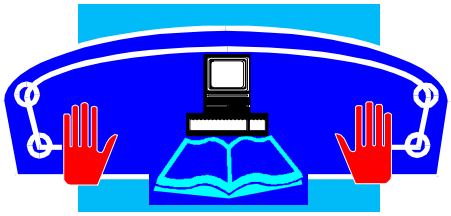

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Tanning Of Seal Skins
Type of Study: Processing / Manufacturing Wildlife Products, Tanneries
Date of Report: 1985
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Tanning of SEALSKINS

SHIVAS CONSULTING SERVICES

SHIVAS CONSULTING SERVICES

Tannery & Environmental Specialist

Stephen A.J. Shivas, B.S. A.
Tel. (705)726-7683

188 Anne St. N.
Barrie, Ontario
L4N 2C2

June 3, 1985

Mr. Larry Simpson,
Northwest Territories, Baffin Region,
Economic Development and Tourism,
Frobisher Bay, N.W.T., X0A0H0

Dear Mr. Simpson:

First let me apologize for the long delay in responding to your request about the tanning of sealskins. After you have read the enclosed report you will see that the development of a process has advanced. Further work is needed so this is just a progress report.

On May 28, I was talking to Bob Glandfield on another subject. He asked me to send him a copy of this report. This I have done. Therefore Bob will be phoning you soon about the Government grants and the financing of the project.

Enclosed also is my expense account. Some expenses are confirmed by receipts. Other expenses must be estimated. Almost every day starting on Feb. 18. for 2 months I did a little work on the project. Often it was only a quick mixing a couple of times a day. At other times a number of hours were spent. So, at $250.00 per day how do I estimate a fair time? I have charged $2,000.00 or 8 days. In practice I'm sure it should be double that because it took 3 days alone to write up the report.

It is an interesting technical challenge. The extra

time I am glad to donate because it has the long range humanitarian possibility of improving the lives of our native people.

The local tanning of skins may eliminate or at least decrease the need to soften skins by mastication and saliva. This should be better for the native womens' teeth. Properly tanned skins will last longer, wear better, not rot and thereby improve foot comfort and shoe durability. Local tanning will salvage a product which is often wasted at present. Locally made leather may supply the material for a garment and shoe with tourists. I hope some of the above can accomplished as the project progresses.

There are still many unanswered questions, many experiments to run and the big step of going from a laboratory or pilot project to actual production. To aid this transition it would assist a great deal if I could go to Frobisher Bay. At first glance this may seem like a needless expense, but it would not be. The cost would be my expenses plus a much lower nominal consulting fee than $250.00 a day. By making the trip I would become better acquainted with:- The size, condition and type of skins.

- The people involved - their educational and technical background and capabilities
- the water problem. Have we got access to sea water? - the hardness of the fresh water.
- The pollution problem. Is it worth developing recycling processes to save sewage transport
- The proposed tannery location. Is it a separate heated shed or liable to be near food etc?

We are going to get to active tanning faster, if I know where, when and how you want to get there.

If you want me to visit you, please allow sufficient time to monitor my other consulting projects.

Best regards,

Stephen Thiras.

SHIVAS CONSULTING **SERVICES**

Tannery & Environmental Specialist

Stephen A.J. Shivas, B. **S.A.**
Tel. (705) 726-768s

188 **Anne St. N.**
Barrie, Ontario
L4N 2C2

June 3/85

INTRODUCTION

This is a report on the tanning of **sealskins** to make the soles for native footwear. The type of skins are called "**oojuk**" and the type of footwear is called "**Kamiks**" in the native language.

As yOU requested an attempt has been made to produce leather with these properties:

the **sealskin** leather should have the **hair** removed.
the resultant leather must be durable, **abrasion** resistant, strong, and have high tear and puncture resistance.
the leather must have sufficient **flexibility** so that extra softening by chewing **is** not necessary. If possible **this flexibility** should be maintained at low temperature.
the leather should be as waterproof as possible.
the leather should be resistant to bacterial and enzyme deterioration.
it should withstand **mild** heat and generally should have all those properties we expect from **normal,** commercially produced leathers.

The aim was to achieve all of these leather properties and do so with a simple tanning method which required:

a minimum of equipment.
a minimum of chemicals.
using the least **toxic** and corrosive chemicals possible.
- producing a minimum of pollution.
it must be fairly **inexpensive.**
the process must require a minimum of education or processing instructions.
the process must be versatile enough to tan any ordinary sealskin without chemical control tests.

Considering the above limitations, we have been able to develop a procedure which should serve the purpose.

. . . /2

It has not been possible to fulfill all of the above listed requirements, but a reasonable compromise has been achieved. A procedure has been developed, the amount and type of chemicals are fairly well established and some leather has been produced. The steps in this development are summarized in this document.

BACKGROUND

On January 23, 1985 one frozen square flipper sealskin was sent to me by John Mattews of the Department of Economic Development, Igloolik, North West Territories. This parcel arrived January 31 and I paid $17.00 for delivery. This charge is included in the expense account.

On January 4, 1985 Larry Simpson, Policy and Planning Advisor for the Baffin Region of the North West Territories Department of Economic Development and Tourism, sent me a letter requesting me to develop a process to tan sealskins. On February 19, Mr. Simpson sent me a sample of oojuk to demonstrate the softness and type of product desired. The following experiments were run to make this leather using a simple tanning procedure. Bob Glandfield suggested there would probably be some federal grants available to help finance such a project. Mr. Glandfield is Industrial Technology Advisor for the National Research Council of Canada. His address is:

200 Towncenter Court
Suite 1101
Scarborough, Ontario MIP 4X8

EXPERIMENTAL

On February 18, 1985 the bundle of sealskin was opened and a small piece removed. It was about 1 1/3 sq. ft. in area and weighed 2010 gins. I fleshed it to produce:

Flesh and fat	- 1140 grams	·	57%
Grain and hair	870 grams	=	43%
Total	2010 grams	-	100%

The 870 grams was soaked and thawed and cut into 16 pieces about 3 inches x 4 inches. These approximately 0.1 sq. ft. pieces weighed between 27.9 and 63.5 grams after refreshing with the average weight of 49.6 grams. After refreshing, the pieces were soaked in water at 90°F. To each gal. of water 80 ml of Sellogen 641 was added to remove natural grease.

Lay and mix 2 hours

Drain and place in soak water #3 containing:

1 gal. water at 90°F

80 ml Sellogen 641 from Diamond Shamrock Co.

Trisodium phosphate to pH 9.5

Mix periodically and lay overnight

February 19 - Remove, rinse out grease and start tests on unhairing.

TEST 1 = Unhair with Mollescal S.F. from B.A.S.F. on February 19. To 5 pieces weighing 250 gms add

100% water (250 ml) at 70°F

3% lime (7½ gins)

4% Mollescal S.F. (10 gins). Stir periodically

There was not enough float to cover, so 100 ml more water was added.

On February 21 the hair was only slightly pulped, so added

40% more water '(100 ml) (180% total)

2% lime (5 gins)

2% Mollescal (5 gins)

February 22 - complete lime penetration. The white hair was pulped but the black hair roots were still tight.

February 23 - 90% of epidermis could be removed by scraping

February 26 - 100% clean

February 28 - Scrape clean and refloat in 500% water.

Ready for pickling and tanning

Total liming time equals 9 days.

TEST 2 - was an attempt to vegetable tan the soaked samples without unhairing. I favoured this process because it required the least toxic chemicals and the fewest chemicals and process steps.

February 19 - 2 soaked and wrung samples weighing 100 gms were placed in 250% float of water at 70°F containing 10% (10 ml) Nopcotan A9. A9 is a synthetic pretanning agent from Diamond Shamrock Co.

February 20 - Add 20% natural vegetable liquid extract (PH 3.0, S. Gr. 1.11)

February 22 - Examine - slight penetration from flesh only

February 23 to Mar. 7 - Examine daily. Skins have a leathery feel but were slow to penetrate.

Mar. 7 - Add 5% sulfonated cod oil.

Mar. 8 - Wash and dry. Leather dried hard.

Sample 1 was wet back and retanned with formalin. It dried thin, soft and flexible.

Sample 2 was refatliquored with 20% Dymsol S (a synthetic sperm oil). It dried very firm and raspy. We can conclude from this it would require a very long time to veg tan sole leather with the hair on, but an aldehyde might work better.

TEST 3 - Unhair with Atlas B E A M .

February 19 - In this test, 5 pieces of soaked, wrung sealskin weighing about 250 gms were treated as follows:

100% water (250 ml) at 70°F (100 ml more in 3 hours)

3% lime (7.5 gins)

4% Atlas (10 gins) Mix periodically

February 21 - Add 80% water (200 ml) at 70° F. (Total 220%)

2.% lime (5 gins)

2% Atlas (5 gins) Mix periodically

February 22 - Almost complete lime penetration. Very swollen.

February 23 - 90% of epidermis scrapes clean.

February 26 - 100% clean.

February 28 - Pull, scrape, wash, place in 500 ml water.

March 1 - Scraped limed weight = 357 gins. Very swollen.

TEST 4 - Was an attempt to unhair with lime only.

February 19 - 6 pieces weighing 200 gms were placed in:

100% cold water (200 ml)

3% lime (6 gins) Stir and examine periodically

February 23 - All hair tight.

February 28 - About 90% of the hair could be scraped off.

March 1 - Still not clean, hairy edges. Lime wt = 247 gms.

Samples of Tests 1, 3 and 4 were punched 1, 3 or 4 respectively and tanned as follows:

Tan I contains 1 cut and was treated with a salt plus acid pickle and then chrome tanned.

Tan 11 contains 2 cuts and was treated with a salt, acid pickle, then Alum tanned and Wattle retanned.

Tan III had 3 cuts and was pickled as above, then vegetable tanned.

Tan IV had 4 cuts to identify it, then was pickled and tanned with glutaraldehyde.

Tan V with 5 cuts was run like Tan I then Wattle Retanned.

Each of the 5 different tannages had 1 of the different unhairing test pieces.

All pickling was done together as follows:

Test	Punches	No. of Pieces	Limed Weight
1	1	5	355
3	3	5	357
4	4	6	247
			959 gms

March 1 -

Add to 16 pieces - 150% float to cover (1,440 ml)
10% of the float as salt (144 gms)
2% formic acid (19.2 gins)

March 4 -

pH = 4.0 so add 1% more formic acid to pH 2.5

March 4 -

Tan I - 6 pieces = 300 gms (2 pieces from each of the unhairing tests)
150% pickle float (450 ml)
10% dry chrome (30 gins) Stir periodically

March 7 Add 5% Alum Oil
300% float to cover. Stir periodically

March 11 pH 3 so add 2% Sodium bicarbonate slowly

March 12 Dump, wash

Time in Tannage was 8 days.

March 4 -

Tan II - 3 pieces = 150 gms (1 Piece from each unhairing test)
Add 150% old pickle float (225 ml)
10% Alum (15 gins)
March 7 Add 5% Alum Oil (715 gins)
Water (100 ml)
March 11 pH 3 so add 2% Sodium bicarbonate in 5% solution
March 12 pH 3.2 - Dump and rinse

March 4 -

Tan III - 3 pieces = 150 gms
Add 150% float (225 ml)
10% Nopcotan A9
March 7 Add 5% Sulfo Cod (7.5 gins) + 15% vegetable extract
March 11 pH 3 add 15% vegetable extract
March 14 Add 30% vegetable ectract
March 21 Add 20% Dymsol S in 200% water
March 23 Rinse and dry

March 4 -

Tan IV - 3 pieces = 150 gms - to this amount of pickled stock was added:
150% pickle float
10% aldehyde
March 7 Add 5% sulfo cod oil (7½ gins)
March 11 pH 3 so add 3% Sodium bicarbonate (4.5 gins) as a 5% solution
March 12 pH 5.5 - Dump and rinse

Tanning time equals 8 days.

From each tannage a sample was removed and tested for shrinkage temperature. Shrinkage temperature in an indicator of degree of tannage.

Sample	Shrinkage Temperature
Native oojuk	130°F (no tannage)
Tan I - Chrome	3 min boil with no shrinkage
Tan II Alum	140°F
Tan 111 Vegtan	152°F
Tan IV Aldehyde	180°F

The different unhairing methods were also tested for shrinkage after tannage but showed little variation between Tests 1-3 and 4.

Without delving into all the different retanning and fat liquoring procedures tried, I shall just summarize some final leather evaluation results. If specific procedures are requested, I shall be glad to forward all details.

Tan V - tanned with chrome, retanned with Wattle was a little stiff but quite usable.
Tan I - chrome tanned and fat liquored with sulfo cod oil was very soft and flexible.
Unhairing Test 1 (1 punch) was hardest and rubbery.
Unhairing Test 3 (3 punch) was a little hard in the thickest area.
Unhairing Test 4 (4 punch) was very soft, but a thin piece- some hair on.
Tan II - Alum with a Wattle Retannage dried hard so this method is out.
Tan III - Was too firm - maybe the 17 days of tannage was too short a time.
Tan IV - All samples soft and flexible after fat liquoring in 10% Sulfo Cod Oil - Excellent,

1. It is very difficult to get natural vegetable tanning extracts to penetrate through the grain. This is especially so with hair on leather.
2. The fastest and cleanest unhairing was with lime plus Atlas B E A M . I was able to scrape clean in 4 days. Test I required 9 days and Test 4 still had hair on at the end of 10 days.

Tannages: Tan I with chrome was satisfactory
Tan II with Alum and extract was too hard
this was the least satisfactory leather but
the least toxic chemicals
Tan III dried too firm
Tan IV was soft and flexible

If you wish to examine any of these leathers I have kept pieces of each.

From all of the above I concluded the following:
The most promising process was Test 3 - unhairing with Atlas B E A M and Tan IV - tanning with glutaraldehyde or chrome.

Therefore the remainder of the seal skin was thawed out and taken to Robson Lang tannery in Barrie, where it was mechanically fleshed.

The unfleshed weight was = 34 lbs.

The wet skin = 16 lbs.

The surplus flesh removed 18 lbs.

Most of the skin was cut into pieces and refrozen into separate packages. Packages 5 and 6 were not frozen but processed at once beginning March 19.

TEST SERIES M 1

March 19 -

1 punch - Piece 5 - Scraped and trimmed = 369.7 gms

2 punches - Piece 6 - Scraped and trimmed = 369.1 gms

Total 738.8 gms

Add 2 pieces plus 200% water (1,480 ml) 70"F

1% Emulsifier (7.4 gins)

March 20 - Drain off emulsified grease. Refloat, wash

Add 200% water (1,480 ml) at 70"F

1% Emulsifier (7.4 gins)

March 21 - Dump, wash cold 10 min almost all grease removed.

Add 150% water (1,170 ml) (cold)

5% lime (39 gins)

5% Atlas B E AM (39 gins)

March 23 - Not enough water to cover swollen skins, so add 390 ml more 'water. Hair almost pulped.

Note: You need about a 500% float to cover properly in the lime,

March 30 - Pull, unhair completely, skins clean and white.

March 31 - Wash thoroughly (10 days in lime)

Limed weight = 1 punch = 551 gms

2 punch = 594 gms

Total 1,145 gms

Add 200% Water at 90"F (2,300 ml) - 8 h,s pH 8.3

5% delimer and bate (57 gms)

Wash cold

Add 200% cold water (2,300 ml)

20% salt (230 gins) Mix.

then add 2% formic acid (23 gins)

April 2 - pH 3.0

Leave in pickle about a week - pull and divide into 2 loads "G" and "H".

"G" load - tan with Relugan G 50 - 10%

"H" load - tan with Chrome - 10% of dry powder

"G" Procedure - 551 gms (Glutardialdehyde tannage)

April 6 -

Add 100% pickle float (551 ml)

10% Relugan G 50 (55.1 gins)

Relugan G 50 is a 50% concentration of glutardialdehyde.

April 17 - Add 2% Sodium bicarbonate (skin cross section is a brown colour throughout indicating complete penetration of G 50). .

April 21 - pH 5.0 - therefore dump and wash

Add 10% Dymsol S (a synthetic sulfonate sperm oil from Diamond Shamrock Co.) in 200% water at 130°F.

April 23 - Wash and dry at room temperature.

"H" Procedure - 594 gms stock (2 punches)

April 6 -

Add 100% pickle float at pH 3.0 (600 ml)

10% dry chrome (59.4 gins)

April 17 -

Add 2% (12 gins) Sodium bicarbonate

(green chrome completely penetrated)

April 21 - pH 4. - Dump and wash

Add 10% Dymsol S (60 gins)

200% float at 130°F

April 23 -

Wash then dry at room temperature

April 30 - Examine the dry leather - Both were almost soft enough but not quite Therefore wet back at 110"F.

Add to each 5% Dymsol S

to G - added 28 gms

to H - added 30 gms

both in 200% float
Let dry slowly
Hand stake over a metal bar
Examine

Pieces of both of these leathers are enclosed. The G process gives a yellowish brown colour which would be very desirable. The H process is green from the Chrome tannage. However, it is possible to dye either of these to a different colour but this would involve an additional process step. Neither sample has been water proofed but are strong, well tanned and would not deteriorate with repeated wettings and dryings. Raw sealskin fat could be rubbed into this leather to help repel water, but this would decrease low temperature flexibility. Other more effective water repellents are available.

The "G" and "H" leathers were stored in a freezer for a day at O°F. They still maintained their flexibility at this low temperature better than the oojuk sample you sent me.

On April 30, I talked to Kent Stewart of Mercer, Hickling and Johnston Inc. in Edmonton. He gave me a fresh approach to the Frobisher Bay potential of tanning and some of the problems involved.

So far throughout these experiments I have tried to develop a "do-it-yourself" tanning kit. As seen by the enclosed leathers this can be done. The idea was to make up a package with all of the materials and instructions to convert 1 sealskin into suitable leather. These packages could then be distributed to hunters where they could tan on site. Here are some of the disadvantages and advantages to this concept.

Disadvantages

1. Communications - To get a hunter to follow each step carefully and safely would be difficult. Instructions in many languages, pictures, etc. would have to be included to get the message across. Literacy is vital.

2. Expense - Enough material must be supplied to tan the largest skin. Considerable material would be wasted on smaller skins. Individual packaging is expensive.

3. Safety - Some of the chemicals are corrosive so rubber gloves etc. would have to be included in each package.

4. Equipment - All process containers such as plastic bags, gloves, individual chemical packaging and instructions would be needed in each kit.

5. Education - As a worker tans more he learns more. Little expertise would be developed using a single kit. Leather can be made this way but not the best.

6. Distribution - The sale and distribution of kits might be a merchandising problem because of distances and costs.

Advantages

1. The tannage can be done right on the site. So once a hunter learned how to do it, he could make leather wherever the seals were killed. Fresh skins c . . be processed thus eliminating the degradation caused by delay.

2. The tannage would occur soon after the kill so skins would not have time to rot or deteriorate. Raw skin and finished leather transportation would be eliminated.

3. Pollution - Because very few tannages would occur at any one location, there would never be an accumulation of tannery by-products. In a larger tannery the accumulated effluent might present a pollution problem.

4. A "do-it-yourself" tanning kit could be developed for hair on seal, reindeer, moose etc. so that the many skins, which now rot, could be salvaged and tanned. There is great potential.

5. The problem of having to soften by chewing could be eliminated because the flexibility would be permanently incorporated into the leather making process.

6. Kit tanning would make durable leather which would stand up better than the current Kamik bottoms.

Mr. Stewart mentioned the possibility that a small tannery could be set up in Frobisher Bay. All the seal skins in that area could be brought to the one tannery for processing at the same time that frozen seal and caribou meat is flown to the store. There are some disadvantages and benefits from this central tanning concept.

Disadvantages

Pollution - Mr. Stewart said that all "grey water" is collected and trucked

to an out of town lagoon for evaporation. This might be a prohibitive cost for a tannery.

Water - Tanneries are big water users. Mr. Stewart thought fresh water sold at 13¢ per gal. However a process can be developed to use some sea water, to recycle, etc. and thereby minimize the use of pure drinking water.

Skin Care - If a hunter knows he is going to make his own shoes from a seal which he has killed, he will look after that skin. He will be careful when flaying not to cut holes and ruin the skin. He will carefully scrape off all flesh. He will process at once so the skin will not rot. However if it is for sale he will do the minimum. I suspect that many unsatisfactory skins will arrive at the tannery. If the same skin was returned to the hunter this problem could be decreased. An educational program on the care and preparation of skins will be needed. Also a careful inspection of skins upon arrival at the tannery would be vital. Even in our sophisticated abattoirs and high technical tanneries here in SouthernCanada there is still many problems with poorly cured, rotten, butcher cut raw stock. The seal skin that was sent to me was about 60% wasted fat tissue and only 40% actual skin. The skins arriving at the tannery should be carefully trimmed and all surplus adipose tissue scraped off. The skins must be preserved by freezing, salting or drying otherwise they will rot quickly. The skins must be as carefully prepared and handled as those sold to the fur market.

Benefits

1. Expertise - The tanner or tanners involved will learn more and more and eventually make better leather. One set of instructions plus a few weeks of coaching would be enough education to start to make usable leather.

2. Equipment - One set of utensils, tan vats etc. would be enough. So equipment and packaging cost per skin would be less. The cost of some tanning machinery such as a drum or fleshing machine may be justified.

3. Efficiency - Ideally every day or so during the process, someone should mix or stir or add some ingredient. A "do-it-yourselfer" might find this demanding and inconvenient. A tanner could easily do this in a few minutes each day. He would probably process a number of skins at once and thereby save labour.

Generally this concept eliminates many of the disadvantages of the "do-it-yourself" kit such as communications, extra material expense, education, safety, multi-language instructions etc. Therefore I favour this. Certainly it is the best way to initiate the program and prove technical and economic feasibility. With this in mind here is what I would recommend. I should work out a complete process for the small tannery concept. If the average trimmed, fleshed oojuk weighs 15 lbs (my guess), we should be able to process about 5 skins in 1, 45 gal. barrel at one time, or the equivalent weight of caribou hides. The soaking and decreasing and liming could be done in clean discarded oil drums. They tell me that these are readily obtainable in your area. Much of the lime solution can be recycled so the pollution problems would be decreased considerably. In the tanning process now developed, formic acid was used to pickle because it was cheap and handy. I have since found a dry acid salt which works and is less corrosive and dangerous. Chrome tanning is used in most commercial leathers, but the green colour, the residual by-products and the pollution might prevent acceptance. So I suggest we use glutaraldehyde because it produces a tannage similar to the Indian smoke tannage and therefore the leather articles would sell as more authentic.

With the background knowledge we now have on this subject and using the remainder of that seal skin in my freezer, I believe the actual process could be worked out very quickly. If you want me to continue to develop this - just let me know.

1 copy

SHIVAS CONSULTING SERVICES

Tannery & Environmental Specialist

Stephen A.J. Shivas, B.S.A.
Tel. (70 S)726-7683

188 Anne St. N.
Barrie, Ontario
L4N 2C2

August 21, 1987

Mr. Larry Simpson,
Economic Development officer,
Government of the Northwest Territories,
Iqaluit, N.W.T. X0A0H0

Dear Larry:

Thank you for your letter of August 6, 1987. I have written to Chile to tell them we cannot sell any sealskins to them.

Enclosed is a treatise on Staking Equipment including 3 sketchs showing our idea for a hand-operated staker. A copy of this plus your letter are being forwarded to Mr. Kucmas. He is a busy man, so I suspect the first machin may not be built for a few months. But when Mr. Kucmas can estimate his time, I'll let you know. Once the prototype is completed, we can test it using pieces of leather which we already have. So it will not be necessary to send any sealskins at this time. If I see a potential problem with the machine injuring the hair, I may request a skin after the first trials here.

To make soft, well tanned leather in a small tannery in the Artic; more than a hand operated staking machine is needed. The tanning method needs more study. I still have some sealskin pieces in my freezer and will be glad to resume testing whenever funds are available.

Best regards,

Stephen

1 copy

SHIVAS CONSULTING SERVICES

Tannery & Environmental Specialist

Stephen A.J. Shivas, B.S. A.
Tel. *(70 S)726-7683*

188 Anne St. N.
Barrie, Ontario
L4N 2C2

Aug 21/87

Brief Treatise on Staking Equipment

Staking can be defined as the flexing of leather to separate the fibers sticking together and thereby create softness.

Historically many methods have been used some of which are listed below:

1. Stamping with your feet on crumpled skins does bend, flex and softens so it is a method of staking.
2. The chewing of ujuks by Inuits is another method of staking.
3. The Chileans used a "Suavizar" made from a tree crotch. Attached to the long end of the crotch was a stirrup so one foot could be used to force downwards. One end of the leather was anchored and the other end moved by hand. The side limb of the Suavizar would slide under foot pressure over the leather. This bent, stretched and softened the leather
4. Twisting and rubbing the hard areas of skins by hand is another method of softening.
5. The most common method was to slide the leather over a blade. The amount of staking could be controlled by the frequency of the stroke, the sharpness of the blade, the angle over the blade and the amount of pressure applied during the slide. The Inuits sit on one end of the skin and slide a Tasibo blade over the remainder to soften. In any Canadian

tanners used to use a verticle blade by holding the leather with their knee and forcing the leather to slide over the blade by hand. This was called "Knee staking". Some fur skins are still hand staked over a verticle blade.

6. The arm graining board was used to produce a special grain effect on leather but it also softened. This instrument was a curved board covered with cork. The operator put his arm through a loop at one end of the board and held a grip on the other. The skin was folded on the table and the graining board creased the leather. This crease was pressed along the leather in a rolling action. This sharp bending softened the leather.

7. Until about 1965 the Slocum staker was the standard method. The operator clamped one end of the leather The Slocum's jaws grabbed the remaining leather and pulled it over blades using controlled pressur This is still considered one of the best methods since a good operator can be selective in the area and amount softened.

8. In the 1970's the Mollesa became the standard tannery staker. I shall describe this machine more extensively because the Kucmas rotating peg staker is a new concept based on the Mollesa principle.

With Mollesa staking the leather is fed between 2 continuous plastic aprons or belts. These aprons carr the leather into the machine where a series of pegs "goose it" from both sides. The leather feeds out the other end of the machine having been prodded by many pegs. Each peg stretched the leather in that area This stretch caused the fibers to become unstuck

and slip over each other and thereby make softer leather. The new Italian version of the Mollisa is a massive machine with these dimensions

Width = 1600 mm
Weight = 4100 Kg.
2 motors = 12.5 H.P. and 1 H.P.

It has about 350 pegs
The principle is shown on sketch #1.

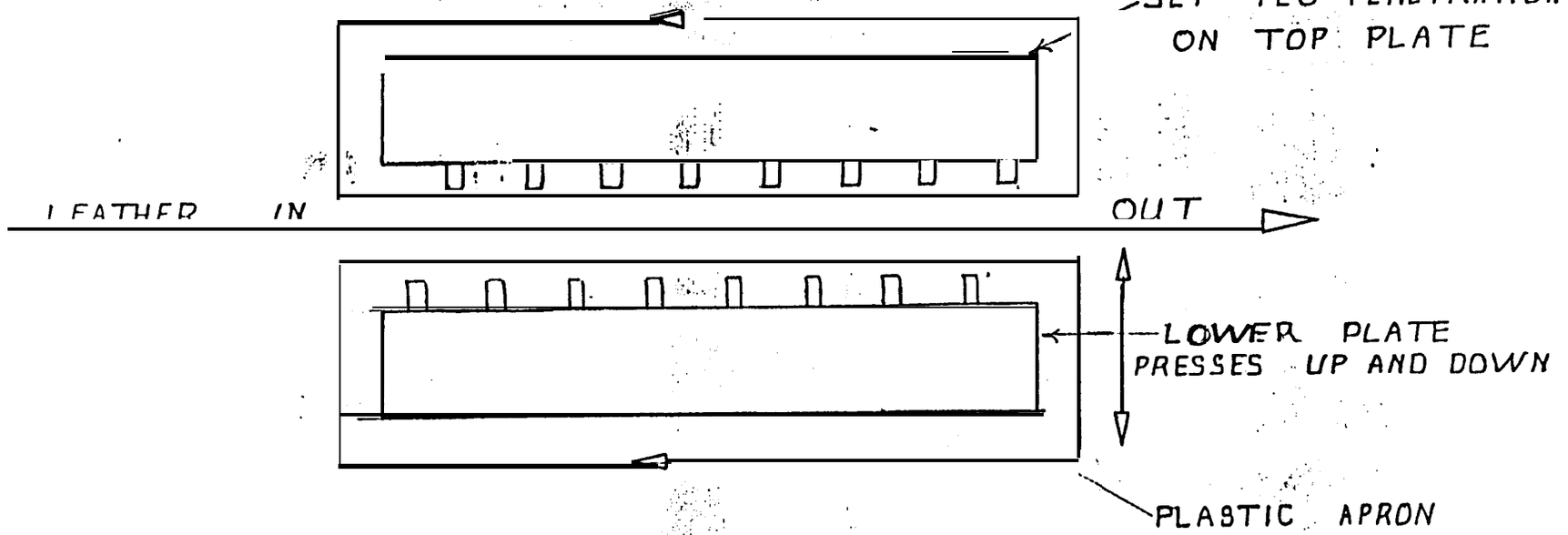
It is interesting to note that methods 1, 2, 4 and 5 are presently used by the Inuits to soften sealskins. To soften enough sealskin to make 1 pair of Kamiks requires about 7 hours of labour.

Sketchs #2 and #3 show the principle of the Kuema rotating peg staker. The leather will be fed in from the left (sketch 3) and out the right and will be subjected to peg pressure like the Mollesa. If the skin is wider than the machine, it can be fed double with the fold in the space to the left of the rollers (sketch 2)

If more data is needed let me know

L.J.

MOLLESA STAKER



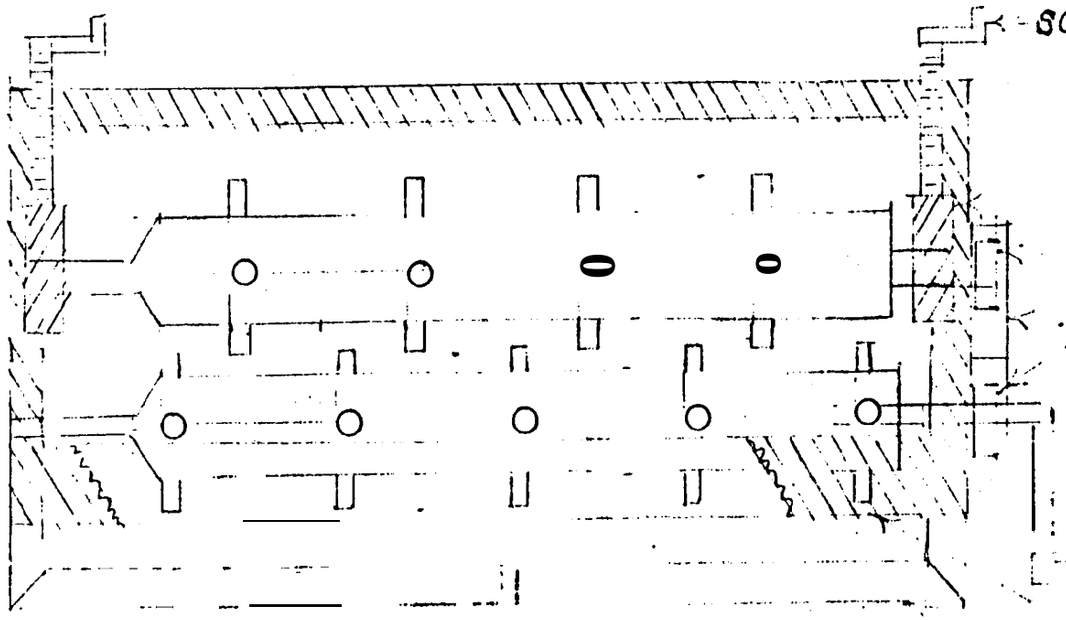
SKETCH #

SHIVAS CONSULTING SERVICES
188 ANNE ST. N.
BARRIE, ONT. L4N 2C2

NOT TO SCALE

JULY 22 1987

KUCMAS ROTATING PEG. STAKER



FRONT VIEW

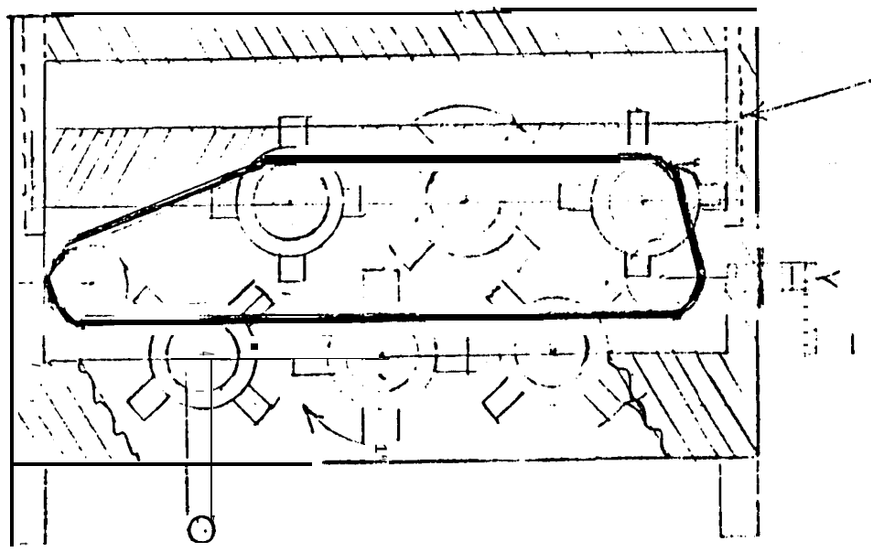
SHIVAS CONSULTING SERVICES
188 ANNE ST. N.
BARRIE, ONT. L4N 2C2

SKETCH # 2

NOT TO SCALE

JULY 22 1987

KUCMAS ROTATING PEG STAKER



UPPER FRAME SLIDES

CHA N

T GHTEN CHA N

½ INCH O.D. PEGS

SIDE VI W

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BARRIE, ONT. LAN 2C2

SKETCH # 3

NOT TO SCALE

JULY 22 1987

SHIVAS CONSULTING SERVICES

Tannery & Environmental Specialist

Stephen A.J.Shivas,B.S.A.
Tel. (705)726-7683

188 Anne St. N.
Barrie, Ontario
L4N 2C2

Progress Report on Seal Tanning

by

S. A. J. Shivas

December, 1987

This is a progress report on a small scale sealskin tanning. Included are data on these item

Item 1 - Seal brains as a tanning agent or a fatliquor emulsifier

Item 2 - Seal oil as a leather lubricant

Item 3 - The Huestis process

Item 4 - The Huestis process plus chrome

Item 5 - The Shivas tannage

Item 1. Seal brains

The ancient, traditional, native tannage for doeskin was to rub deer brains on the skin. I can find nothing in the literature to prove the value of brains in making leather, although there is a quotation that "each deer has enough brains to tan its own skin". Assuming seal brains are chemically similar to deer brains, I have requested and received some seal brains from Michelle Lavigne of Broughton Island. These seal brains were kept frozen, then sampled periodically for trials to solve these questions:

Trial A. Do brains really tan?

Trial B. Do brains contain an emulsifying ingredient to help disperse fats and thereby soften skins?

The results are reported below.

Trial A. A sample of dehaired cowhide was cut in half. One half was untreated. The other half was rubbed with seal brains. Both were stored cool for 5 days then given a shrinkage test.

Note: Throughout this report, I will use the shrinkage test as a criteria of tannage. The higher the shrinkage temperature the better the tannage.

The untreated stock shrank at 138°F and the treated at 140°F, so the brains did not significantly tan these limed cowhides. The above process was repeated on pickled cowhide and

again I got no significant tannage.

Trial B:- Will brains emulsify fats?

To study this, some test tube experiments were run From this it was learned that brains do have some slight fat dispersing effect but this was minimal.

Therefore I can detect little advantage to using seal brains. Please forward this data to Michelle Lavigne and thank her for her assistance in obtaining the brains.

Item 2. - Seal Oil as a Lubricant

Leather requires oil to lubricate its fibres and thereby create softness and strength. This is normally done with fat liquors. Fat liquors are now made from all sorts of oils such as: fish oils such as cod, sperm whale oil, neatsfoot oil, synthetic oils, mineral oils etc. Could seal oil be rendered from seal fats and used in a fat liquor? To study this Table I shows the properties of some of these oils.

Table I

Oils	Seal	Cod	Sperm	Neatsfoot
Specific Gravity	.915-.926	.922-.931	.878-.884	.913-.918
Solidification point °C	20-22*	-10-20	15.5	+10-2
Iodine value	103-117	111-128	80-84	525-25

*I wouldn't argue with Langes Handbook of Chemistry which is the source of this data but the oils I rendered off seal blubber remained liquid at well below room temperature. Anyway the point I wish to make is that seal oil can indeed be used in leather fat liquors and if it could be collected and rendered in quantity there is a potential market for this.

With this in mind I made up a fat liquor emulsion as follows:

Seal oil* - 100 gms
Emulsifier** - 4 gms
Water 100 gms

*. The seal oil was obtained by scraping the flesh off a harp seal, boiling the small pieces in water and filtering and

salvaging the liquids. The oil floated to the top and wa skimmed off to separate it from the water phase.
** As an emulsifier I used Sunlight Household detergen
This fatliquor is referred to as "Seal F.L" in subsequen "ses. It proved to be an excellent leather lubricant with -hese disadvantages:

1. It dries yellow so could not be used on white or pastel leathers.
2. It smells like fish. This can be reduced by washing the final leather and it would then be satisfactory fo shoe leather but not for garments or high quality parka leather chemists can however almost eliminate this problem by adding antioxidants etc.
3. When fish oils are put on skins they react to form a chamois type of leather. Since seal oil has an iodine number very similar to fish (cod) oil it would have this property and tend to make this type of leather.

Item 3 - Hnestis Process

The Hnestis process was obtained from a formula supplied by the Vertebrate Zoology Division of the B.C museum. The raw material used for these tests were cuttings of ringed sealskins. These cuttings were untann pieces left over from Kamik production from the Tuinnguq Sewing Group of Broughton Island, which I received on my visit in December 1986.

To make a valid comparison 3 cuttings were used nd identified with 1, 2 and 3 small punch holes. Each o these cuttings was cut into 3 pieces and identified with 1, 2 and arge punch holes. Table II shows the various treatments and the weights of the samples.

Table II - Dry Weights

^ ttings		1	2	3	Total Weight	Treatment
small punches		1	2	3		
	Big Punch					
Treatment A	0	retained sample				none
: ratment B	1	16.9g	21.8g	30.2g	69g	Hunestis
Treatment C	2	12.1g	18.4g	26.5g	57g	Hunestis plus innovati
T tal of B+C		29	40.2g	56.7g	126g.	

The total weight of the B+C treated samples was 126 gms. dr
. about 250 gms wrung wet weight. Treatments are based
on the wrung wet weight (= 2x dry weight)

Process

All the B and C treatments were wet back and soaked
+ gether as follows: Water 70°F - 700% = 1750 ml.
(ommercial laundry detergent (ABC from Colgate Palmolive Can) 0.4 oz per
gal = 4.4 gms. The samples were left in this soak water
ernight to wet back Nov. 7, 1987 to Nov. 8, 1987. On Nov. 8. all
were removed, slicked out to remove excess water and
eighed to give an accurate wrung wet weight. This weigh
would be very similar to the raw fleshed skin weight
oon after flaying.

Treatment B. (Hunestis Process)

Wrung weight = 138 gms

Formula	Ratio	Amount used	
Water	1 gal at 70°%	966 ml.	
Salt	8 oz	48 gms	XX
Alum	5 oz	30 gms	
¥ Carbolic Acid	1 tsp (4.7 ml)	1 gm	

. This was added as 20 ml of a 5.0% solution
x This solution had a specific gravity of 1.040
(Salometer = 21°) When skins are exposed to acids and
the Salometer is less than 23° there is swelling. Excessive
acid swelling can ruin a skin. Therefore the above
solution is a borderline case of being deficient in salt.
On November 9 the pH was 3.0. On November 17 the
the shrinkage temperature was 135°F indicating little

or no true tannage, The Huestis formula called for a Soda ash neutralization. I had none so used the milder Sodium bicarbonate using a 1% solution instead of 0.5%. I added 966 ml. of 1% solution or 9.66 gms to raise the pH to 7.5.

As per the formula I washed the cuttings several times in clean water, allowed them to hang for 12 hours, while covered with plastic to prevent drying. On Nov. 18. they were placed in this solution.

Material	Formula Ratio		
Water 70°F	1 gal.	700% =	966 ml.
Salt	8 oz.		48 grams
Acetic acid *	1 oz.		6 grams
Carbolic acid	1 tsp.		1 gram (20 ml. of 5% solution)

* I had no lactic acid so had to substitute vinegar (acetic acid.) The samples laid in this solution Nov. 18-23. Actually I can see little use for this "lactic acid soak" step but tried to follow the recommended process anyway.

On Nov. 23 the solution pH was 5.5. The shrinkage temperatures were all less than 140°F indicating little or no true tannage. The samples were allowed to drain overnight, after one rinse to remove the excess salt. The flesh was oiled using Dymsol 5 which is a highly penetrating, sperm oil substitute, sulfonated fat liquor. The fat liquor mix was applied to the flesh side using a 50:50 mix of warm soft water and Dymsol 5.

Sample (small punch)	Wrung weight in grams	% added	Amount of mix added
1	38.8	10	3.4
2	42.8	15	6.4
3	60.4	10	6.1

They were covered with plastic and allowed to lay overnight. Next day they were hung to dry and compared to Treatments A and C.

Item 4. The Huestis Process Plus Chrome

Treatment C (with 2 big punches) was treated as follows:
% 's based on wrung weight = 114 gms.

	Ratio	Amounts Used
Water at 70°F	1 gal (700%)	800 ml.
Salt	12 oz / gal	60 grams
Alum	2½ oz / gal	12.5 grams
Nitre cake	1% on wet weight	1.2 grams

The specific gravity = 1.053 (Salometer 26) which is ideal. On Nov. 7 the pH was 2.0
On Nov. 9 the pH was 3.5 so 1% Nitre cake was added (1.2 gr to give a pH of 2.0.
Nov. 10 the pH was 3.0. Add 2% chrome powder (2.4 grams Stir each day for a week.
Nov. 17. The Shrinkage temp = 172°F pH = 3.0.
Add 2% Sodium bicarbonate as a 2% solution in 3 fees 1 hour apart. This gave a pH of 3.8 in 30 minutes after the last feed.
Nov. 18. - Drain, refloat, add 2% ammonia in 800 ml. water. Rest overnight.
Nov. 19. pH 5.0 - slick out surplus water. Paint flesh with Seal F.L. Oil. Apply the 20% Seal F.L. as follows ie. to 114 gms wet hide add 22.8 ml. of F.L. Lay overnight Covered then dry.
Nov. 23. The shrinkage temperatures were
1st punch - 210° 2nd punches 190° 3, 5 small punches 202°
This shows a fairly good tannage. The dried leather was very soft and flexible, but smelled like fish oil

Item 5 - Shivas Tannage

Nov. 17. - A preliminary trial was run using ringed seal Kamik cuttings.
Presoak 64 gms wet weight (wrung)
Soak in salt and acid at pH 1 - Lay overnight
Add 10% chrome powder 6.4 gms Lay a week.
Add Sodium bicarbonate to raise the pH to 3.5 - Wash.

Add 2% ammonia (1¼ grams) 700% water
Lay over night – slick out.
Fat liquor on flesh with 20% Seal F.L.
Lay over night wet under plastic – Dry and test.
Nov. 23 · Shrinkage temperature = 210°F
= a soft, well tanned piece of leather with no excessive green colour on hair

The leathers produced in Items 3, 4 and 5 have been evaluated and compared with these results.

The softness of the leathers has been rated numerically and is shown in Table III.

1 – means perfect softness for garments.
3 – is as firm as it can be and still be acceptable for shoes
5 – means extremely hard and unsatisfactory.

Table III – Softness Rating

Item	Treatment	Small Punch 1	Small Punch 2	Small Punch 3	Punch 5
1	None	5	2	2	
3	Huestis	4	1	3	
4	Huestis + Innovations	4-2	1	1	
5	Shivas	1			2

Conclusions: All pieces of Cutting #1 (small punch #1) were hard, no matter what treatment they received. On the Huest tannage 1 and 3 punches were hard but #2 soft. #2 contained 15% fat liquor whereas 1 and 3 had only 10%. Punches 2 and 3 of Item 4 and 5 punches of Item 5 had satisfactory softness. All of these were fat liquored with Seal F.L., which shows the excellent softness that this oil produces when the leather is well tanned.

The smell of the leather has been rated numerically as follows:

1. means it smells all right for garment leather.
3. smells as bad as it could and still be used for garments.
4. Smells as bad as it could and still be used in foot wear.
5. It really stinks too much to use.

The results are shown on Table IV

Table IV Smell Rating

Item	Treatment	Punch 1	Punch 2	Punch 3	Punch 5
	none	3	3	3	
3	Huestis	3	3	3	
4	Huestis T Innovations	5	5	5	
5	Shwas				5

Conclusions from Odour Rating Tests

Those leathers fat liquored with seal oil smell very fishy and too potent to be used as is. All the other leathers also smelled too much. This could have been caused by a number of factors:

2. all samples were stored together and thereby odours may have been transferred.
3. Maybe the cuttings had not been degreased completely and some residual seal fat caused the smell.
4. Some of the materials added in the process may have added odour.

All of these leathers will be washed in soap to see if this odour can be reduced to a satisfactory level.

The colour was examined on both the flesh and hair side with the results shown in Table V

Table V - Colour Comparison on Flesh

Item	Treatment	Punch 1	Punch 2	Punch 3	Punch 5
	None	Yellow	Yellow	Orange	
3	Huestis	More yellow	Pale yellow	pale yellow	
4	Huestas + Innovations	Green	Yellow green	yellow green	
5	Shwas				very green

Colour Comparison on Hair Side

	None	Grey	Grey	Pale	
3	Huestis	Grey	Grey	Yellow	
4	Huestis + Innovation	Grey	More silvery	More Yellow	
5	Shwas				Silver grey

Conclusions from Colour Comparisons

The added chrome in Items 4 and 5 did give a greenish cast to the flesh but this should be no problem. The colour of the hair side is the only valid consideration. One significant factor on Item 4 and 5 (with Seal F.L.) was a more shiney oily hair. In some cases the hair is more yellowish which would be undesirable.

All of these leathers were tested for shrinkage temperature I raised the temperature in 10°F intervals so the shrinkage readings are slightly higher than the actual leather shrinkage. These readings are shown in Table VI.

Table VI Shrinkage Readings in °F

Item	Treatment	Punch 1	Punch 2	Punch 3	Punch 5
ntrol	None	150	140	150	
3	Huestis	150	150	160	
4	Huestis + Innovation	200	170	200	
5	Shwas				210

nclusions: The Huestis tannage is tanned entirely with Alum. Alum does not produce very little if any true tanna so shown by the very low shrinkage temperatures. Items 4 and 5 (with chrome) were much better tanned as shown by their

higher shrinkage temperatures. This is very significant because it not only indicates heat resistance, but many of the other properties associated with well tanned leather such as water resistance, resistance to bacterial decomposition, chemical resistance, better aging, better retension of softness etc.

In order to answer these 2 questions, all 10 pieces were wet back overnight with a little detergent.

1. Is the alum in the Huestis process water soluble which would permit the leather to revert to raw hide after soaking
2. The Seal F L treated samples smelled very bad. Can this stink be removed?

After the 10 samples were wet back overnight, they were rinsed a few times and dried at room temperatures. The leathers were examined for these properties.

1. Shrinkage temperature loss in (Table 7)
2. Smell before and after the wash (Table 8)
3. Softness before and after the wash (Table 9)

In each case the "after wash" reading is shown without brackets. The difference from "before wash" is shown in brackets

Table VII Shrinkage in °F with Difference in Brackets

Item	Treatment	Punch 1	Punch 2	Punch 3	Punch 5
	None	150 (0)	140 (0)	150 (0)	
3	Huestis	140 (-10)	132 (-18)	150 (-10)	
4	Huestis + Innovations	200 (0)	190 (+20)	190 (-10)	
5	Shivas				200 (-10)

see notice over page

Table VIII Smell Rating Compared with Table IV

Item	Treatment	Punch 1	Punch 2	Punch 3	Punch 5
	None	2 / -1	2 / -1	2 / -1	
3	Huestis	2 / -1	3 / 0	2 / -1	
4	Huestis + Innovations	2 / -3	4 / -1	5 / 0	
5	Shivas				5 / 0

The top numbers are the test results after the wash
The differences from those in Table IV Before Wash are the lower numbers.

Note:

Generally the Questis process lost tanning properties and those with chrome maintained a good tannage.

Conclusions from the Smell Test (Table IV vs VIII.
The wet back and wash did remove some of the odour But those pieces treated with seal oil retained too much smell to be used. The Dymsol S used on the Huestis leather would be O.K. for our purpose provided a good degreasing had been done previously.

Table IX Softness Rating after Wash Dry and Hand Stake

Compare with Table III for the Original Softness

Item	Treatment	Punch 1	Punch 2	Punch 3	Punch 5⁻
	None	5⁻ (0)	3 (+1)	3 (+1)	
3	Huestis	4 (0)	3 (+1)	4 (+1)	
4	Huestis Innovations	4 (0)	2 (+1)	2 (+1)	
5⁻	Chrome Tanned				2 (0)

Conclusions: All the Punch 1 samples are still hard. I suspect this was something in the original skin and its curing. Most samples firm up a little when some of their oil is washed out as shown by the (+1). Items 4 and 5⁻ are the most consistently soft and retain that softness.
During all of this processing the fur on most samples became more felted with a fuzzy woolly look. In order to see if this can be improved, a piece of 5⁻ punch skin was soaked in weak formalin solution overnight, then dried and examined. To identify it, it was given 5 big punches.
After drying the hair had a more desirable feel and appearance. And in addition, the odour from the sea L. had decreased considerably. In fact I would say this piece of leather would be an excellent, commercially acceptable fur.
All of these cuttings are available for your examination.

THE FEASIBILITY OF A TANNERY ON BAFFIN ISLAND

The report is based on a visit by Stephen Shivas to Frobisher Bay Dec. 1 to Dec. 8, 1986 and Broughton Island Dec. 8 to Dec. 12, 1986.

This project has been sponsored by C.E.S.O. as Project T-55006

CESO Address
Suite 2000
415 Yonge Street
Toronto, Ontario
M5B 2E7

S. Shivas Address
188 Anne Street North
Barrie, Ontario
L4N 2C2

THE FEASIBILITY OF A TANNERY ON BAFFIN ISLAND

SUMMARY

The Baffin Region of the N.W.T. produces many seal and caribou skins. At present much of this resource is wasted. This report covers the following possibilities to use this resource more fully:

1. To collect these skins, partly process them, then ship them to a tannery in Southern Canada for tanning.

2. To build a tannery near the supply of raw skins so that local crafts industry can expand their markets. For such a tannery only 2 sites were studies in detail: Frobisher Bay* and Broughton Island.

This report covers some of the advantages and disadvantages of these possibilities. It includes data on the economics involved as well as some tanning technology.

METHODOLOGY AND SCOPE

A literature survey was made. This includes books on tanning, previous surveys, pamphlets from Larry Simpson etc. All this literature is itemized in Supplement A of this report. When this report quotes any of these references it shows as “ref. 1 - 2 - 3 etc.” in brackets. The references are in no special order.

Interviews were conducted with many people. A partial list of people talked to is found in Supplement B. The minutes of some of the more salient meetings are included as Supplement C. Using literature, interviews and personal observations the following were studied and are reported under six items.

Section 1 - To control the scope of this report a number of limitations were established.

Section 2 - An estimate of the supply, distribution and value of seal and caribou skins.

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* Note: In 1987 the name "Frobisher Bay” will be changed to "Igaluit"

Section 3 - An estimate of the market for tanned skins with both fur on and as grain leather along with some present costs.

Section 4 - A simple process for tanning with and without hair on along with the chemicals and equipment needed.

Section 5 - An analysis of location factors

Section 6 - Potential locations

Section 7 - Supplement A - References

Supplement B - People interviewed

Supplement C - Minutes of meetings with

1) Larry Simpson

2) Howard **Madill**

Supplement D - Some **Inuktitut** useful words

SECTION 1 - SCOPE

In this feasibility study some parameters were needed to limit the scope namely:

la) Only 2 locations were considered namely Frobisher Bay and Broughton Island. Pangnirtung is given only perfunctory mention. Frobisher Bay was chosen because it is the centre for Baffin region of transportation, culture, government, tourist trade, shopping, etc. Besides the Parka Shop has room available for a tannery. Broughton Island is the centre of the sealing industry. Besides it has a talented nucleus of craft-oriented sewers called "The Minnguq Sewers. Group". Miss Katherine Trumper suggested these 2 groups could join together: Broughton Island to manufacture and the Parka Shop to merchandise and sell to the tourists.

lb) The skins of only 2 animals were considered namely seal and caribou. Only these 2 have the possibility to reach economic proportions for a local tannery in the immediate future.

lc) The third limiting question is: should they tan "fur on" or "fur off"? Any skins tanned locally would be for use by the local craft and garment trade. This trade is mostly interested in a "fur on" tannage.

Therefore the scope of this report will concentrate mostly on a fur tannage.

At present some grain leathers, splits, suedes, etc. are brought in for uses such as heel reinforcements for duffle Kamik liners etc. So far little development has been done to use grain leathers from caribou and seal skins to make handbags, mitten palms, moccasins, belts, purse straps etc. There is considerable potential here.

Another reason that grain leathers should be tanned locally is that considerable amounts are now used already to make black or white, water-proof Kamik uppers. The unhairing to make these products require

considerable skill and labour. It can be done readily by chemical means.

Another big use of grain leather is to convert ujuks into Kamik soles. Traditionally these have been chewed to prepare them for sewing. This is a demanding and laborious process which is becoming unappealing to the young generation of Kamik makers. In order to assure continuity and to increase production a new method of making ujuk soles is needed. Such a method would save the wear and tear on these women's teeth. With five thousand dollars for development, a good leather chemist should be able to work out most of the "details for a suitable process which would be safe to use locally.

At present the use of untanned kamiks in southern Canada is minimal because they rot under their humid conditions. Tanning these skins would open this market to the northern craft and garment industry.

A tannery catering only to local craft utilization will leave a big surplus of raw skins. If these skins are to be salvaged and shipped south, they must be prepared properly. It would be a complete waste to ship skins to a tannery such as the one in Cobourg, Ontario unless the takeoff, trim, fleshing and cure were adequate. A write up is included about this potential.

1d) In order to limit the scope of this report to practical realities only 2 tanneries are considered in detail:

a) a 10 skins per week tannery at Broughton Island

b) a 30 skin per week tannery at Frobisher Bay.

1e) This report does not study the methods of financing the capital expenditures and initial research for such a tannery. No doubt some Government grants are available for such a worthy project.

1f) The scope of this report is limited by the lack of valid marketing data. A market survey to obtain data of potential sales is essential. A quantity of ringed seal, raw furs should be shipped to a large tannery

which specializes in seal processing. Then return the tanned skins north to make various products. From this learn the sales volume and prices and articles in demand - then build the tannery to satisfy this market. From this you would learn the quantities needed, the softness of the tannage, the uses, the tannery size etc. I would think such a market survey would be the "first step" in deciding if a tannery is feasible. My interview with Craig Hall supports this idea.

lg) Any northern studies are limited to anyone who only speaks English. An "English-Inuktitut dictionary would aid communications considerably. I have written to Language Bureau
Dept. of Culture and Communications
Gov. of N.W.T.
Yellowknife
to promote this need. Many tourists and workers would buy such a book.

SECTION 2a - SKIN SUPPLY

Seals:

The most common seal in the Canadian Arctic is the ringed seal. The 1986 estimate of their population was about 1 million (ref. 27). But the number harvested is a better indication of availability. Tab 1 e I (ref. 16) shows the trends in sealskin sales from 1978 to 1983 on Baffin Island. The table shows the number of sealskins harvested, their dollar value and the percentage change from the previous year. Starting in 1981 the value of this harvest has been greatly reduced because of the efforts of Greenpeace.

Apparently the main aim of Greenpeace is to make money for itself under the guise of animal rights (ref. 22). Greenpeace has caused an economic plague to the seal hunters. Since the Greenpeace campaign, the value of skins has decreased continuously creating much hardship for seal hunters. Tanning these skins would increase their value and help alleviate this hardship. Of course the main purpose of hunting seals still is to supply edible food. Table II gives some idea of just how important this food is to the native diet.

TABLE II

Estimate of seal and caribou harvest for Broughton Island and Padloping. This data is taken from ref. 11 Table 66 for one year - 1965-66.

Animal	lbs of edible food	lbs per capita
Ringed Seals	268,600	1,014
Harpseals	1,360	5
Bearded Seals	3,660	14
Caribou	4,990	18

The supply of sealskins does fluctuate considerably over the year as shown in Figure 1 taken from ref. 11 figure 22. But even the minimum month of April could supply 120 sealskins in the Broughton Island area which would be more than adequate for any local tannery.

This potential production is so high that one should investigate their collection and shipping south for tanning into grain leather. This is covered later in the report. Certainly for any tannery planned in this area there is a year round adequate supply of sealskins.

Caribou Supply:

Of all the types of caribou found in the Canadian Arctic only the Barren ground caribou is prevalent on Baffin Island. In Canada there are about 680,000 of this type (ref. 24).

There are not many caribou in the Broughton Island area nor in the northern parts of the Cumberland Peninsula. Some are found in the Home Bay to Clyde River area but they seem to prefer the southern and western parts of Baffin Island. These numbers were reported in the Pangnirtung area (ref. 11)

1962-63	- 425
1963-64	- 450
1964-65	-1,200
1965-66	- 600

Most indicators show that the herds are extending their range into the eastern part of the Island. In any case I do not believe their numbers justify being included in tannery plans at present. But their particular value to make insulated garments is so unique that this resource should be studied more fully.

Sealfur is not nearly as good an insulator as caribou (ref. 11 p. 112). Garment-insulation is expressed in "CLO" units. A CLO unit equals the amount of insulation provided by the clothing a man usually wears at room temperature. It requires only 1½ inches of caribou fur to produce 7 CLO units of insulation. It requires 2½ inches to produce 2½ CLO units with seal skin. For tannery purposes the sealskin aesthetics and durability are of more concern than its insulating properties. But caribou fur is a superb insulator and this should

be exploited economically.

Since the average ringed seal's live weight is about 100 lbs (ref. 11) and that of the caribou is 150 lbs one can roughly transpose tannery data from sealskin production to caribou production by inserting a factor of $\frac{150}{100} = 1.5$. Subsequent tannery calculations are based on ringed seal skins. Since this is going to be the basis of calculation some further data is in order. See Table III for the animal and skin sizes. Not included in this table are "Silver Jars".

Silver Jars are young ringed seals up to about 3 months old. These are particularly prized because of their silver colour. As the animal gets older the silver shade turns more yellow and is less desirable aesthetically. From a cutting and durability standpoint skins from seals 6 months to a year "old are ideal for Kamik uppers.

SECTION 2b - SKIN VALUE

Before a tannery is built it is wise to study competitor's prices. Here are some prices charged in Frobisher Bay.

At the Amarok HTA Store:

Harp seals - from Arktis, Greenland, about 14 square feet per skin each $290 to $300.

At Arctic Ventures Ltd.:

Ladies' sealskin parkas hip length, satin lining, zipper front, nicely styled $999 to $1,599
made in Arktis, Greenland

Hair on caribou, made in Narssage, Greenland - 1 skin = $169.
These reindeer were almost 30 ft^2 in area.

All of the above are imported from Greenland so must pay 22½% duty.

The Parka Shop buys sealskins from Trans Canada Arctic. Fur which is tanned by RVM process - each skin =$60.

In 1968 a Winnipeg tannery charged $5.00 per skin to custom

tan a sealskin. Another tanner, Halford Hide and Leather Co. Ltd., 10529 - 105 Avenue, Edmonton, Alta. T5H 3X7 now charges $13.00 per square foot to tan or about $80.00 for a ringed seal. This price is excessive.

If any of the above prices and quality could be maintained for volume business a local tannery would be profitable. But, to be realistic, a tannery here must cater to local crafts and the tourist trade. Nevertheless, Greenland furs and garments are now sold in our fur hanresting 'area. This does not flatter Canadian entrepreneurship. Surely we can tan and sell our skins and products as well as the Dane's can. Earl Lailiberte of Nanasi Corp., 230 Albert St. Ottawa, Ont. K1P 5B8 wants to buy seal leather in bulk quantities.

RAWSKIN PRICES

All skins purchased received a $5.00 per skin subsidy or hunters' incentive from the Government of the N.W.T. The following prices are those paid by the purchaser and do not include this subsidy. Larry Simpson felt the minimum which one could expect to buy a seal-skin is $10.00 with $15.00 being more realistic. Here are the guesses of what it would cost for skins in the Frobisher Bay area.

	Minimum	Probable
Ring seals	$10.00	$15.00
Harp seals	$20.00	$25.00
Caribou	$30.00	$35.00

If skins had to be flown in to Frobisher Bay it would cost another $5.00 per skin to collect and deliver the skins.

One vital consideration in the above rate is quality. A poorly flayed, butcher cut, half rotten, hair slipped skin is worthless. To promote quality a bonus for quality should be paid by an inspector. For example, for a ringed seal a price differential such as this could be used:

Average size, well processed - $15
not fleshed - $10
badly butcher cut - $5 less
rotten and hair slipped - not acceptable

Here are the prices currently paid by the Minngaq Sewing Group of Broughton Island:

regular ringed sealskins with good flaying, well scraped, flipper holes sewn, stretched and dried - $8 per skin

- if lower quality $6 per skin

ujuks (full size bearded sealskins) untreated - $70 per skin.

These are very low prices when you consider that in 1979 a ringed seal broughta hunter $15. Even if you consider the skin as a no value by product, an $8 per skin price is very little to pay for all the work of preparing this skin for market. To purchase any volume of sealskins at least $10 should be the minimum price. I have no data to substantiate this, but think one of these skilled women 'could flay a seal, flesh it with an ulu, trim it, wash it, sew up the flipper holes, then lace it to the stretching frame all in 2 or 3 hours. At $8 per skin delivered this is scarcely paying a minimum wage.

Instead of buying bearded sealskins the Minnguq Sewing Group can purchase precut adult soles unchewed for $20 per pair. The cost of producing these at the Group plant is:

1½ days for 2 women to flesh, dehair and stretch =

3 x 6 hours x $5	=	labour	= $90
cost of 1 raw skin			= $70
Total			= $160

1 ujuk skin can be cut into 8 adult pairs of soles, so the cost per pair is 160 = $20 which is the same as the price paid for prepared soles. However, the Group is usually able to cut a pair or two of child's ujuks from the scrap edges. None of the above prices includes chewing.

Table IV shows the skin requirements to make various articles.

TABLE IV

Ringed seal requirements for each article and the number produced in November, 1986 by the Minnguq Sewing Group.

Article	Skins Required			Articles Produced		
	Adult	Youth	Infant	Adult	Youth	Infant
Pairs of **Kamiks** *	1	2/3	1/2	6	2	7
Pairs of Mitts	2/3	1/2		2		
Pairs of Slippers	1/2	3/8	1/4	3	2	
	Large	Medium	Small	Large	Medium	Small
Penguin	1/2	3/8	1/4	2		2
Ookpiks	1/2	3/8	1/4	4	2	2
Mice			1/5			2

* These ringed sealskin requirements for **Kamiks** include only the fur-uppers or water proof uppers. In addition there are the skin requirements for soles. The **Kamik** soles are made from bearded seals (**ujuks**). One adult (size 10) **ujuk** sole is an oval 18 inches by 9½ inches. An average bearded seal hide is 91 inches long and 66 inches at its greatest dimensions. This equals about 30 square feet.

The soles are cut "with the grain" so that the residual hair bristles point backwards to give maximum friction when walking. For ease of handling each hide is cut in half widthwise to give a **squarish** pattern. This lateral bisecting reduces the number of soles per hide. There is much more waste than if it could be processed whole. If **ujuk** leather soles could be produced chemically and mechanically rather than by the present traditional method, I would recommend the use of larger drying frames and not bisecting the hide. At present production at Broughton Island one full **ujuk** hide lasts about 1 month.

SECTION 3 - MARKET FOR TANNED PRODUCTS

Section f under limiting parameters discusses the need for a market survey before proceeding with a tannery. Table V gives a list of some of my ideas which could be made in a local craft shop. Those requiring fur on are marked "F". Those made of grain leather are marked "G".

TABLE V

Sealskin Pants	F
Briefcase	F and G
Cushion	F and G
Footrest (Hassock)	F and G
Change Purse	F and G
Wall Hangings	F and G
Bar Stool Cover	F
Belts	F and G
Leg Warmers	F
Wrist Warmers	F
Hunter's Parkas	F
Gauntlets	F and G on palm
Mittens	F and G on palm
Coasters	F
Doiley	F
Zipper Grips	F or G
Table Centre Piece	F
Kamiks	F and G

Table VI shows the present prices of most of the articles sold by the Minnguq Sewing Group. These prices will be going up 5 or 10% in January, 1987.

In December 1986 two vital things will be happening to increase efficiency at the Group, namely: Mervyn Souder of CESO arrives Dec. 17. His expertise on sewing and shoe construction will improve productivity. Also The Group soon will be putting into operation its 6

new sewing machines. Up until now all work was done by hand. These machines were made by Juki, a Division of Benz Sewing Machine Ltd. Toronto. Two are heavy duty, 4 can be used for duffle and larger pieces. It will require considerable training to teach the lady sewers to use these machines. But they do have good manual dexterity. Due to the above reasons production of Kamiks should at least double very soon at Broughton Island. But 6 sewing machines seems more than necessary for present production forecasts. But the Group costs are about $8100 per month. Receipts per month are $2500 approximately so the loss per month is $5600.

The operation needs to be subsidized to exist. I have not tried to calculate just how high production must be in order for the Group to pay its way. Of course this dollar data does not take into account the great social and local economic benefit that this Group brings to Broughton Island.

Bonnie Plaunt, Manager of the Parks Shop in Frobisher Bay was unable to give me any "calculated guesses" on the amount of seal fur she could use nor the increased potential if the sealskins were tanned instead of raw.

SECTION 4 - THE PROCESS FOR TANNING WITH AND WITHOUT HAIR ON

On my trip many people questioned the value of tanning these skins. Therefore I have listed some of the advantages and disadvantages to tanning. These are listed below.

ADVANTAGES OF TANNING

1. Heat resistance. Untanned skin will shrink at 140°F. Therefore tanners seldom expose untanned skins to temperatures over 100″F for fear of damage. Fully chrome tanned leather can be boiled at 212°F for 5 minutes without shrinking. The tannage I propose will stand about 180°F without shrinkage.

2. Rot resistance. If untanned skins are exposed to warm humid conditions they will rot in a few weeks. Tanned skins will last indefinately under these conditions without any rotting. However sometimes the oils added to leather will grow molds under humid conditions.

3. Enzyme deterioration. The breakdown due to enzymes of untanned hide goes on continuously. The speed of this breakdown is slowed down at cold temperatures - but it does proceed continuously. Tanning stops this enzyme breakdown of hide substance.

4. Tanned skins dry soft after continuous wetting and drying. Untanned skins dry hard after getting wet.

5. Normal tanning removes much natural oil from the hides. This oil has a “fishy” smell. The reduced odour is more appealing to the southern trade.

6. After tanning the leather can be easily softened and that softness is maintained throughout the use of the article. Untanned skins are very difficult to soften and require much work to keep them soft.

7. Well tanned leather has considerable resistance to many chemicals which would deteriorate untanned skin.

DISADVANTAGES TO TANNING

1. It is not the normal, proven, traditional Arctic process. Therefore some people consider tanned seal as a synthetic substitute for the "real thing".

2. The chemical cost of tanning make it more expensive for materials. However, the process might create more softness with less labour and therefore it might be cheaper in the total cost.

3. Tanning requires trained people. The need for and extent of this training is covered in this report.

4. It usesconsiderable water which is expensive (5 cents per gallon in Broughton Island, 0.95 cents per gallon in Frobisher Bay.

5. Tanning produces some undesirable sewage. The amount and type is covered in this report.

6. Building a tannery would require the approval of the Hamlet, the Government of N.W.T. and the Federal Department of Fisheries. This is covered more extensively later in this report.

7. A suitable tannage will require some development work to produce a formula and procedure that will have these properties:

a) uses very few chemicals
b) these chemicals should be non toxic, non corrosive, have no solvent base, withstand freezing etc.
c) the procedure must require very little expensive equipment
d) the leather must be at least as good as untanned leather in softness, stitch tear strength, tensile strength, flexibility, wear resistance, tightness of hair, etc.

e) the tannage must not change the colour of the hair

f) the tannage should have all the benefits of a good tannage such as resistance to heat, washes, enzymes, water, bacteria, chemicals etc.

g) the tanned leather should not smell fishy

For a few thousand dollars a skilled leather chemist should be able to develop a simple tannage.

There are plenty of ideas about how to tan sealskins. Many of these methods can be found in these references: 4, 9, 10, 12, 13, 14, 15, 17, 18, 19, 20, 29. In addition I have studied considerable literature supplied by tannery chemical suppliers. Without going into a lot of details, I will comment on some of these processes:

Ref. 4 is an alum tannage which iswater soluble so it will wash out. It does little for heat resistance and smells very medicinal.

Ref. 9 is mostly for moose and caribou but tanning with moosebrains and smoke do not take advantage of modern technology. The Alum tannage will eventually wash out.

Ref. 10 is a good tannage and I recommend it. Some adjustments for sealskins will be necessary.

Ref. 12 I think this was an Alum tannage which will wash out.

Ref. 13 this is an excellent reference and I recommend it as essential reading for any proposed tannery personally. There is very little on fur tanning. The chrome a vegetable tannage recommended would stain the fur.

Ref. 14 Kaplan's book is rather old (1971) but contains many useful ideas.

Ref. 15 supplies a lot of technical information on tanning but no fur tanning procedure.

Ref. 17 gives a procedure for 1 hide. This type of process could be adjusted to suit our needs.

Ref. 18 gives a commercial, do-it-yourself process but it doesn't give the chemical name of the tannage. I'm fairly sure it is a chrome salt which would give a green colour which would be undesirable for fur.

Ref. 19 is a moose hide tannage I developed in 1980 for the Yukon. It would be applicable to caribou in Baffin Island.

Ref. 20 shows the excellent technical knowledge of John Greifeneder. Some of his ideas will be useful in designing a suitable tannage and tannery.

Ref. 29 gives some background data on tanning oojuk.

To summarize all the above procedures and write the ideal formula is rather difficult without some experimenting. However, here is an / approximate method:

For hair off . grain leather to make Kamik soles for ujuk or to make water-proof uppers for Kamiks.

Step - Starting with fresh skin

1 - Flesh #1

2 - Trim head straight across just removing eyes and snout and leave ear holes

3 - Reflesh from head to flippers removing the orange flesh and flesh membrane exposing the true corium (purple colour). This is traditionally done with a 6 inch ulu

4 - Wash fur in liquid detergent at about 95°F. Squeeze out.

5 - Wash flesh side in above solution. Squeeze out.

6 - Slick off surplus water using a saligoot with a flat blade

7 - Lay skin on the floor hair side down. Paint with a lime and sulfide mixture all over fleshside. Fold flesh to

flesh and cover with plastic and let lay overnight to react

8 - Next morning wipe off hair and epidermis with a **saligoot**

9 - Soak overnight in lime and water stirring periodically

10 - Wash thoroughly in water at 70°F.

11 - **Delime** thoroughly

From here on, the procedure is the same for both fur on and grain leathers.

If white water-proof is the desired product - at this stage you could spread Downy on the flesh side as usual, stretch on a frame and frost dry outside, use a **Tasiqqut** to soften as usual. This should make the traditional water-proof but it would not be tanned.

12 - All skins are tanned the same whether it is hair off water-proof, hair off **ujuk,** or hair on furs.

If the skin has been received in the traditional condition it will have been: fleshed, washed, **rescraped,** laced to a frame and dried with holes sewn up. There are 2 ways to handle these dried skins: A traditional, B with new equipment.

A. Traditional: lace 2 similarly sized skins together with flesh out (fur to fur). Pile skins and walk on them to soften for about an hour. Then wash in a soap such as Palmolive green liquid **dishwashing** detergent at 95°F.
- First wash fur out, squeeze.
- Then wash fur in with the same water, squeeze
- Slick out on grain side (fur) with a **saligoot** to remove excess water and any residual oil
- Tan using the following process:

B. A new process for wetting back and softening skins for tannage would require a tannery drum or an **occilating** washing machine. Add soap, water at 95°F. the dried skins and run until soft and thoroughly wet back. It will probably require an overnight lay to insure complete wet back. If longer soaks are required a small amount of a germicide may be needed to stop bacterial decomposition.

13 - Before going into tannage the squeezed out skins should have the surplus water removed by slicking with a **saligoot.**
Weigh

The amounts of tanning material are based on this damp skin weight.

Note: From the time the skins is first wet back until it goes into tannage there is a danger of rot. If for any reason there is a delay this rot must be stopped by such steps as rubbing salt on the flesh and storing cool, or adding a bactericide *to* the solution.

14 - For each lb of damp skin weight add the following:
- 1 Imperial gal. of water at about 85°F.
- 6½ oz. of common salt per gal.
  Dissolve by stirring.

Note: The container for this tannage should not be iron or galvanized. Plastic pails, or wooden barrels work fine. A wooden paddle should be used for stirring so there is no exposure to iron.

- Add 1 1/8 fluid ounces of glutaraldehyde (50% solution) for each lb of damp skin weight
  or .07 lbs per lb of skin = 7% based on skin weight.
  It will make a 0.7% solution in the water.

15 - When the salt and glutaraldehyde has been thoroughly mixed add the skins and stir continuously for at least 5 minutes.
Then stir for one minute every hour all day. When not stirring keep barrel covered.

16 - Stir one minute per hour on the second day and maybe the third day on heavy skins.

Note: Before removing skins from the tanning solution we must be assured of a thorough tannage. This is determined by doing a shrinkage test. A small strip of skin taken from the thickest area is immersed in water. The water is gradually warmed and the temperature read when the skin shrinks. Untanned skin shrinks at about 140°F. Glutaraldehyde tanned leather shrinks over 180°F. To be assured of a thorough tannage I recommend tanning 1 day longer after the leather passes the shrinkage test.

17 - On the last day of tannage add 1% of Lipoderm Liquor fatliquor, mix 10 minutes then 1 minute per hour for at least 3 hours.

18 - Wash with 2 changes of water at 70°F approximately.

19 - Hang fur up and let drain overnight.

20 - Weigh ½% household ammonia
2% Lipoderm Liquor
Mix with an equal amount of warm water to make a white emulsion.
Divide this mixture into 2 equal volumes.

Lay the skin, fur down on a flat surface and paint this emulsion all over the flesh making sure it is rubbed in thoroughly and evenly all over.
Let lay 30 minutes.

21 - After the 30 minute lay, apply the second coat of fatliquor just like the first one.

22. - If s number of skins are processed at once, pile them flesh side to flesh side overnight. Cover with plastic and let lay overnight. This helps the even distribution of the oil.

23 - Next day - hang skins fur up and let dry slowly at room temperature - but do not dry completely.

24 - Uhen partly dry, soften with a tasikot.

25 - Lace to frame, stretch and dry slowly.

26 - Soften with a tasikot.

NOTES ON PROCEDURE:

This whole procedure has been designed to use as few chemicals and as little new equipment as possible. The process uses traditional equipment and tec iques as far as possible. If a simple procedure such as this one can be used and the leather proves satisfactory, it will be easy to increase production by adding more equipment. There are many labour saving gadgets and machines that could be installed once the basic process proves its value.

Here is a list of the equipment which is needed for this process:

Steps 1, 2, 3 - UIU*

Steps 4, 10, 11, 18 - a sink or wash tub *

Steps 6, 12, 13 - saligoot *

Steps 7, 20, 21 - A swab or paint brush *

Steps 9, 14 - a plastic barrel or pail

Step 13 - scales

Step 14 - a liquid measure. If you prefer, all measurements can be converted to metric

Steps 9, 15 - a wooden stirring paddle

Step 16 - a thermometer

Step 19 - a horse or clothes line to hang skins to drain or dry *

Steps 7, 22 - a plastic sheet *

Steps 24, 26 - tasikot *

Step 25 - a stretching frame *

Steps 7, 8, 11, 14, 15, 17, 18 - rubber gloves and plastic apron

* This equipment is already at the Minnguq Sewing Group factory. Therefore all that is needed are:

3 plastic pails each holding about 25 gal.

A weigh scales

A liquid measure = a cook's measuring cup should be OK

2 wooden stirring paddles can be made from a 5 foot 1" x 4" board

1 thermometer

rubber gloves and plastic apron

Here is a list of the chemicals required:

Steps 4, 12 - a detergent such as Palmolive dish washing liquid

Step 7 - lime and Sodium sulfide

Step 9 - lime

Step 11 - Ammonium sulfate

Step 14 - common salt

Step 14 - Glutaraldehyde. This is sold as a 50% solution in water so it will freeze

Steps 17, 20 - Lipoderm liquor is a fatliquor which softens and lubricates the leather fibers

Step 20 - household ammonia

COMMENTS ON CHEMICALS

It would be better to buy a dry, concentrated detergent rather than ship a liquid such as Palmolive Soap and have the danger of it freezing.

The following are dry powders: lime, Sodium sulfide, ammonium

sulfate, salt. These present no freezing problem. The lipoderm liquor oil will freeze but once thawed it regains its properties as does the glutaraldehyde and liquid ammonia.

Some of the materials will require special handling. I would recommend the use of rubber gloves and plastic aprons whenever there is danger of exposure to lime, Sodium sulfide, glutaraldehyde, and household ammonia. These are strong chemicals which react to skin -- any skin including human -- so gloves make sense.

After each batch of leather it will not be necessary to sewer all chemicals to run the second batch but rather after each run a small amount is runoff the remainder is restrengthened and reused. This decreases the amount of water and chemicals required and the amount of sewage produced. Water and sewage will be covered under a separate section of this report.

The procedure recommended could easily fit into the present Minnguq Sewing Group factory. Enclosed isa very rough floor plan showing where the equipment would fit. The present front porch would have to be insulated and heated to give room for fleshing, unhairing etc. This tannery as laid out could tan about 10 skins per week using 1 person 3 hours per day or less.

The most labour intensive part of traditional tanning is staking and softening. Table VII shows the approximate times it takes for 1 pair of Kamiks. This includes: 1 fur on ringed seal which is big enough for two Kamiks and 1 pair of ujuk soles.

TABLE VII

		Staking Time
Lace 2 skins together, bend and tramp on them 1 hour tramping per pair	=	½ hour
Dry then Tasikot stake on flesh	5	1 hour
Twist and rub firm areas by hand	=	½ hour
Tasikot restake all over flesh	·	½ hour
Total time per pair of Kamik uppers		2½ hours
Ujuks: Bend and chew all over every ¼ inch lengthwise then widthwise 1 pair	=	2 hours
After butter treatment - chew again in all directions - per pair	=	2 hours
Dampen - then Tasikot stake on flesh then on grain	=	45 reins.
Cut to size - then dampen and chew 2 inches all around edge to soften	=	30-mins.
Total time per pair of soles	=	4½ hours

Total labour to soften per pair = 7 hours.

Staking is very arduous work. I found the chewing particularly demanding. From my investigation I find that the chewing is almost entirely a mechanical binding with very little benefit from any saliva reaction. Except for the last step on ujuks, chewing is done dry and this can be done mechanically. I am working on a machine to do this.

Enclosed is a copy of a letter to George Kucmas - a friend of mine who has invented a number of tannery innovations. Maybe we can develop a simple machine to stake and soften these skins.

Additional equipment would decrease labour. Using a washing machine - or better still a tannery drum - would decrease labour, increase production, speed and level the tannage. A shaving machine or splitter would thin and level the guage - this would be needed if caribou skins were to be used for garments. A cylinder flesher, or a Quebec circular blade flesher, would remove fat and meat - but this would reduce the need for local labour which may or may not be

desirable. There would be room for much of this equipment at the Jewellry Shop back room or at the Parka Shop in Frobisher Bay. But I just can't see a tannery in downtown Frobisher Bay. There would soon be complaints of the smell and then the tannery would be forced to move. Why not get a better location before making any firm commitment ?

ITEM 5 - TANNERY

AN ANALYSIS OF LOCATION FACTORS

No matter when, where or how big a tannery, there must be a procedure and process development stage preceding it.

This can be done using small pieces. The preliminary formula development would cost about $3,500.

If a tannery is to be built on **Baffin** Island it might pay to give the process a trial run locally before going full scale. There is a research laboratory in **Frobisher** Bay specifically for this type of pilot plant testing. Permission to use this laboratory can be obtained from:

District Manager
Indian and Northern Affairs Canada
P.O. Box 100
* **Frobisher** Bay, **N.W.T.**
XOA OHO
Telephone: 819-979-4405

*The new name for **Frobisher** Bay is **"Ingualiut"** Iqaluit

The use of this laboratory should not be considered until a satisfactory procedure has been worked out in the South where different tanning chemicals are readily available. The research lab would just be's scaling up to assure quality before the procedure is adopted in the actual site.

To ship all the chemicals and equipment to the laboratory site and import and house a trained tanner for a few weeks would cost:

15 days consult at $300	= $4,500
Transportation	· 1,000
Food & Accommodation 110 x 20	· 2,200
Miscellaneous	· 300
	$8,000.

It would pay to bring the potential new tanner at the new site to **Frobisher** Bay for the last week for a training session.

Preliminary tanner training for 5 days	
Food & Accommodation 5 x 110	= $ 550
Transportation (if Broughton Island)	= 350
Pay (my guess)	= 200
	$1,100

Then the tanner would have to spend about 2 weeks on the site to get the process going.

10 days at $300	= $3,000
Transportation	1,200
Food & Accommodations 120 x 14	1,680
Miscellaneous	120
Total	$6,000

So the total cost of development and training is:

Research	= $3,500
Pilot Plant	8,000
Tanner Training	1,100
Start-up	6,000
Total	$18,600.

This basic development and training cost must occur no matter where the tannery is located.

It is inaccurate to estimate the chemical costs, water use etc. until the actual formula is developed. Table XII is my cost approximation. It assumes the following 11 variables:

1. A small tannery at Broughton Island.
2. Processing in this tannery 10 fur on skins plus 1 ujuk per week.
3. Prices are bulk prices paid by tanneries here. They have been adjusted to recent increases and smaller volume buying. In other words I did not get accurate price quotations. They are my calculated guesses.
4. The data on Table XII is for 1 week. The material costs for skins, chemicals and water was $190.74. So I will use $200.00 to allow for some extra chemicals if needed.
5. The total water was 160 gal. At Broughton Island water costs 5 cents per gal; at Frobisher Bay about 1 cent per gal.
6. Sea lift to Broughton Island from Montreal is:

Boat $380 per metric ton	= 17.2¢ lb
Beach to tannery $150 per metric ton	= .7¢ lb
Packaging & transport to Montreal	= 7.1
Total	25¢ lb

7. The sea .-lift to Frobisher Bay will be about 20¢ lb

8. The estimates have been calculated 3 ways - A, B and C.

   Estimate A working 40 weeks per year at 10 tanned Kamiks per week

   Estimate B working the Broughton Island factory 50 weeks per year at 10 tanned Kamiks per week

   Estimate C working a Frobisher Bay tannery 50 weeks per year at 30 tanned Kamiks per week.

9. Some of my data may be inaccurate but you can correct this such as:
   - wages and salaries
   - light, heat, electricity
   - production per worker
     etc.

10. It presently takes 3 or 4 days for 1 worker to make 1 pair of Kamiks. With the introduction of sewing machines, chemical softening, a softening machine, etc. production will be speeded considerably. I , estimate that 1 worker will be able to make a pair of Kamiks in 1 day (6 hours). This will include all cutting, hand decoration, lining, etc. so that quality will not be jeopardized. It presently takes a worker 7 hours just to soften and stake leather for a pair of Kamiks. When this is done by machine this along should cut a day off production time.

11. The complete adult Kamik now sells for $185. A pair of tanned Kamiks should sell for at least $200.

Estimate A = Work 40 weeks per year and process 10 tanned Kamiks per week at Broughton Island.

	Cost/year
Skins, water, chemicals $200 x 40 weeks (Table XII)	$ 8,000
Sea -lift 25¢ x 25 lb x 40	250
Salaries (3300 + 800) x 12 months	49,200
Light, heat, electricity 700 x 12 months	8,400
Sewer wages 10 Kamiks 2 sewers x 6 hour x $6. x 5 day x 40 weeks	14,400
Materials for 1 Kamik: - thread = $ 2.00 - ½ yd duffle 10.00 $12.00 x 10 Kamik x 40 weeks	4,800
Wages for tanner and staker: - 3 hours per day x $6 x 5 x 40	3,600
Total	$88,650

Yearly expenses	$88,650
Receipts - 10 Kamiks x 40 x $200 =	80,000
Yearly loss	$ 8,650

Estimate B is just like A only the factory works 50 weeks per year instead of 40.

	Cost/year
Skins, water, chemicals $8{,}000 \times \frac{50}{40}$	$10,000
Sealight 250 x $\frac{5}{4}$	313
Salaries (unchanged)	49,200
Light, heat, electricity (unchanged)	8,400
Sewer wages 14,400 x $\frac{5}{4}$	18,000
Kamik extra materials $4{,}800 \times \frac{5}{4}$	6,000
Tanner wages $3{,}600 \times \frac{5}{4}$	4,500
Total	$ 96,413

Yearly expenses	$96,413
Receipts 80,000 x $\frac{5}{4}$	100,000
Theoretical profit	$ 3,600

Estimate C

Work 50 weeks per year at Frobisher Bay
Tan 30 Kamiks per week
Sea -lift is 20¢ lb vs. 25¢ at Broughton
Water is 1¢ gal vs. 5¢ gal at Broughton
so the estimate A would be decreased because of water cost saving by
160 gal x 4¢ = 6.40 per week

Broughton Island would pay $10 for ringed seal and $70 for a bearded seal. On Frobisher Bay this cost weld be $12 for a ringed seal, $7S for a ujuk.

Therefore the Frobisher Bay chemical costs would be 200 - 6.40 = $193.60 (water correction)
Skins in Frobisher Bay = ringed 10 x $12 = $ 120
bearded $75 x 1 = 75

Frobisher Bay total skin cost $ 195 per week

In Broughton the skin cost is $170 so we must add $25 to Broughton Island costs ·

$195 + $25 = $220 per week for 10 Kamiks

Skins, water chemicals 220 x 3 x 50	$ 33,000
Sea -lift 25 lb x 3 x 20¢ x 50 weeks	750
Salaries	49,200
Light, heat, electricity	8,400
Sewer wages 18,000 x 3	54,000
Kamik extra materials 6,000 x 3	18,000
Tanner and stakers wages 4,500 x 3	13,500
Total	$176,850

Yearly expenses	$176,850
Receipts: 30 Kamiks x $200 x 50 weeks	300,000
Theoretical profit	$123,150

TABLE XII

Material costs for 1 week to make 10 tanned Kamiks at Broughton Island

Step	Amt.	Price $	$ otal
Skin:			
1 **ujuk** dry = 3.2, wet = 6.4 kg = 14 lbs		at $70.	70.
10 hair ons at .51 kg dry, wet = 10 x 2.25 lb = 22.5 **lbs**		at 10.	00.
Total skin weight wet = 36.5 lbs			
1. Detergent to wet back and clean 2% x 36.5	.73	3.	2.19
water 1 gal/lb	36.5 gal	.05	1.83
2. Unhair: Sodium sulfide 3% x 14	.42	.52	.22
3. Relime: lime 4% x 14	.56	.04	.03
water 1 gal/2 lbs	7 gal	.05	.35
4. Wash and delime 4% bate x 14	.56	.56	.32
water/2 washes 2 gal/lb	28 gal	.05	1.40
5. Tan salt 6½ oz/gal = $6\frac{1}{2}/16$ x 36.5	14.8 lb	.03	.45
water 1 gal/lb	36.5 gal	.05	1.83
glutaraldehyde 1 1/8 oz/lb = $1\ 1/8 x/16$ x 36.5	2.57	3.00	7.71
6. Fatliquor: Lipoderm Liquor 1% x 36.4	.37	1.50	.56
7. Wash: water 1 gal/lb	36.5 gal	.05	1.83
8. Oiling off: household ammonia ½%	.19	.70	.14
Lipoderm Liquor 2%	.73	1.50	1.10
9. Wash up: water	15*5	.05	.78
Total water	160 gals		
Total materials cost per week			190.74
Total weight of chemical to sealift	21 lb		
+ packaging	25 lbs		

Here is a summary of the 3 estimates.

Estimate A shows a yearly loss of $8,650.

Estimate B shows a theoretical profit of $3,600.

Estimate C shows a theoretical profit of $123,150

All of the above assume only adult Kamik tanned production which would not be the case. This was done to simplify calculations. The data is theoretical but does demonstrate these trends:

the difference between estimate A and B shows that by working 50 instead of 40 weeks per year, profitability improves. The factory should operate as consistently as possible.

the reason B shows a possible profit over current losses is because the workers in B produce 1 Kamik per person in 6 hours. This is 3 or 4 times the present production. This does not indicate that the present ladies are not working hard because they are. But the addition of new production techniques, job specialization, sewing machines, staking machines etc. can improve productivity tremendously. No doubt the visit of Mr. Souder of CESO will make a great contribution in this regard.

Estimate C shows a good profit but to achieve this will require considerable increase in tannery equipment, Kamik sales etc.

In fact to achieve our objective in all 3 estimates some additional equipment will be needed in addition to the basic list of pails, thermometer, scales etc. already mentioned. Estimate A and B will require a staker or softening machine and a flesher. Probably the best flesher would be a Quebec disc type. For estimate C a tannery would need everything recommended for A and B plus a small tan drum. A tan drum 3 feet wide and5 feet in diameter would do the job. A second tan drum to be used as a dry drum would also be useful.

Either the back room of the Jewellry shop or the Parka shop would hold this equipment although some walls would probably have to be knocked out to get the equipment in.

SECTION 6 - POTENTIAL LOCATIONS

Where should the tannery be located? Here are the alternatives:

1) A small tannery (up to 11 skins per week) at Broughton Island.

2) Alternative 1 plus a collection depot at Broughton Island.

3) A collection depot at Pangnirtung.

4) A tannery connected with Alternative 3.

5. A medium sized tannery at Frobisher Bay (up to 30 skins per week).

6) A fish processing plant at Frobisher Bay connected with Alternative 5.

7) A complete big tannery at Frobisher Bay.

A number of facts affect the decision:

Fact 1 - Any tannery on Baffin Island would be a source of income for seal and caribou hunters, tannery workers, the local craft and garment industry etc.

Fact 2 - Tanned products would sell easier to the tourists and southern markets.

Fact 3 - Since the Greenpeace campaign, the lack of markets for skins has not only caused economic hardship but also a morale degradation. Inuits have studied their hunting craft, developed great skill and success as hunters and have a pride and self-esteem in their trade. With such little pay off from sealskins they have lost much independence and self-esteem. A lackadaisical attitude has fostered secondary problems such as drunkenness, solvent sniffing, increased suicide etc. An increase in the price of sealskins would not cause these secondary problems to disappear - but it would help.

Fact 4 - The previous facts would justify running a tannery even if it was not immediately profitable.

Fact 5 - Inuit women are also skilled in their craft in skinning, fleshing and drying sealskins and caribou hides. This skill should be fostered by paying a premium for well processed skins. Their self-esteem is in jeapardy too.

Fact 6 - Any plant collecting skins and preparing them for a southern tannery could choose from 3 ways to cure: 1) drying, 2) brine curing, 3) dry salting. I can not see any advantage to soaking and salt curing a dry skin at a northern collection depot. It would be better to ship the dry skin. However, if fresh skins have to be fleshed, then brine curing or dry salting makes sense especially if the sea lift is used for transportation. The advantage of dry salting is that almost no sewage is produced. I do not think a dry curing operation suits a big collection agency. This is more of a home industry.

Fact 7 - Food processing and tanning do not mix well. But an insulated building with a utilidor hook-up, wiring, office etc. could be used to prepare fish for food and also tan skins. There would have to be a wall between and the processes would operate independently. The fish guts and tannery fleshings could be cooked together for a dog or cat food.

Here are my thoughts on the 7 alternatives:

Alternative 1 - A tannery of up to 11 skins per week at Broughton Island has already been described in detail. I believe this should be the first installation. Here all the technical problems could be resolved; then personel trained for any other expansion.

Alternative 2 - Broughton Island has just built new refrigerated storage lockers. The old cooler building will soon be vacant. This vacant building has refrigerated storage - everything that is needed for summer storage of dried, cured sealskins. This could be an ideal collection depot. The M.O.T. sealift could take these skins to a Cobourg tannery in September.

Alternative 3 - Pangnirtung is not only a good sealing area but it has many more caribou than Broughton Island. Therefore it would be a good skin collection location. Pangnirtung does not need work projects as much as Broughton Island. Also it suffers from a winter water shortage. Sea water could be used in brine curing.

Alternative 4 - If Pangnirtung became a collection depot for a Cobourg tannery as recommended in the Nunasi report (ref. 8) a heated building would be needed for the fleshing and brine curing. Some silver jars could be sorted out and fur tanned instead of brine curing. Very little extra equipment would be needed to run the tannery.

Alternative 5 - A medium sized tannery in Frobisher Bay of up to 33 skins per week has been described in Section 5 estimate C of this report.

Alternative 6 - See Fact 7 above

Alternative 7 - The trend in the leather industry is to move the tanning operation closer to the source of hides. This eliminates the need to cure the hides. Also the industry is tending to move the colouring and finishing of the leather closer to their customer so they can cater to style changes, customer needs etc. With this in mind eventually one big tannery in Frobisher Bay could be viable. All the skins on Baffin Island could be processed there. Some would be tanned fur on. The rest would be unhaired, bated, pickled, chrome tanned, split, shaved, fatliquor and dried. The skins "in the crust" would be sent south for drying, staking, finishing etc. Since only the dried useable leather would be shipped, leather transportation costs would be minimal and the leather would be moved safely with no worry of deterioration. Freight for chemicals would be high. The economics of this scenario needs much study - but it could be viable. Such a study is beyong the scope of this report.

This is the end of this report, I hope it is the beginning of a tannery.

Stephen Shivas
Dec. 22, 1986

SECTION 6b - NUSASI REPORT

Reference 8 discusses a joint venture of Nunasi Corp. and the Final Touch Tannery in Cobourg, Ontario. The scheme is to collect sealskins in Pangnirtung, flesh them, brine cure them and ship them to Cobourg for unhairing, tanning and finishing. Nunasi would sell the leather.

Having been superintendent of this Cobourg tannery for 9 years I know its capabilities. The idea is excellent and should be pursued at once. On Dec. 18/86 the Federal Government announced a program to help seal hunters. A good way to do so would be to increase the sealskin subsidy to seal hunters.

A few items in the report can be questioned:

1) The report states that the poorly flayed skins can be used for local fur production and the good ones sent to Cobourg. The opposite view makes more sense to me.

2) The skins should be brine cured. I believe they should be air dried the traditional way. Here is my data to prove this:

The weights of one average ringed sealskin were as follows:

fresh off animal	= 4.44 kg
flesh removed	= 3.00 kg
skin weight after #1 fleshing	1.44 kg
trim and reflesh	.535 kg
wrung fleshed weight	.905 kg

This would be like a brine cured weight.

When this same skin was stretched and dried it weighed 355 grams. The dimensions off the animal were 29 x 22 inches andoff the stretcher were 43 x 28 inches.

Table XIII shows the costs to transport 1000 skins from Frobisher Bay and Pangnirtung to Montreal.

TABLE XIII

	Rate	Brine cured	Dry cured
	$/kg	905 kg	355 kg
Sealift			
from Frobisher Bay	.441	399.11	156.56
from Parnirtung	.551	498.66	195.61
Air freight - bulk price			
from Frobisher Bay	2.36	2135.80	837.80
from Pangnirtung	4.52	4090.60	1604.60

By dry curing you would save about $300 per 1000 skins to ship sealift from Pangnurtung to Montreal. There would be a saving from Montreal to Cobourg. Unfortunately a full year's supply of skins would have to be shipped in one boat once a year.

Assuming the average sealskin is 6.2 square feet the cost of flying brine cured skins from Pangnirtung to Montreal is:

1000 skins = $\frac{4090.60}{6200}$ = 66 cents per square foot of leather.

In my opinion this would be too much to make the project feasible.

Even to fly dry skins would cost $\frac{1604.60}{6200}$ = 26 cents a square foot.

If dry skins are purchased in Pangnirtung at $10.00 each, the skin cost per sq ft. of leather is $\frac{\$10}{6.2}$ = $1.61

air delivery to Montreal = .26

delivered cost/ft = $1.87

So probably the cost of a dry raw square foot of sealskin in Cobourg is about $1.95. This is just about what a square foot of finished cowside leather sells for now.

Therefore either the seal leather must be sold for a premium price or else some costs must be cut to cover the cost of tanning and a reasonable profit.

SUPPLEMENT A

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SUPPLEMENT B

People interviewed and their addresses
(in no special order)

Larry Simpson	Tourism and Industry Department Government of N.W.T. Frobisher Bay, N.W.T. XOA OHO Tel. 819-979-5311 House #281 - tel. 6736
Craig Hall	Jewellry Project Manager Same office as Larry Simpson Shop tel. 819-979-5530
Katherine Trumper	Superintendent of Economic Development and Tourism Frobisher Bay, N.W.T. XOA OHO Tel. 819-979-5311
Joe Kunuk	Assistant Superintendent of Economic Development and Tourism Frobisher Bay, N.W.T. XOA OHO Te. 819-979-5311
Miss Bonnie Jean Plaunt	Manager of Parka Shop Frobisher Bay, N.W.T.
Howard Madill	Water Resources Officer Northern Affairs Program P.O. Box 100 Frobisher Bay, N.W.T. XOA OHO Tel. 819-979-4405
Ken Harper	President Arctic Ventures Ltd. P.O.Box 670 Frobisher Bay, N.W.T. XOA OHO Tel. 819-979-4252

Gary Magee	Economic Development Officer for Broughton Island and Pangnirtung
J. A. Huestis	Economic Development Officer 'Pond Inlet, N.W.T. XOA 0S0 Tel. 819-899-8988
Michelle Lavigne	Manager of Minnguq Sewing Group Broughton Island, N.W.T. XOA OBO Tel. 819-927-8885 work 819-927-8027 home "
Harry O'Keefe	Hamlet Secretary Broughton Island, N.W.T. XOA OBO

SECTION 7a

SUPPLEMENT C

Meeting with Larry Simpson, Thursday Dec. 4/86

Water: In Frobisher Bay the commercial and industrial rate for water is: A $75.00 per month minimum charge. Rate is $9.50 per 1000 Imp. gal. equal almost to 1¢ per gal. This applies whether the water is trucked or piped by the utilidor system.

The Government get a special rate which is no charge. Therefore a tannery start-up under Government sponsorship would likely not pay for water.

See Table VIII for water analytical data. There appears to be plenty of fresh water available for any small tannery needs.

Garbage: In Frobisher Bay to date there is no charge for garbage collection and disposal. The fleshings and trimmings from a tannery may present special collection problems. All garbage is now dumped in an open field, north-west across the bay and burned.

Sewage: Any tannery is a big sewer user. The effluent contains much solids. Currently the sewage goes to an open lagoon where some settling occurs in summer - then flows into Frobisher Bay. Residents have been warned not to eat clams from this area because of the possibility of transferred contamination.

The Price and Availability of Skins: Only'seal and caribou are considered in this report.

Larry was convinced that any tannery needs for skins could be satisfied by local hunters without the need for any collection agency. One could easily have 1000 seal skins per year delivered to the tannery by the hunters. Many hunters live in Frobisher Bay, go hunting seal and

caribou for a day or two, then return to their homes. Therefore a fresh supply of skins is assured especially of sealskins.

At present the price of sealskins is very depressed, in fact, they are hardly worth saving. It takes about 2 hours of labour to properly flesh one sealskin by hand. If a hunter can only get about $5.00 for a skin - it isn't worth his labour to bother to flesh it. Therefore the absolute minimum one could expect to buy a skin for is $10.00 with $15.00 being more realistic. So here are the minimum and probably prices a tannery would have to pay for a properly flayed well scraped skin:

	Minimum	Probable
Ring seal	$10.	$15.
Harp seal	$20.	$25.
Caribou	$30.	$35.

If the tannery had a good fleshing machine, hand fleshing would not be necessary. The hunter could just flay the animal and bring it to the tannery - flesh and all. His labour would be reduced and also the cost of the skin. The women have traditionally done this skin fleshing and scraping and may appreciate the extra income and do it themselves.

The above skin prices would apply within the hunting radius of Frobisher Bay which is about 50 miles. If more skins were needed in the future an outside collection agency would be needed from surrounding communities. The skins would have to be flown to Frobisher Bay. This would add about another $5.00 per skin to the delivered cost.

Without a market survey it is very difficult to estimate how big a tannery should be. But it is necessary to make a rough guess at volume in order to establish economic feasibility on some sensible basis. Larry Simpson thought the craft industry in the area could absorb the following amounts of locally tanned fur per week all year round:

	Minimum	Maximum
Sealskins	5	20
Caribou	5	10

These tanned skins would not only be used by local craft shops but also to make garments at home.

Untanned hunting parkas of fur on caribou sell for about $400. One which was tanned and which would therefore remain soft and durable for years should easily be worth $500. The same potential make-up would also apply to mittens, pants, mukluks etc. So there should be no problem to sell much of the locally tanned product if it proves to be a quality item.

Larry Simpson knew of no other buildings in Frobisher Bay suitable for a tannery other that the Jewellry Shop and the Parka Shop.

Minimum pay for labour would be $6.00 per hour.

If a tannery was to be set up in Broughton Isle it would cost about 50¢ lb to fly the leather to Frobisher Bay. Because the plane usually flies out of Frobisher Bay with a full load and returns fairly empty a special deal could be worked out. Besides, there is a special rate for fish products which might also apply to sealskins.

Government funding will not be available if the purpose is only to supply local needs such as:

- local clothing

  locally manufactured arts and crafts and souvenirs and to earn money locally

The Government would probably fund on a long term basis a tannery at Frobisher Bay rather than Broughton Island because of its ultimate potential to be self sufficient.

End of L. Simpson Dec. 4 Interview.

There was a second interview with Larry Simpson on Dec. 12 between flights at the airport.

Larry has a few fresh ideas:

1) A medium sized tannery at Broughton Island.

2) A very small tannery at Broughton Island plus another at Frobisher bay or Pangnirtung.

3) A combined fish plant and tannery at Pangnirtung.

4) One medium sized tannery at Frobisher Bay or Pangnirtung.

The original tannery plans were for only "Hair on" leathers because not enough ujuk, black waterproof and white waterproof were made to justify the development work. But to make traditional Kamiks ujuk soles are needed. Great skill is needed to unhair so that there are " no ulu cuts. One of the major costs of Kamik manufacture is the softening and chewing of ujuk soles. Only older sewers continue to chew to soften. Chewing soles will become less attractive as the younger workers join the Kamik production work force. Therefore if unhairing could be done chemically and softening done mechanically it would have these advantages:

1) Save teeth wear
2) Speed production
3) Save labour
4) Assure future production
5) Require less skill
6) Reduce costs.

SUPPLEMENT C

Minutes of Meeting with Howard Madill
plus some additional data on costs - Dec 5/86

We discussed inlet water quality, sewage effluent and garbage disposal for Frobisher Bay and Brougton Island including the problems a tannery might have.

The present water supply data for these 2 communities is summarized in Table VIII.

TABLE VIII

Drinking water for Frobisher Bay and Broughton Island. Unbracketed data is the most recent analysis received from Howard Madill. Bracketed data is from Table 4.12 ref. 16 (1981).

Chemical Analysis	Frobisher Bay	Broughton Island	
pH	6.7	6.3	(7.3)
Conductivity (micro ohms)	18.0	6.7	(4.4)
Turbidity (national turbidity units)	3.8	1.6	
Colour	less than 5.	5.0	
Total solids	0	less than 5 mg/l	
Total dissolved solids	0	64 mg/l	
Calcium as Ca	2.9 mg/l	1.6 mg/l	
Magnesium as Mg	0.5 mg/l	1.0 mg/l	
Total hardness (as $CaCO^3$)	9.3 mg/l	8.3 mg/l	(12)
Total alkalinity (as $Ca\ C0^3$)	5.6 mg/l	5.1 mg/l	(8)
Sodium as Na	0.6 mg/1	20.4 mg/l	
Calcium as Ca	0	1.4 mg/l	
Chlorides as Cl	0	28. mg/l	
Sulfates as S04 mg/l	3.3	68 mg/1	(10)
Fluoride			(<0.1)
The following cations are expressed as parts per billion			
Cd	0	0.51	
Cu	4.1	1.1	
Fe	38.	125.	(1300)
Pb	0.3	0.6	
Hg	.02	0	
Ni	0	14.3	
Zn	0	74.	
Cr	0	.85	
Mn	8.5	3.5	
Silica			(1.45)

TABLE VIII cent'd

		Frobisher Bay	Broughton Island
Delivery:		½ by 4 trucks ½ by Utilidor	1 truck hauling 4550 l
Volume used		22,000m³ per month	600 m^3/month
Volume allowed		348,500m^3 per year	30,000 m^3/year
	or	1,200m^3 in any one day (264,000 gal)	
Chlorinated		all year	all year
Cost per Imp. gal		.95 cents	5. cents

Sewage:

In both cases the municipality must get a license from the Government of Canada to discharge sewage. With this license the Government insists on certain specifications. Broughton Isle must meet these criteria on Dec. 1/87:

BOD 5 - 600 mg/l
Suspended solids - 725 mg/l
Oil and grease - non visible

The effluent must be macerated then egested into the sea. No analytical data was available on the present sewage pollutant concentration. Such data is difficult to obtain because the test lab. is in Yellowknife and tests must be run on BOD soon after sampling.

Frobisher Bay presently macerates its sewage then it flows into a lagoon. This lagoon is big enough to hold one year's supply of effluent. Theoretically the idea is to store until summer when bacteria will kill pathogens. In the fall the supernatant is drained to Frobisher Bay and the sludge dug out to go to landfill. Unfortunately at present the system is not working as theoretically hoped. No analytical data is available on the extent of the pollution going to the sea at present. The town's license is presently under review.

A book was received (reference 3) which gives the guidelines for discharge. A tannery might also have to meet the specifications

for the Federal Fishery Act.

Any proposed tannery in Frobisher Bay or Broughton Island should determine if its effluent is acceptable before contemplating building. The effluent parameters on page 15 of reference 3 should be studied and approval received before a tannery is considered. A tannery would not create a problem on most of these parameters but Table IX shows those which might be summarized from Table 2.2 ref. 3.

TABLE IX

Limits of Additional Effluent Parameters that may be of Concern in a Tannery Discharge - N.W.T. Water Board Guidelines.

Parameter	Maximum concentration
Total Aluminum	2.0 mg/l
Total chromium	0.1 mg/l
Fluoride (dissolved)	5.0 mg/l
Manganese (dissolved)	0.05 mg/1
Sulfate (dissolved)	500 (applies to fresh water only)
Sulfide (dissolved)	0.5

Table 2.3 of ref. 3 should also be considered.

In Frobisher Bay the sewage is collected in 2 ways: 1) by utilidor 2) by truck. Both cost the same and are included in the water bill. The two potential tannery locations in Frobisher Bay now use these sewage collectors:

- Jewellry Shop by utilidor
- Parka Shop by truck. However the utilidor is only a few hundred yards away and it could be hooked up at a cost of about $300 per foot

In Broughton Island sewage is disposed of in 3 different ways: 1) Honey bucket - The Hamlet supplies heavy green plastic bags free. They are placed directly below the toilet. The filled bags, and

some are filled to capacity, are placed outside. Here they are collected and taken to the local solid waste disposal site. There is a charge of $1.00 per bag for collection and disposal.

2) There is a truck which pumps out holding tanks and dumps the contents into a lagoon which flows into the ocean.

3) Much dish water, shower water, and other slightly adulterated water from washing clothes etc. just drains outside. In the winter this freezes. In the spring it melts and washes away.

A tannery would have to discharge into a holding tank for lagoon disposal. I do not know the charge for this service nor the cost of the installation.

GARBAGE

At Frobisher Bay the garbage is picked up and delivered free of charge to a solid waste disposal facility a mile or so south west of town. Here the organics are burned to decrease the volume. This "garbage glow" can be seen at most times from the town centre.

At Broughton Island, the garbage is disposed of in an open site 1.5 km north east of the town.

ELECTRICITY AND HEATING

When considering the 2 tannery locations the cost of electricity and heating should be compared. Table X shows some comparisons.

TABLE X

Electric Rates 1983 - cents per KWH (ref. 16)

	Broughton Island	Frobisher Bay
Non Government		
Domestic - up to 300 KWH/month	29.44	22.11
over 300 KWH/month	48.47	30.20
Commercial	50.92	29.60
Government		
Domestic	61.49	32.17
Commercial	61.49	32.60

Retail Fuel Prices (1983) - cents per litre (ref. 16)

Heating oil	45	43
Deisel	57	52
Gasoline	58	52

When one compares the electric costs of Table X with Ontario's at about 5 cents and Quebec's at 5½cents per KWH one can easily see why a big mechanized tannery would be very expensive to run on Baffin Island.

Oddly enough these fuel prices are not much different from Ontario prices at present. But the data on Table X is for 1983 so it may now be obsolete.

Another consideration on Baffin Island is the cost of transportation. Table XI shows some comparative data for Frobisher Bay and Broughton Island.

TABLE XI

Transportation costs

unbracketed data from ref. 16 (1983

bracketed data is 1986

	Broughton Island	Frobisher Bay
Sealift $ per metric tonne or 2.5m³	295.63	192.20
ships per year	1	3
regular passenger airfares one way from Montreal (adult)	397	397* (389)
Frobisher Bay to Broughton Island	175	
Total	572	397
air freight rates $/kg		
Montreal to Frobisher Bay		
regular		2.45 (3.00)**
bulk		2.36
Government		2.18
Frobisher Bay to Broughton Island	2.16	

Joint Ottawa

* There is an airfare price war on at present so that over Christmas the price has been reduced from $389 to $380 one way Frobisher Bay to either Ottawa or Montreal.

** There is a special rate for food to Frobisher Bay at $1.70/kg.

To simplify and bring up-to-date here are the freight rates per lb:

Sea lift to Frobisher Bay $192.20 per tonne = 8.7¢ lb in 1983. This is now about 10¢ per lb. But considering packaging and delivery to the site in Frobisher Bay a 20¢ lb sealift is realistic.

Sealift to Broughton Isle at 295.63 per tonne = 13.4 ¢ lb. So a delivered price Montreal to the site is about 25¢ lb.

Airlift at 3.00/kg to Frobisher Bay = $1.36 per lb

Airlift Montreal to Broughton Island = 3.00 + 2.16 = 5.16/kg = 2.34 per lb.

However it is probable that a special rate for fish products and seal skins could be negotiated between Broughton Island and Frobisher Bay.

All of the above extra costs are reflected in the extra cost to live at these places. Using Montreal as an index of 100 the living cost and food price differentials are shown in the 1982 G.N.W.T. Statistics.

Montreal - 100
Broughton Island - 160 to 169
Frobisher Bay - 150 to 159

From my observations living costs are at least this high.

SUPPLEMENT D

This report contains many words which were new to me. A future visit by a tanner could use a few translations. Here is a list of useful words and their English equivalent.

Inuktitut - the **inuit** language and its 27 dialects

Ulu - a hand instrument with a curved blade, 2 to 6 inches in length, used for flaying, fleshing, **unhairing,** cutting patterns etc.

Saleguut, Saligoot - a straight **bladed** hand scraper.

Tasiqqut - a hand instrument to scrape and soften. It is a half cylinder with a curved tip.

Ikhalupik - Arctic char

Inuksuit - marker stone **pillors**

Notsiavinik - a silver jar, a young ringed seal

Atigi - a parka

Ujuk, udjuk, **oojuk, ugjuk** - a bearded seal used for **Kamik** soles

Kamik - a fur boot **which** goes up to the knees

Tupik - a tent

Qiqirtarjuaq - Broughton Island

Iqaluit - **Frobisher** Bay

Apigi - ask

Niunga - bend

Kipi - cut

Pani - dry

Nivinga - hang

Ingu - Mix

Nutsu - pull

Miksu - sew

Angula - soften

Kimigluk - **spine**

Kadlunak - white man

Tuktu - caribou

Tuktuynk - caribou skin

Uksuk - seal fat

Kishik - **sealskin**

Ekkakti - scraped sealskin

Pualuk - mitts

Pinigak - short **duffle** socks

Ingmuit - laundry soap

Inuit - 3 or more person

Inuuk - 2 persons

Inuk - **1** person

A good **Inuktitut-English** dictionary sure would be useful.

TABLE I

TRENDS IN SEALSKIN SALES

YEAR	RINGED	HARP	OTHER	TOTAL
1978-79				
-Number	20,601	2,066	1,032	23,699
-Value	$282,907	50,279	14,503	347,689
-Z Change	+31	+132	-51	+42
1979-80				
-Number	22,446	3,549	296	26,291
-Value	371,063	116,433	7,121	494,617
-%Change	+12	+94	+434	+37
1980-81				
-Number	23,681	6",116	1,763	31,560
-Value	414,116	226,344	39,481	679,941
-%Change	-43	-43	-85	-45
1981-82				
-Number	14,808	4,149	257	19,214
-Value	237,445	128,975	5,835	372,253
-%Change	-70	-13	-72	-50
1982-83				
-Number	7,453	4,244	170	11,867
-Value	$ 70,238	112,709	1,618	184,565
-%Change	-83	-28	-57	-29

Source: GNWT Department of Renewable Resources

TABLE III
Data on Animal Sizes
Most data from ref. 11

Common Name	Ringed Seal	Bearded Seal	Caribou
Technical Name	Phoco hispida beaufortiana	Erignathus barbatus nauticus	Rangifer acticus stonei
Eskimo Name		lath-tak or ugjuk	
Length of animal			
male average	135cm	250cm	180cm
male maximum	168cm		210cm
female average			166cm
female maximum	153cm		186cm
Weight of live anima			
adult average	68kg	273kg	68kg
adult maximum	113kg		
skin	5kg	49kg	
Scraped, stretched and dried skins			
length average	110cm*	231cm*	
width average	7 lcm*	165cm*	
area in square ft.	6.2*	28	16.5**
dry weight average	. 510kg	3. 2kg	2.0

* Data from a small number of personal measurements.

** The caribou skin area are averages of ref. 11 plus measurements I made at the Amarok HTA Country Food Store in Frobisher Bay. These averages might include some reindeer from Greenland which are larger.

TABLE VI

MINNGUQ SEWING GROUP PRICES

Sept/86 - Jan/87

OOKPIKS	small	$ 15.00
	medium	$ 20.00
	large	$ 28.00
MICE		$ 8.00
PENGUINS	small	$ 15.00
	large	$ 30.00
SEALSKIN HAT	pill box style	$ 25.00
SEALSKIN MITTS with lining	adult	$ 49.00
	youth	$ 30.00
SEALSKIN MITTS without lining	adult	$ 40.00
	youth	$ 20.00
SEALSKIN SLIPPERS with lining	adult	$ 35.00
	youth	$ 28.00
	infant	$ 20.00
SEALSKIN SLIPPERS without lining	adult	$ 30.00
	youth	$ 23.00
	infant	$ 15.00
KAMIKS****	adult	$185.00
	youth	$100.00
	infant	$ 45.00
DUFFLE SOCKS	adult	$ 30.00
	youth	$ 18.00
	infant	$ 14.00
DUFFLE SLIPPERS no flap	adult	$ 20.00
	youth	$ 15.00
	infant	$ 10.00
DUFFLE SLIPPERS with flap & embroidery	adult	$ 28.00
	youth	$ 23.00
	infant	$ 18.00

****All kamiks come with duffle sock and slipper except the infant size, which comes with sock only.

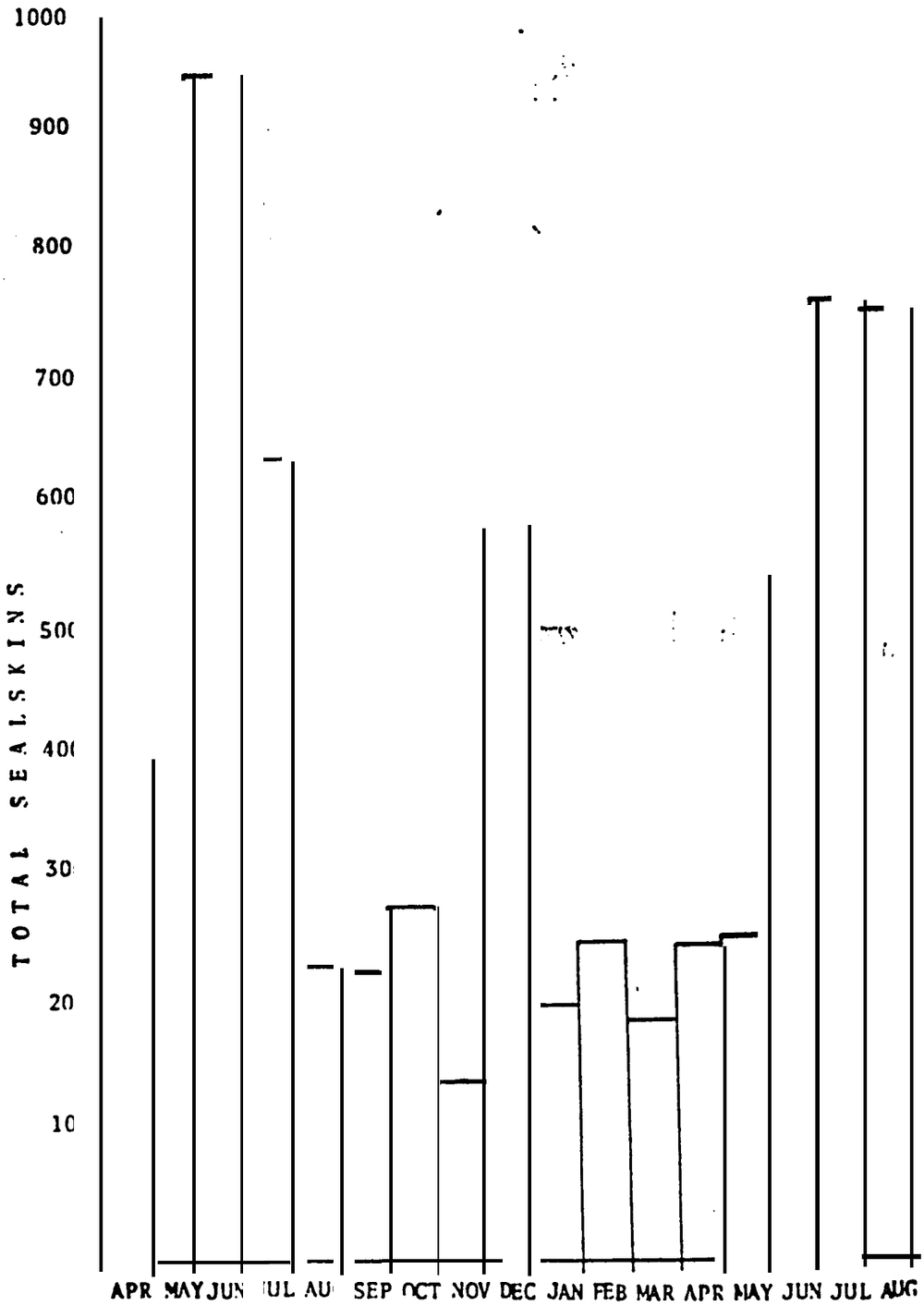
NOTE: Adult = ages 16 - . . .
Youth = ages 5 - 15
Infant = ages newborns - 4

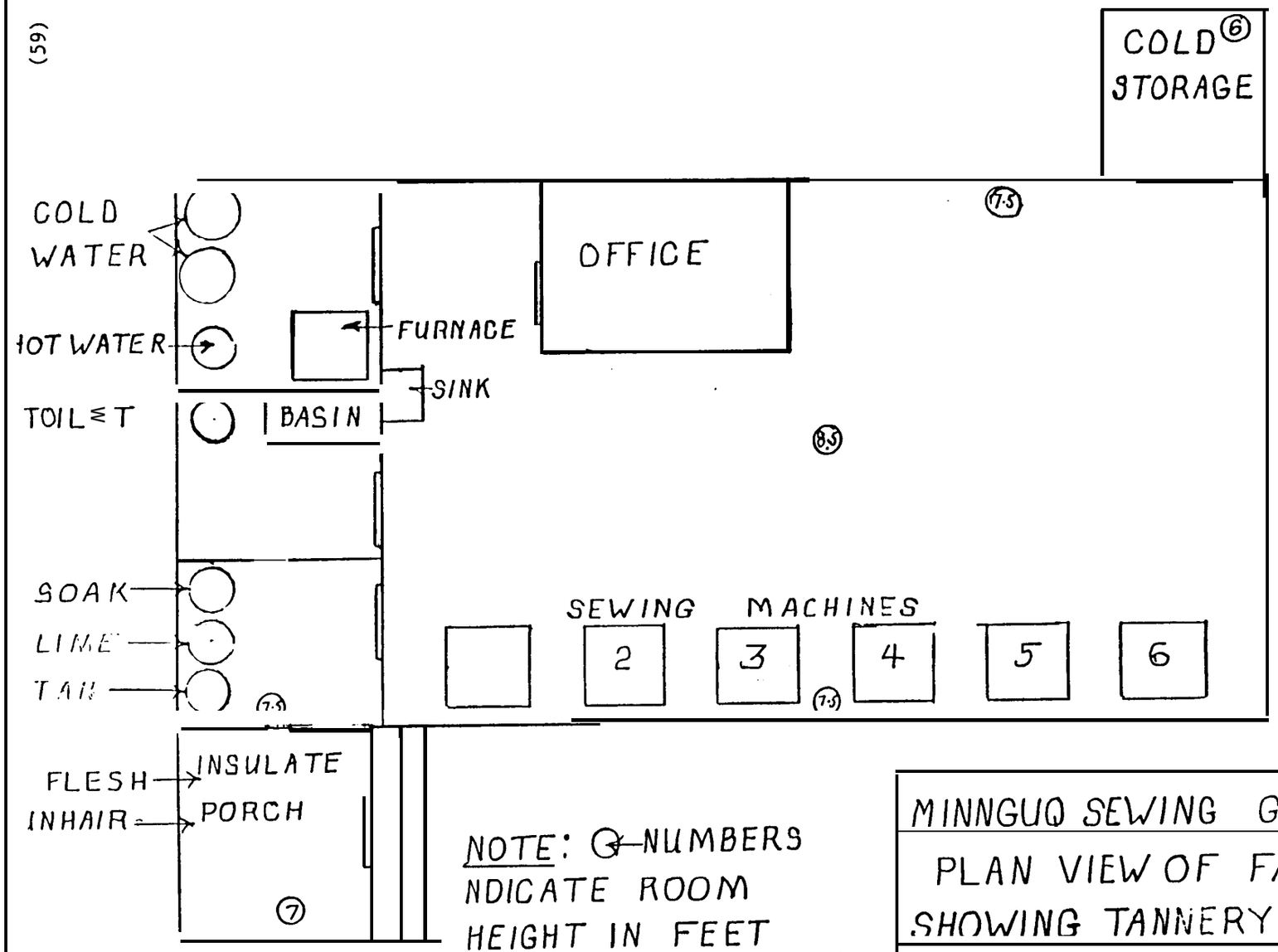
PRICES SUBJECT TO CHANGE

FIGURE #l . . . . . REF. 11

SEALSKINS TRADED, BROUGHTON ISLAND

April 1965 to August 1966





MINNGUQ SEWING GROUP

PLAN VIEW OF FACTORY
SHOWING TANNERY LOCAT ON

SCALE 3/16" = 1 FT.

DATE-DEC. 20-86

SHIVAS ONSU NG SER ES
88 ANN ST. N.
BARRIE, ONT. L4N 2C2

DR. BY S. SHIVAS

1 .

185 Cedar St N.
L4N2C2 Barrie
Dec 16/86

Dear George:

I just returned from 2 weeks on Baffin Island – up north of the Arctic Circle. It was a volunteer project to study the feasibility of a tannery up there. While there I learned how they now treat their skins & make fur garments and shoes for survival. It is a harsh climate and a rough life.

One thing that shocked me — in order to make 1 pair of Kamiks (knee high fur boots) the women spend about 7 hours just trying to soften the hides. This does not include the flaying of the seals, the fleshing, sewing etc — but just staking. