addition eight hours. System is then in a chargeable position.

8.14 System to be charged with Freon containing red dye type leak detection substance such as Dytel or equivalent.

8.15 **Refrigerant line (suction only) insulation to be provided by this section. A minimum of 3/4 inch Armaflex, Rubetex or equivalent to be utilized on lines below 32°F and 1/2 inch material on lines over 32"F.**

8.16 The bidder will include as an optional cost of at least the following:

- One **replacement compressor of each type.**
- **One Freon charge total, including red dye.**
- **Coil elements for solenoids, one each type.**
- **Two of each type of fan motors.**
- **One condenser fan motor.**

SECTION 1X: ELECTRICAL SPECIFICATIONS

9.1 GENERAL

The vendor to provide and install all items as indicated on the electrical drawing and including the generator set switch gear and sub panels.

9.2 The generator set is to be diesel powered, automatic start, 240/120 volt. Sizing is included on Equipment List. The generator set to be complete with switch gear.

9.3 Sub panels are to be provided for the plant; one each of 240 volt and 120 volt. Also required will be one 120 volt panel (not shown) in the generator building to provide camp power and lighting for the generator shed.

9.4 All plant wiring to be in conduit as approved by the owner. Conduit to be ceiling mounted and attached to metal skin, complete with 'stand offs' to hold conduit a minimum of 3/8 inch off ceiling.

9.5 All light fixtures 'exterior' and 'interior* to be included by this contract excluding power run after switch or plug-in box to service camp. The service to the residential camp to be determined as an 'extra' cost.

9.6 Emergency light packs must be installed complete with trickle charger. The unit to match NEMA 4 requirements. A minimum of three are required; one in the generator room, one in the process area and one in the compressor/switch gear room. Remote heads to expand coverage may be considered.

9.7 Light fixture must be installed on exterior to entrance as indicated. Size is indicated on drawings. Do not consider photo cell type (for exterior use) unless otherwise instructed by owner.

SECTION X: WORKMANSHIP AND SITE ARRANGEMENTS

10.1 GENERAL

Due to site location, the degree of difficulty in providing materials, lodging conditions, etc., vendors bidding this project should be aware of the following conditions.

10.2 Warranty considerations must be discussed with the owner.

10.3 The contractor is responsible for ensuring all materials are on site and must liason with Northwest Territorial Government personnel to ensure proper transportation arrangements are made. Freight must be supplied to Hall Beach via boat transport from Montreal.

10.4 Air transport is available to Hall Beach for site personnel. Travel from there is either by aircraft charter or by water. Approximate 45 foot water craft are available.

10.5 Accommodations on site including board will be of a temporary nature. Costs and facilities to be negotiated with the owner.

