Arctic Development

# Hay River Cannery Proposal
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## PREFACE

This report is an attempt to establish the cost of converting the existing Hay River Fish Plant from a total fresh and frozen/processed operation to a plant that will can 2.3 million pounds of fish and handle the remainder in the traditional fresh/frozen product forms.

With reference to the canning alternative, the report indicates varying levels of employment and end-of-line production costs for a range of labour intensive and more mechanized processes. Recommendations on the relative advantage of alternative canning methods are based on a least cost criterion.

While this report provides an analysis of the costs and employment created in a fish cannery process, it may be of use in a future assessment to determine (a) would more income be available for fishermen as a result of a change in fish processing methods, and (b) would more employment be available in the Hay River Plant, relative to the traditional methods of handling the NWT fish production. In addition to the cost comparisons developed in this report, there is therefore a need to address carefully the important question of market potential for canned products.

EXECUTIVE SUMMARY


1) Three methods of producing the various canned product have been compared; a predominantly manual operation, a fully automated operation using conventional cans and a fully automated operation using light gauge, nesting cans. Relative to the manual process, the latter alternatives require increasing capital investment but result in lower end-of-line product costs. Relative to the alternative using conventional cans, -the alternative using light gauge nesting cans has a cost saving of 5.4¢/tin for the flat pack fillet product or $108,000 per annum for an annual production of two million cans.

2) A loaf/spread type canning line is addressed and cost estimates included for future product line expansion. This process would have relevance for lower valued species such as mullet or for the trim of premium species from other process lines.

3) Mechanical filleting is estimated to provide a 4.3¢ per tin cost advantage over manual filleting.

4) Relative to the light gauge, nesting can, mechanical filleting and can seaming advantage, the manual Line has an annual disadvantage of $176,000 but creates approximately 7 to 10 more jobs.

s) The end-of-line cost, F. O.B. Hay River, for the flat pack fillet product ranges from 73.1¢ to 80.3¢ and ranges from 69.8¢ to 73.3¢/tin for the round pack 'steak' style product.

Profit margin, freight to market, wholesale/retail mark-ups remain to be addressed in detail.

6) Job levels range from 45.5 to 59 full time employees depending upon option chosen.

7) Capital investment requirements range from $520,310 to $655,850.

8) The effect on the primary commercial fishery in terms of prices to fishermen and the lake station infrastructure is not addressed in detail.

Introduction

Creating a more viable economic base for the communities in the N.W.T., particularly utilizing local renewable resources, has long been of prime concern to the Territorial Government and such organizations as the Hay River Town Council. This concern has led to the joint request to examine the feasibility of canning fish products in Hay River and thereby exporting a 'value added' product from the community.

To respond to this request the Fisheries Development component of Fisheries and Oceans delivered an initial analysis of canning prospects to the Territorial Government and the Hay River Town Council in time for their 'Economic Prospects' Conference in Hay River on May 4-6, 1978. It was understood at that time that Fisheries and Oceans Service would pursue a more detailed study provided that the initial indicators offered at least marginal potential. Subsequent to this conference, the Territorial Government and the Hay River Town Council requested further analysis.

This report addresses canning processes in a much more detailed and accurate manner than the initial report. It covers a variety of mechanized and manual options, examines required existing plant expansion, addressed end-of-line costs versus employment opportunities, looks to future product lines, refers to technical problems, employee training and quality control and finally, identifies a preferred canning process based on least cost criteria. This information will have relevance to a comparison between the. employment and income provided by current process methods and the proposed canning alternative. This comparison is not addressed in this report, but is necessary in the consideration of a cannery for the N.W.T.

The preferred canning process has been scaled to handle 2.3 million pounds of dressed fish including 200,000 pounds of Arctic char. Raw material would be processed into a round pack eight ounce steak style product and a four ounce flat pack smoked fillet product, with all the char going into the latter. Production above 2.3 million pounds would be processed in the existing fresh/frozen mode.

" The model also addresses canning processes for sauce fills and loaf/spread fil 1s.

The plant, as it stands, does not lend itself to utilizing existing space. The same or a greater volume of product must be received and handled for the cannery model than in the existing mode. To encroach on the existing plant would result in a variety of complex problems such as enfringing on the ice making and storage capability, constricting space requirements to a level that would seriously restrict product flow lines, dislocation of a variety of existing services, ability to handle fresh product and continue to put up a percentage of product in the fresh/frozen mode, etc.

The cannery does affect the maximum utilization of the existing filleting/process area and this area is essential to the cannery model. Therefore, a capital expansion which is discussed in the Appendix, is necessary to provide canning capacity. The capital outlays required are discussed further in the text.

## DESCRIPTION OF THE CANNING PROCESS

### 1) Products

The plant would be designed to produce two types of canned products;

a) 8"02 round tin canned whitefish fillet steak style product. The physical processes to produce this product include steaking skinless fillets, packing in cans previously filled with salt in a gel base, vacuum seaming, retort cooking, cooling and labelling.

b) 4 oz rectangular flat aluminum canned smoked whitefish, lake trout and char fillet products. In addition, there would be process equipment flexibility to permit product diversification to include unsmoked fillets packed with various sauces, i.e. mustard, tomato, mushroom, etc. The physical processes to produce this product include brining, smoking and precooking skinless fillets, can packing, adding oil, seaming, retort cooking, cooling and labelling. An unsmoked fillet packed with various sauces would exclude brining, smoking and the addition of oil, and include adding a sauce to the can before and after packing.

c) Additional capital investment would provide the capacity to process an 8 oz round tin canned mullet loaf product and a 4 oz round tin canned whitefish and/or lake trout and/or char spread products. Physical processes to produce these products would include, for a mullet loaf product, splitting and deboning fish, mixing added ingredients, filling emulsion into cans, vacuum seaming, retort cooking, cooling and labelling. For a canned spread product, trim accumulated during the can packing of product b) would be utilized and flesh recovered from the frames.

after filleting from product forms a) and b), precooked, comminuted, mixed with added ingredients, spread emultion filled into cans, vacuum seaming, retort cooking, cooling and labelling.

Product form flow lines are illustrated in the Appendix, page 37.

2) Alternative Processing Methods

a) Manual System (Option A)

This system would require the highest labour input to accommodate manual filleting, for all product lines, plus an increase for the flat pack fillet line, to operate a series of manually operated semi-automatic closing machines, generating increased employment but higher end-of-line production costs. Manual filleting, although reducing the initial capital input, would have a minimal net effect on the amortization component cost of the final cost per can.

b) Automated System (Option B)

In this system the labour component would be decreased by including automatic filleting for all product lines and the use of a fully automatic closing machine for the flat pack fillet line. It would also include a continuous precooker in the flat pack fillet line. These inclusions although significantly increasing initial capital requirements would again have a minimal net effect on the amortization component cost of the final cost per can.

c) Automated System - Thin Gauge Can (Option C)

In this system an increase in capital cost would be required for a retort system that would accommodate all product lines but would be mandatory, because of can design, for the flat pack fillet line. Additionally, the costs would be further increased by the outright purchase of the closing machines which cannot be rented in this case but are rented in 1) and 2) for the flat pack fillet line. However, the increased capital cost, while having little impact on the amortization component, would, because of lower can cost, result in the lowest cost per can for a flat pack fillet product of options A,B, and C.

d) Mechanized Filleting

The opportunity for mechanized filleting in this operation is very significant. Given the utilization of fairly consistent sized whitefish we advocate the use of mechanized filleting. We do not suggest its use for char or lake trout fillets but rather that it be used primarily for whitefish. This would consist of the installation of one filleting machine. Lower yield rates as opposed to manual filleting are taken into account.

The operation would consist of taking a dressed/thawed fish and passing it through the filleter to yield fillets for steaking as well as smoking.

Graded trout and char may also be mechanically filleted if the size range approximated the whitefish, leaving only small quantities for manual filleting.

e) Precooking

This process is a moisture reducing function for quality improvement in the flat pack fillet product. Its function would be essential for varying end-product type. Its inclusion, because of its initial cost and the greater plant space required to accommodate the equipment would add significantly to capital costs.

f) Loaf/Spread Line Addition

This option would permit expansion into comminuted canned products which could, depending on market potential, provide a use channel for the flesh of lower valued species in loaf type products. This would also permit the inclusion of the use of minced flesh recovered from fish frames after filleting, and trim residue generated during can packing, in the production of the flat pack fillet products yielding some of the base material for a canned fish spread product.

## COST ANALYSIS

### 1) Assumptions and Analysis Method

In attempting to establish cost parameters for this type of operation, a variety of assumptions must be made. The basis for the assumptions used in this study is information from the Rankin Inlet Cannery, accepted operating modes in the herring cannery industry on the east coast, and the salmon industry on the west coast. As well, most costs are either verified by quotation or estimated by reliable suppliers.

Operating costs are generated on the basis that 13,000 cans per day and 3 million cans per annum regardless of the product. This is consistent with the physical capacity of the lines discussed; as well, it allows constant application of variable costs on a cost per can basis. While this procedure is not entirely accurate the variance is negligible and escapes measurement in studies of this nature.

We do not apportion overhead costs between the on-going fresh and frozen operation and the cannery operation, rather we attempt to pinpoint the canning cost only. This dual operation would obviously create overlaps with the on-going existing operation and though not addressed in detail, should affect overhead cost savings on both.

Amortized costs are based on new investment only, but total amortization is addressed in a separate section. The on-going fresh/ frozen operation affects the cannery operation in only two areas - the freezing costs, and receiving costs. Labour is added into the cannery costs for these operations.

When we deal with amortization costs we are basically going beyond the scope of the report. Our estimates are accurate enough to determine the effect on the end-of-line price, however, our 'book value' estimate on the existing plant and other economic parameters remain for a more in-depth marketing/viability study using this report as a guideline for determining commodity price required F.O.B Hay River.

Assumptions:

1) Landed price of dressed whitefish and trout during 1978 was approximately 31¢/lb average.

2) Yield rates on dressed fish to skinless fillet equals 45%.

3) Approximately 3.5 million pounds of dressed fish is landed annually. The cannery will utilize 2.1 million with an additional 200,000 pounds of Arctic char derived from a different source.

4) Landed value of dressed frozen char at Hay River will cost about $1.00 per pound.

5) Prevalent general labour rates will be $5.00 per hour average. This mean will include higher wage rates for supervision, etc.

6) Shrinkage in the smoke and pre-cook process will be 15%.

7) Amortization costs are based on an interest rate of 12% and 10 year time frame for equipment and a 20 year time frame for building.

8) Sufficient capacity is available in the existing steam boiler.

9) Freight rates and installation costs are not verified.

10) The cannery will produce 13,000 finished cans per day.

11) A total 3 million cans will be produced annually - 2 million fillet style, 1 mill ion steak style.

2) Unit Production"Costs

Table 1 indicates capital investment by option.

Table 2 indicates total labour input.

Table 3 indicates unit production cost.

Details on capital investment requirements including a specific equipment list can be found in the Appendix, Table 2.

Table 1 - Capital Investment Requirements

| Item | Option A | Option B | Option C |
|---|---|---|---|
| 1) General Equipment | 136,570 | 136,570 | 136,570 |
| 2) Specific Equipment | 55,460 | 132,000 | 191,000 |
| 3) Plant Expansion | 328,280 | 328,280 | 328,280 |
| TOTAL | $520,310 | $596,850 | $655,850 |

Table 2 - Unit Labour Input Requirements

| | Man Days/Day | | |
|---|---|---|---|
| | Option A | Option B | Option C |
| * Labour - Fillet Style | 54.5 | 47.5 | 47.5 |
| - Steak Style | 59.5 | 45.5 | 45.5 |

* Input labour by function is detailed in appendix.

Table 3 - Unit Production Costs (t/tin)

| Item | Option A | Option B | Option C |
|---|---|---|---|
| A) Steak Style | | | |
| a) raw material | 34.4 | 34.4 | 34.4 |
| b) ingredients | 2.0 | 2.0 | 2.0 |
| c) cans | 8.8 | 8.8 | 8.8 |
| d) labels | 1.5 | 1.5 | 1.5 |
| e) maintenance | 1.5 | 1.5 | 1.5 |
| f) labour | 18.0 | 14.0 | 14.0 |
| g) rentals | .5 | .5 | .5 |
| h) utilities & insurance | 2.0 | 2.0 | 2.0 |
| i) amortization | 2.6 | 3.1 | 3.4 |
| j) misc. | 2.0 | 2.0 | 2.0 |
| | 73.3 | 69.8 | 70.1 |
| B) Fillet Style | | | |
| a) raw material | 28.7 | 28.7 | 28.7 |
| b) ingredients | 2.0 | 2.0 | 2.0 |
| c) smoking | 1.0 | 1.0 | 1.0 |
| d) cans | 17.5 | 17.5 | 11.5 |
| e) labels | 5.0 | 5.0 | 5.0 |
| f) maintenance | 1.5 | 1.5 | 1.5 |
| g) labour | 17.0 | 15.0 | 15.0 |
| h) rentals | 1.0 | 1.0 | 0 |
| i) utilities & insurance | 2.0 | 2.0 | 2.0 |
| j) amortization | 2.6 | 3.1 | 3.4 |
| k misc. | 2.0 | 2.0 | 2.0 |
| | 80.3 | 78.8 | 73.1 |

3) Effects of Precooking vs Kiln Drying and Mechanical Filleting vs Manual Filleting.

Based on capital investment and labour input, mechanical filleting contributes 1.2¢/tin to the cost and manual filleting contributes 5.5¢/tin to the cost.

Precooking requires a capital investment of $124,100 on equipment as opposed to approximately $41,560 for kiln drying but an extra man-day/day is required for the kiln drying. Contribution to end-of-line costs are roughly the same and given the advantages on flexibility and efficiency in precooking, kiln drying is not considered.

LOAF/SPREAD LINE - COST ANALYSIS

In order to simplify the analysis at this stage, we are assuming that the production of loaf/spread type products would replace whitefish fillet steak style product in the production schedule and would occur at the same 13,000 can per day rate. Following through on this assumption we are able to utilize the same base for such general costs as amortization, receiving, maintenance, etc.

We have identified mullet as the base material for loaf products and we feel that fisherman would deliver mullet for a cost of 10$/lb dressed F.O.B. the plant. Yield rate on a deboning generates the 9.1¢/lb raw material cost.

The inclusion of a loaf/spread line would require the addition of. several equipment items, particularly a deboner, mixers and a filler. The remainder of existing equipment can accommodate this option except that change parts would be necessary for the seamer if a can other than the 'steak style' can is used.

Utilizing the basic 'steak line' the following additional costs are considered.

Table 4 - Capital Investment - Loaf/Spread Line

| Item | cost |
| --- | --- |
| 1) Splitter | 14,000 |
| 2) Food Grinder | 2,000 |
| 3) Deboner | 18,000 |
| 4) H.P. Washer | 7,000 |
| 5) Mixers | 10,000 |
| 6) Filler | 24,000 |
| 7) Peripheral Equipment | 5,000 |
| Total | $80,000 |

## Labour Input

Utilizing labour input of the 'steak' style pack as the base line, the following additions and deletions are necessary to arrive at total labour input.

Table 5 - Labour Requirements - Loaf/Spread Line

| Function | Option A | Option B | Option C |
|---|---|---|---|
| 1) Base Line | 59.5 | 45.5 | 45.5 |
| 2) Delete | | | |
| Filleting | 18 | 4 | 4 |
| Skinning | 1 | 1 | 1 |
| Steaking | 2 | 2 | 2 |
| Can Packing | 12 | 12 | 12 |
| Sub-total | 26.5 | 26.5 | 26.5 |
| 3) Add | | | |
| Splitter/Header | 2 | 2 | 2 |
| Deboning | 1 | 1 | 1 |
| Material Handling | 1 | 1 | 1 |
| Mixing | 1 | 1 | 1 |
| Filler | 2 | 2 | 2 |
| | 7 | 7 | 7 |
| Total | 33.5 | 33.5 | 33.5 |

Table 6 - Unit Production Costs - Loaf/Spread Line

| Item | cost |
|---|---|
| a) Raw material costs - mullet (55% yield, 10¢ dressed) | 9.1¢ |
| b) Ingredients | 2.5 |
| c) Cans | 8.8 |
| d) Label | 1.5 |
| e) Labour | 10.1 |
| f) Maintenance | 2.0 |
| g) Amortization (add. invest. + original) | 3.8 |
| h) Utilities and insurance | 2.0 |
| i) Equipment rental | 0.5 |
| j) Misc. (freight, office supplies) | 2.0 |
| | 42.3 |

Discussion

The cost parameters discussed above are approximately the same for either a loaf or a spread product except for raw material costs. For a spread product it is expected that whitefish, char or trout would be utilized, however, costs could be minimized by deboning filleted frames and using can packing trim for source product and since these are waste products with zero value, the average raw material costs would be approximately the same as for mullet.

REGULATORY AND QUALITY CONTROL ASPECTS

Canning, as a food process, is regarded as one of the more sophisticated methods of food preservation. As well, canning food products, particularly low acid products such as fish, can foster serious health hazards to the consumer. For these reasons the canning industry has generated a rigorous set of Government regulations; as well as an internal industry capability for quality control procedures that will ensure a continuing high quality product.

Federal inspection requirements, while fairly rigorous, are basically sound in ensuring a good operation. They include:

1) The requirement for heat penetration tests on all canned product formulations to establish safe time/temperature relationships, ensuring commercial sterility. This will establish the length of time a product must be retorted to ensure death of prevalent bacteria, particularly *Clostridium botulinum*. These tests can be conducted by a reliable can supplier or the Department of Fisheries and Oceans, Winnipeg. In all cases cook times must be satisfactory to the Fisheries and Oceans regulatory agencies, in this case, the Industry Services Branch. This service is available through Pat Bobinski, Industry Services Branch, Hay River.

2) All equipment purchased must meet the capability of the Federal Inspection Regulations. This is an on-going requirement for any agency that wishes to export fish products.

3) Quality control procedures must be instituted that will ensure:

a) proper retort times are adhered to,

b) time/temperature retorting records are kept and made available for inspection,

c) date coding of all production is in effect at all times,

d) monitoring of can seam quality occurs on a regular basis and records maintained,

e) end-of-line quality is monitored on a regular basis,

f) standard formulations are utilized in order to correspond to approved retorting times,

g) proper incubation procedures are followed prior to shipment of product to market. This usually requires a 14 to 21 day delay from production to shipping with the appropriate sample size provided to the Industry Services Branch for incubation, bacterial monitoring, and quality assessment.

It is no accident that a sound quality control program in conjunction with the national regulatory requirement will turn out a high quality safe product. In pursuing this investment opportunity it is essential to include regulatory personnel in the planning stages. Further, because of the continued input of regulatory and in-house quality control personnel, they can also provide a high quality input into future product development.

While regulatory and quality control personnel do not appear to affect initial investment, they do provide the expertise to ensure consistent quality and therefore are of utmost importance to long term viability.

Equipment suggested in the proposed model conforms to National Fish Inspection Regulations. Cannery equipment supply firms have, for obvious reasons, long considered high quality and efficiency as their ultimate goal. Hence the equipment suggested would not only generate the lowest end-of-line product cost but would also exhibit the best regulatory features.

DISCUSSIONS

1) Pro/Con of Various Options

In developing the cannery model we have utilized various mixes in capital investment versus labour input. In all cases, additional capital investment has reduced labour input and also reduced end-of-line costs.

When examining a product and alternative canned goods, it must be realized that the 'steak style' pack will most likely compete with light or dark tuna 'chunks', mackerel etc. The" fillet pack will be a low volume, gourmet item possibly competing with canned oysters and shrimp and therefore must be sold in the mass American market. "Loaf style' products must overcome the 'mullet' stigmatism and the 'spread' market provides limited volume (but possibly lucrative) markets. In light of the established market shares for competing products, any canning investment must be based on the least cost option in order to be competitive. However, this direction leads to the highest initial investment and therefore the highest risk. Rather than take this risk, gradual entrance to the market place with minimal initial investment may be explored but this type of option tends to result in higher costs from the outset.

For the flat fillet pack, on a *gourmet* market, it is not Inconceivable that the effect of freight, wholesale/broker and retail margins could add 100% to the end-of-line price. 50% to 60% may be added to the steak or loaf style product. Given the large range of potential mark-ups, it is difficult to predict an actual retail price and pursuit of this aspect in an investment decision Is left to marketing experts.

Given the variance in prices and the obvious competition we feel that the least cost method must be pursued.

The relative advantage on a sale of 3 million tins from Option A to C on Table 3 is 7.2$/tin for 'fillet' style and 3.2¢/tin for 'steak' style yielding a total potential advantage of $176,000 per year.

However, given the apparent dollar value in sales price advantage as well as the superior quality and flexibility generated by Option C, we should consider this option the more viable. While investment in this option is the highest, it reduces rental costs, and also provides the highest potential resale value for equipment purchased and may lower the risk involved in this high initial investment. Also, this line with minor additions provides the flexibility" for canning sauce products.

Option C provides the best opportunity for reducing end-of-line production costs, reduces empty can storage space because the empty cans are tapered and nest, provides a retort system that can handle spread jars and reduces the number of complex machines (closures or seamers) requiring constant maintenance.

Advantages of Option C over Option B are less apparent. The lines are similar except that a seamer is rented and a different can is used for Option B. The reduction in initial capital investment affects a saving of approximately .3¢ per tin for Option B, but use of the thin gauge tin realizes a 5.7¢ per tin saving for Option C, for a net advantage of 5.4$ per tin. (This applies to the fillet style pack only.) This saving results in a yearly advantage of $108,000 for Option C.

Employment generated by Option B or C are the same, therefore Option B should be discarded as there appears to be no net benefit in pursuing it.

2) Steam Precooking vs Smoke Kiln Predrying.

Apart from factors such as the initial freshness of raw material, added ingredient quality and the impact of process quality control, an important feature in the quality of a canned smoked fillet product with oil, or a canned fillet product with the addition of various sauce mediums, is the firmness of fillet texture and the minimization of free liquid residue in the final canned product. Both of these can be achieved to a large degree by removing moisture from the fillets before retort processing. Some removal of moisture from fillets can be accomplished without the use of a continuous precooking line but would limit the flat pack fillet line to the production of only a canned smoked fillet product. In this case the fillets would be exposed to an air drying phase followed by a limited exposure to a smoke atmosphere to induce an appropriate level of smoke flavour. Smoke kiln temperature would be maintained below a cooking temperature to facilitate manual unloading of fillets and further manual handling during can packing. Alternatively, the use of a continuous precooking line to remove moisture from fillets would a) accomplish optimal fillet moisture reduction, and b) expand end product flexibility to include the option of processing canned fillet products with the addition of various sauce mediums. Smoke kiln residence time for fillets designated for a canned smoked fillet product would be reduced by omitting the drying phase as the smoke flavoured fillets would be transferred to the continuous pre-cooking line for subsequent moisture reduction.

Kiln drying could also lead to traces of smoke flavour being added to products not requiring it. As well, kiln drying would require more labour input in the handling of two more kilns and the fact that the can packing and seaming system is built into the pre-cook line.

3) Boiler Capacity

We have not firmly established whether the existing boiler has sufficient capacity to provide the necessary steam supply, however the existing boiler can provide approximately 4,000 pounds of steam per hour and our estimated consumption is approximately 1,200 pounds (approximately 800 pounds for the retorts, 330 pounds for the precooker and 70 pounds for can washing. Additional steam will be used for washdown but not at the peak periods) or 30% of available capacity.

Our problem in determining whether sufficient capacity is available hinges on existing useage, but given the existing plant operation and the fact that the boiler is a water tube type which can operate well above rated capacity for short periods of time (up to 50%) the boiler should have sufficient capacity.

If an investment decision is made, it is suggested that Cleaver Brooks (Winnipeg) or Cleaver Brooks (Milwaukee) be contacted to evaluate the useage of the existing plant.

The impact on the viability of the model in acquiring a larger boiler. is minimal (probably in the area of 1/10 of a cent per can) and affects only the final operation. A decision in this area, while important, should not be a priority and can easily be made at a later date.

4) Expansion to Utilize All Great Slave Lake Fish and Amortization Costs.

The cannery is designed to handle 2.3 million pounds of dressed fish input. If 200,000 pounds is Arctic char, the actual utilization of Great Slave Lake fish will be 2.1 million pounds. This leaves approximately 1.5 million to be handled in the existing mode. To assess true end-of-line costs for a canned product we should then absorb approximately 2/3 of the existing plant costs amortized against the cannery. This is estimated at one million dollars. This leaves five hundred thousand dollars to be amortized against the 1.5 million pounds fresh frozen operation. Evaluating this impact on the total N.W.T. fishery is beyond the scope of this study but is essential to any final decision.

Should markets exist for a total of 3.6 million pounds of Great Slave Lake canned products, the extra volume throughput would result in higher efficiencies for the cannery. However, the cannery is capable of handling an absolute maximum of 18,000 cans per day versus the 13,000 cans per day considered in the above analysis. The cannery could accommodate the extra production by adding labour in the can packing and steaking operation if the extra sales were generated in the 'steak style' end-of-line product. If the sales are generated in the loafor spread market, product costs per tin would diminish, however if they are in a fillet style pack a second shift would have to be added. In any case, end-of-line costs for this product should not increase and should in fact drop by 1¢ or 2¢ for steak style and loaf style packs. Therefore, canning the entire Great Slave Lake production could be done without any increase in the capital costs suggested.

5) Amortizing Existing Plant.

Since our model processes approximately 2/3 of in-coming product, one should examine the effect of absorbing that amount of overhead on the cannery operation. Given a book value of $1.5 million, this would require the amortization of another one million dollars over the annual can production. As in the other model we estimate this amortization over 20 years at 12% or a total annual cost of $133,880 or 4.5@ Per tin.

6) Effects on the primary Commercial Fishery.

The scope of this study does not address the primary industry. Given the complex infra-structure at the lakeside packing plant, subsidies required, freighting, etc. we have attempted to utilize a constant raw material price F.O.B. Hay River. Given that the throughput on the lake would remain the same, the structure on the lake may well remain the same. If the cannery is required to absorb these buy in costs in total it could add 5¢ to 6¢ per tin.

7) Unaddressed Potential Costs

The scope of this study concerns itself in determining unit cost for 3 million cans. However in parts 4), 5) and 6) three topics are mentioned that could have a significant effect on end-of-line costs. We do indicate that should the cannery assume total responsibility for lake stations and 2/3 of the amortization of the existing plant we could have a 9.5¢ to 10.5¢ per tin cost increase. These could be somewhat offset by a market condition where all Great Slave Lake production were canned. However, sales volumes below the 3 million tins per year would have a further negative effect.

These important topics must be addressed at a senior level and decisions made prior to investment.

RECOMMENDED MODEL

On technical, quality and least cost basis, Option C is proposed. Even though all three options are adequate in turning out a good quality product, the advantage of Option C over Option A appears to be approximately $176,000 per year, and over Option B approximately $108,000 per year.

The ultimate facility to can the amount of product discussed resemble the model discussed. The more sophisticated the model, -- the cheaper the end-of-line price. To enter this project on a piece-meal basis will only escalate the end-of-line price. If the product cannot be sold at the end-of-line prices indicated in Option C it would serve little purpose to reduce capital investment requirements as they only contribute somewhere between 5 and 7% of that price.

# APPENDIX

PLANT EXPANSION

In adding a cannery to the existing plant we do not recommend encroaching on the existing plant as discussed in the Introduction.

The scope of the plant addition and its relationship to the existing plant are detailed in Drawing 1 and 2.

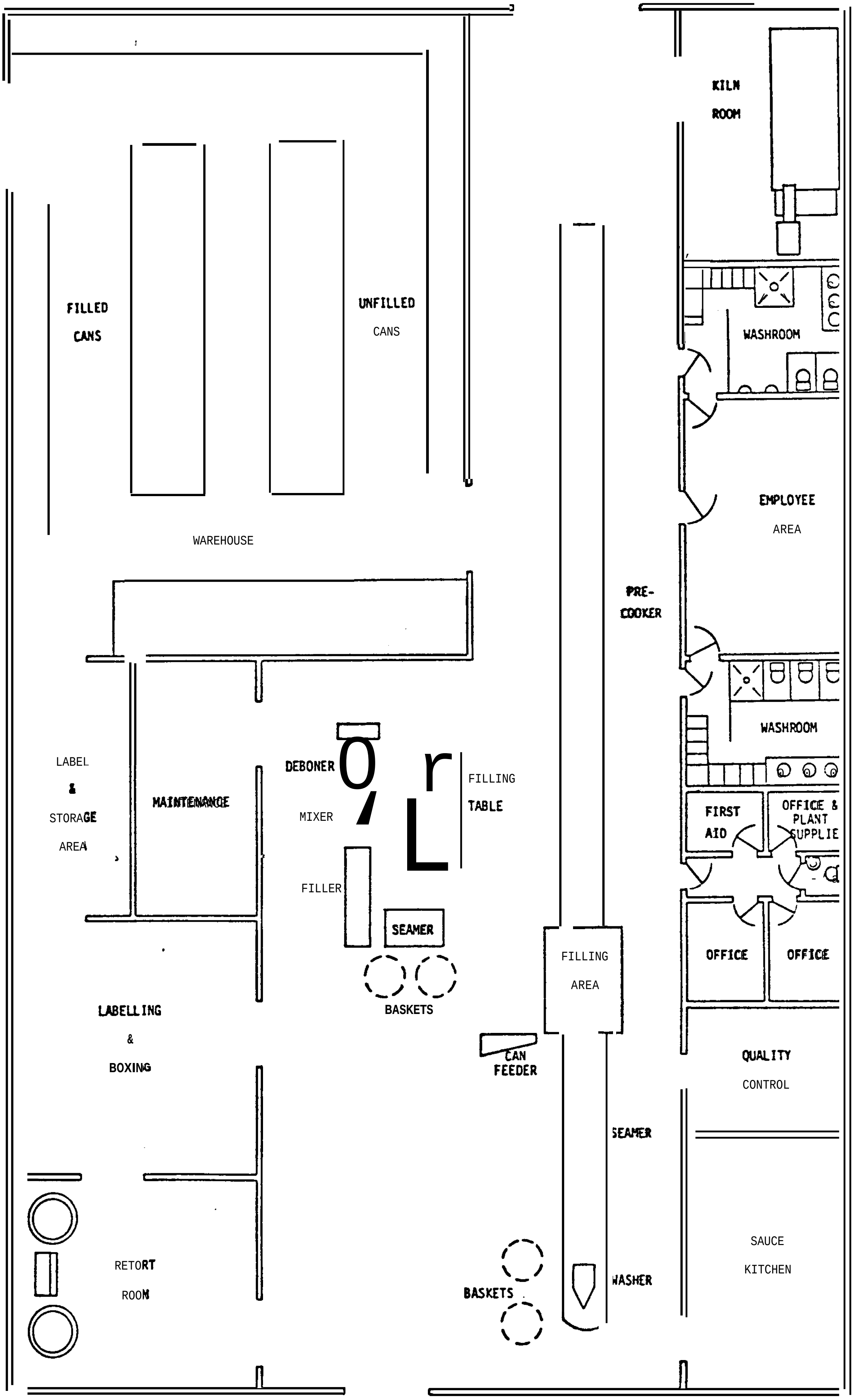
We propose that the addition be of the prefabricated metal variety or concrete block. The metal building is cheaper and is utilized in this analysis.

General Specification:

- 80′ x128′ (10,240 $ft^2$)
- 14′ stud height minimum
- all walls insulated including interior walls
- venting in all areas where steam is utilized
- interior walls made of white aluminum such as "Al Can Hygeneceil"
- in areas where high humidity conditions will exist, waterproof electrical outlets must be used.

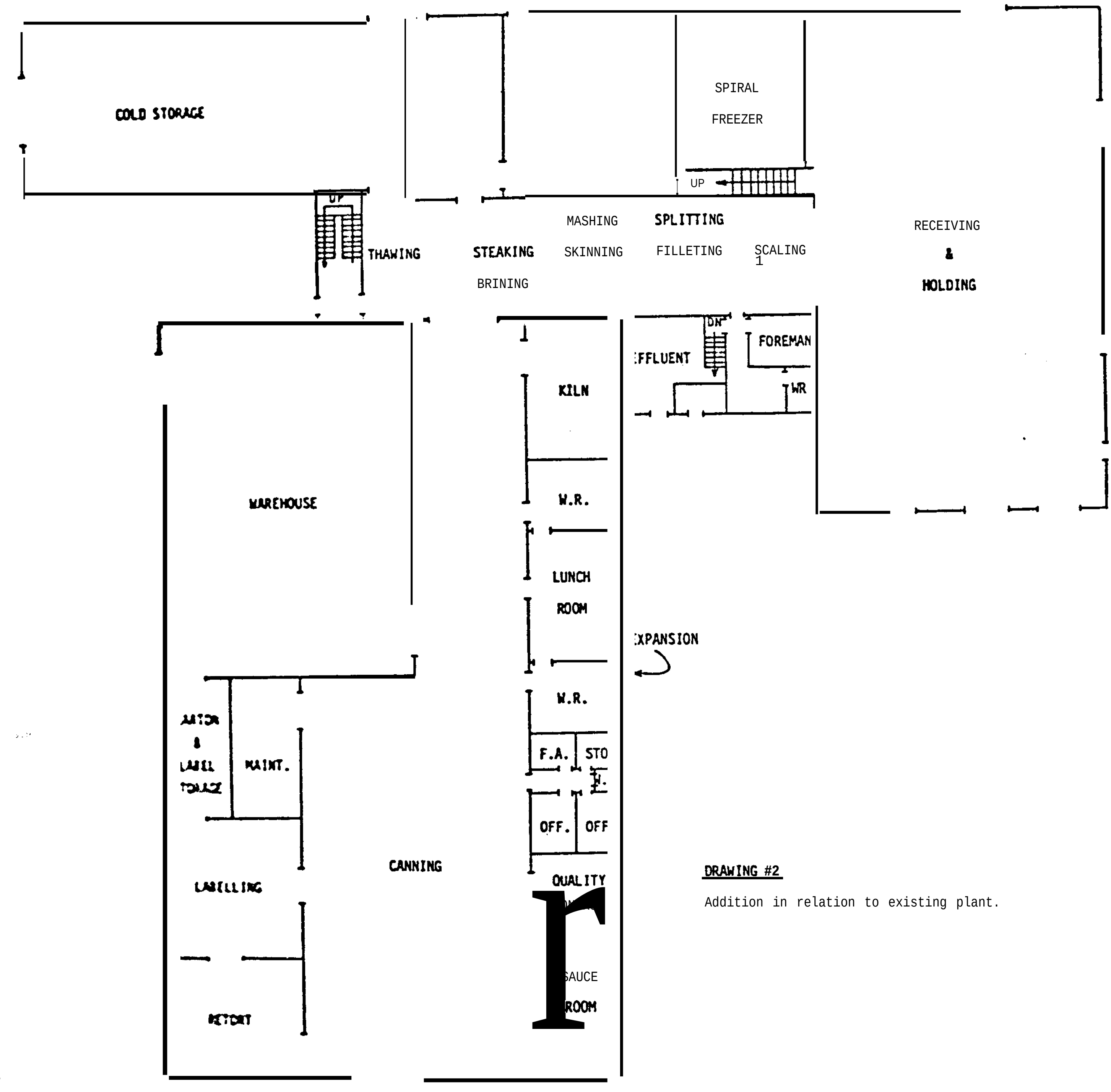
Capital Cost

The capital cost is estimated, including electrical and mechanical services at $328,280.




DRAWING #1

PROPOSED
CANNERY
LAYOUT
(80' x 128')




DRAWING #2

Addition in relation to existing plant.

## Appendix 1 - Labour Input by Function

Table 7 indicates the required man days/day for all of the functions necessary to produce a canned product including a maintenance man who would have to acquire special training to handle seaming machines, quality control and clean-up personnel.

This data is utilized in estimating labour costs per can.

Table 7 - Labour Input by Function - Filleting Steak Lines.

| FUNCTION | MAN DAYS | | | | | |
|---|---|---|---|---|---|---|
| | Steak Style Pack Line | | | Flat Pack Fillet Line | | |
| | Option A | B | C | Option A | B | C |
| 1) Receiving | 2 | 2 | 2 | 2 | 2 | 2 |
| 2) Mashing & Freezing | 2 | 2 | 2 | 2 | 2 | 2 |
| 3) Glazing & Packaging | 3 | 3 | 3 | 3 | 3 | 3 |
| 4) Thawing | .5 | .5 | .5 | .5 | .5 | .5 |
| 5) Filleting | 18 | 4 | 4 | 9 | 4 | 4 |
| 6) Skinning | 1 | 1 | 1 | 1 | 1 | 1 |
| 7) Steaking | 2 | 2 | 2 | - | - | - |
| 8) Brining | | | | 2 | 2 | 2 |
| 9) Smoking | - | - | - | 2 | 2 | 2 |
| 10) Can Packing | 12 | 12 | 12 | 12 | 12 | 12 |
| 11) Ingredient Add. | 2 | 2 | 2 | 2 | 2 | 2 |
| 12) Seaming | 26 | 2 | 2 | 6 | 2 | 2 |
| 13) Washing | 1 | 1 | 1 | 1 | 1 | 1 |
| 14) Retorting | 1 | 1 | 1 | 1 | 1 | 1 |
| 15) Labelling | 2 | 2 | 2 | 2 | 2 | 2 |
| 16) Packing | 2 | 2 | 2 | 2 | 2 | 2 |
| 17) Material Supply | 1 | 1 | 1 | 1 | 1 | 1 |
| 18) Supervision | 2 | 2 | 2 | 2 | 2 | 2 |
| 19) Clerical & Accounting | 2 | 2 | 2 | 2 | 2 | 2 |
| 20) Maintenance | 1 | 1 | 1 | 1 | 1 | 1 |
| 21) Quality Control | 1 | 1 | 1 | 1 | 1 | 1 |
| 22) Clean-up Crew | 2 | 2 | 2 | 2 | 2 | 2 |
| Total | 59.5 | 45.5 | 45.5 | 54.5 | 47.5 | 47.5 |

Equipment Costs

In many cases, specific equipment makes are utilized in arriving at the approximate cost. This, in no way, indicates a recommended or preferred line of equipment, but rather provides the necessary detailed information to follow up the data for future verification. As well, where specific specifications were required it was necessary to detail the equipment to ensure that all parameters were compatible and substitute equipment which may be cheaper but not compatible was not utilized for verification purposes.

1) General Equipment

| Equipment Required for Processing 'Functions in All Options | Approximate Cost $ |
|---|---|
| 1) skinning machine | |
| 2) steak cutting machine | 4,000 |
| 3) brining tanks (2) | 950 |
| 4) can rinser: gravity s/s | 1,900 |
| 5) packing tables: s/s, portable (6) | 3,000 |
| 6) "Afos" 60 stone batch smoking kiln with 4 trollies and 200 s/s trays | 20,780 |
| 7) checkweigh scales (4) | 1,800 |
| 8) portable containers s/s (8) (raw material movement) | 1,600 |
| 9) can conveyors | 3,200 |
| 10) automatic fluid fillers on can packing line and at closing machine station | 10,200 |
| 11) fluid mixer | 1,500 |
| 12) can washer, round cans | 3,000 |
| 13) can washer, flat rectangular cans | 9,000 |
| 14) labelling machine, round cans, box packager, rectangular flat cans, case packing machines, case sealing machine | 26,000 |
| 15) miscellaneous equipment | 10,000 |
| 16) closing machine, round cans. $1800/year. Amer. Can Co. 006 machine (rental) mechanical vacuum, 40 cans/rein. | |
| motor, pulleys, electrical, etc., installation, shipping | 6,000 |
| 17) retort: standard vertical (2), 3 cage, 42"x72", capacity: 2000 - 307x200.5 cans (8 oz round can) with spare cages plus loading and unloading hoist. The retorts to have the capability for water cooking 'fillet' style and steam cooking the 'steak' style. | 33,640 |
| | 136,570 |

II. <u>Specific Equipment</u>

| Equipment required for processing by option | Approximate Cost $ A | B | C | Loaf/Spread |
|---|---|---|---|---|
| 1) mechanical filleting . | | | | |
| 2) splitting machine | | | | |
| 3) deboning machine Baader 694 | | | | 17,000 |
| 4) vacuum mixing machine, (several different units are available to perform this function and associated costs are variable. The specified cost shown here need further verification). | | | | 11,000 |
| 5) grinder/homogenizer | | | | 8,000 |
| 6) precooking and packing line Lubeca LW1088 | | 124,000 | 124,000 | |
| 7) flat rectangular can (Norwegian) feeding accessory, LW737 | | | 5,000 | |
| 8) sauce mixing and pumping equipment | | | 6,000 | |
| 9) emulsion filling machine, "Simplex" piston filler and "Moyno" food pump | | | | 25,000 |
| 10) closing machine, Amer. Can. Co., flat rectangular. can (rental $6000/year) mechanical vacuum PUV semi-automatic (6) | | | | |
| motors, pulleys, electrical etc., installation. shipping | 13,900 | | | |
| 11) closing machine, Amer. Can Co., flat rectangular can (rental $8000/year) steam flow vacuum fully automatic (1) | | | | |

II) Specific Equipment (cent' d)

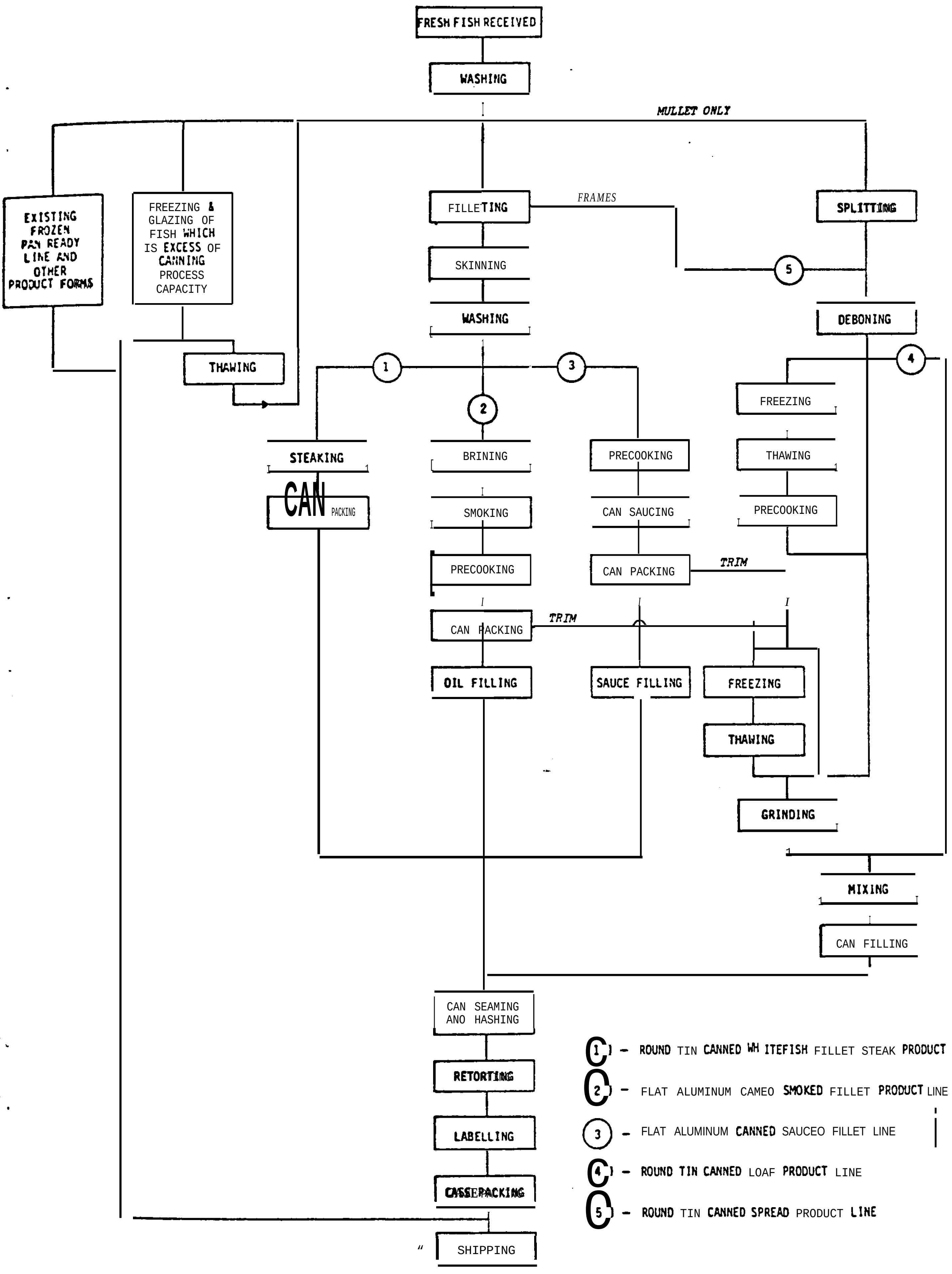
| Equipment required for processing by option | Approximate Cost $ A | B | C | "'Loaf/Spread |
|---|---|---|---|---|
| 11) closing machine, Amer. Can Co., flat rectangular can (rental $8000/year) steam flow vacuum, fully automatic (1) | | | | |
| motors, pulleys, electrical, etc., installation, shipping | | 8,000 | | |
| 12) closing machine, Norwegian flat rectangular can, atmospheric closure, "Trio" TAF-4 machine with clincher | | | 56,000 | |
| 13) two extra kilns for precooking to replace the steam precooker "Afos" 60 stone | 41,560 | | | |
| Total | 55,460 | 132,000 | 191,000 | 61,000 |

Appendix 3 - Local Can Manufacturing

On-site manufacturing of flat rectangular aluminum can bodies for the proposed production of two million cans of product per year would not justify the capital outlay required to obtain a can body making press.

A compact Norwegian press manufactured by "Trio" can produce 20 - 25 million can bodies per year on a single shift basis. Its price, F.O. B. Norwegian port is approximately $63,000. Suitable pre-laquered aluminum coil for can body production can be imported from Norway or North American suppliers. It is of interest to note that the number of can bodies that can be produced from a 20 ft. container of aluminum coil is only about twice the number of pre-manufactured tapered stackable Norweigian cans that can be contained in the same sized container. This would include the can lid whereas the can lid would have to be purchased separately if on-site manufacturing of can bodies was undertaken. For product packed in a Norwegian "tapered can as proposed under Option C, two container shipments per year would be required.

# PRODUCT FLOW DIAGRAM




1 - ROUND TIN CANNED WHITEFISH FILLET STEAK PRODUCT LINE

2 - FLAT ALUMINUM CAMEO SMOKED FILLET PRODUCT LINE

3 - FLAT ALUMINUM CANNED SAUCEO FILLET LINE

4 - ROUND TIN CANNED LOAF PRODUCT LINE

5 - ROUND TIN CANNED SPREAD PRODUCT LINE