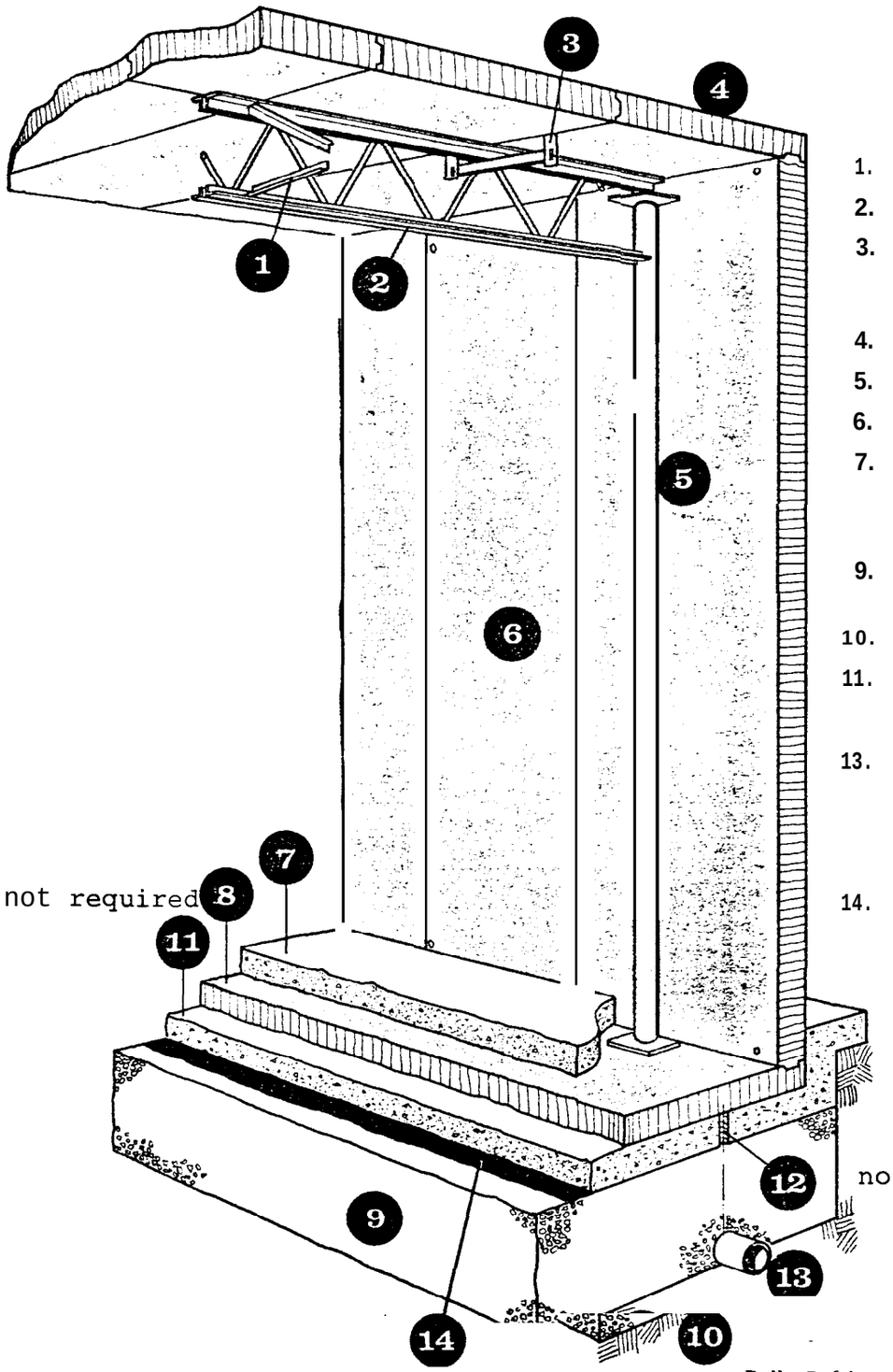
10.6 Workmanship and conduct must be exemplary. The site is not conducive to callbacks. The systems must be accepted by the owner prior to final payment.

10.7 The contractor is responsible for removing all extraneous equipment and site clean-up to the satisfaction of the owner.

APPENDIX ‘A’

Representative Prefab building and refrigeration facilities. The refrigeration facilities apply only Bally type construction at Hall Beach and the main plant.

cutaway views showing typical building construction



1. Lateral bracing as required.
2. Web joists in required size.
3. Ceiling anchors, spaced every 92" on every supporting joist. (46'' ctrs. for high wind)
4. Prefab ceiling panels.
5. Pipe post or "H" columns.
6. Prefab vertical panels.
7. thick reinforced concrete wearing floor.
9. 2" rock aggregate, 15" deep. Freezers only.
10. Hard tamped earth.
11. 4" thick concrete sub-slab.
13. 4" or 6" dia. perforated drain and ventilation pipes spaced on 6 ft. centers, running the entire length of the refrigerated building floor. (See page 13 section 3.)
14. Watertight seal formed by asphalt paper or 6 mil polyethylene sheets. Sealed joints.

NOTE :weeping tile not needed for short season

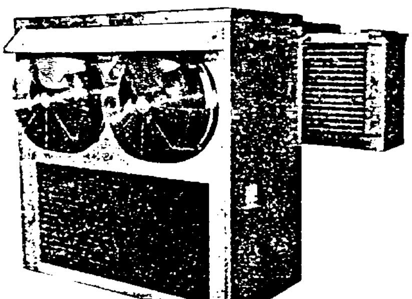
Bally Refrigerated Building with prefab floor. panels in a depressed pad and a concretr wearing floor on top.

Bally

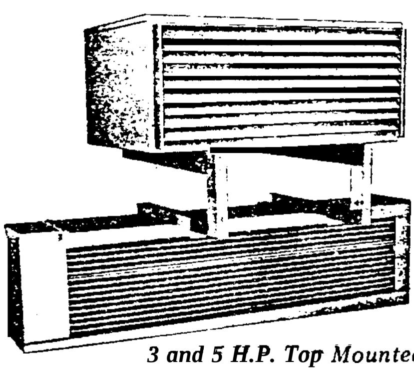
THERMOBALANCE REFRIGERATION SYSTEMS

self -contained — cont.

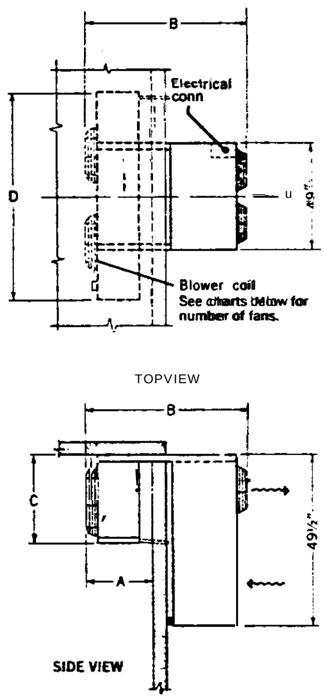
normal and low temperature systems—s, 5 and 7½ hp.



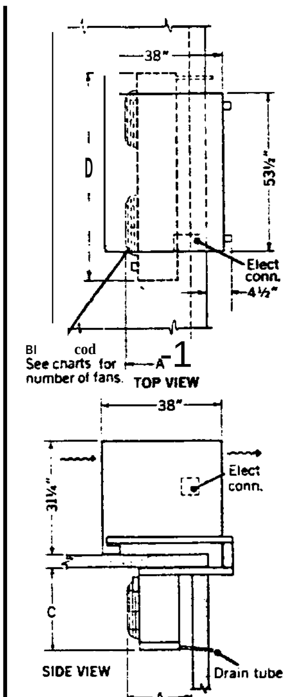
3, 5 and 7% H.P. Side Mounted



3 and 5 H.P. Top Mounted

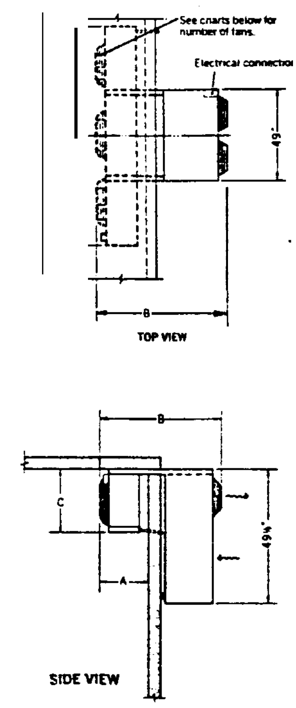


SIDE MOUNTED



TOP MOUNTEO

3 & 5 hp. systems



7½ hp. systems

(Available in side mounted only)

specifications-normal temperature

SYSTEM NO.	BTU/HR +35°F.** (1.7°F.) BOX TEMP. AIR COOLED	WATER COOLED	EVAP. C.F.M.	APPROX. AIR THROW	H.P. OF UNIT	EVAP. MOTORS	FULL LOAD AMPS. 230/1/60	208-230/3/60	460/3/60 ††	575/3/60 ††	APPROX. NET WT. LBS.	DIMENSIONS A	B	C	D
BSC-300A("I-2	29.100	29.000	4,400	30'	3	(2) 1/6 H.?.	20.8	15.7	8.1	5.3	695	32"	65%"	25¾"	66½"
BSC-300B(*)-2	28;000	28,000	3,000	20'	3	(4) 1/15 H P	77.0	169	8.7	5.8	700	32"	65¾"	20"	84½"
BSC-300C(*)-2	28,600	28,500	4,400	30'	3	(2) 1/6 H.P.	20.8	15.7	8.1	5.3	6a5	33⅛"	63"	30½"	51%"
BSC-500A(*)-2	44,000	45,000	6,600	40'	5	(3) 1/6 H.P.	28.9	26.6	15.9	10.8	810	32"	65%"	26%"	90½"
BSC-500C(*)-2	43,000	45.000	6,400	XI'	5	(2) 1/4 H.P.	29.4	27.1	16.0	11.0	800	33%"	68"	37½"	51%"
BSC-750AS-2	59,000	65,000	7,800	40'	7½	(3) 1/4 H.P.	–	39.0	23.0	15.8	1,010	32"	65%"	26½"	SW"
BSC-750CS-2	58,000	64,000	7,200	50'	7½	(2) 1/3 H.P.	–	39.4	23.2	16.0	990	33⅛"	68"	37½"	51%"

All N.S.F. Listed.

specifications—low temperature

SYSTEM NO.	BTU/HR —10°F.** (—23.3°C.) BOX TEMP. AIR COOLED	WATER COOLED	EVAP C.F.M.	APPROX. AIR THROW	H.P. OF UNIT	EVAP. MOTORS 230/1/60	FULL LOAD AMPS. 230/1/60	208-230/3/60	460/3/60 ††	575/3/60 ††	APPROX. NET WT. LBS.	DIMENSIONS A	B	C	D
AZ-300A(*)-2	16,200	15,300	4,400	30'	3	(2) 1/6 H.P.	20.2	17.6	8.1	5.3	705	32"	65%"	25% "'	66½"
AZ-304 B(*)-2	15,600	14,800	3,000	20'.	3	(4) 1/15 H.P.	21.0	18.8	8.7	5.8	710	32"	65¾"	20"	84⅓"
AZ-300C(*)-2	16,300	15,400	4,400	30'	3	(2) 1/6 H.P.	2U.2	17.6	8.1	5 . 3	700	335"	68"	30%"	51½"
AZ-50DA(")-2	23,600	23,500	6,600	40'	5	(3) 1/6 H.P.	30.9	31.5	15.9	10.8	825	32"	65%"	26!4"	90½"
AZ-500C(*)-2	23200	23,000	6,400	50'	5	(2) 1/4 H.P.	31.4	32.0	16.0	11.0	815	335"	68"	37½"	51½"
AZ-750AS-2	36,000	40,000	7,800	40'	7½	(3) 1/4 H.,.	–	41.0	20.5	10.3	1,020	32"	65¾"	26%"	$3%"
AZ-7 Y3CS-2	35,c00	40.000	7,200	50'	7?4	(2) 1/3 H.P.	–	41.4	21.0	10.5	1,000	33%"	68"	37½"	51!4"

→ *Air flow of Condensing Unit.* ****Based on 90°F. (32.2°C.) ambient temp.** *††Available on special orders only,* 208-230/1/60 *or stepdown transformer required for evaporator fan motors . . *Substitute S or T for side or toP mount...*

APPENDIX 'B'

This appendix refers to the operating characteristics of the settling tank as depicted on drawing D-2 details.

The theory on this type of system is predicated on discharging effluent back to the base ecological system that the effluent by-products came from, i.e. fish products.

The system is designed to trap solids in the first two compartments and large suspended solids on the screen in the third compartment.

The first two compartments will trap dirt, fish scales, etc. that are heavier than water and will require periodic cleaning. The screen in the third compartment will trap floating solids and will require cleaning daily or every second day as required to ensure water transmission.

Since **clean-up water is highly chlorinated the effluent water escaping back to the source will not contain significant amounts of bacteria.** As well, it will remain relatively odour free if proper operational procedures are maintained.

Phosphate type detergents are not to be used. As well, domestic type effluent, non-biodegradable products are not to go through this system.

NOTE: While this system **is** utilized in many locations, environmental approval by pertinent authorities must be applied for.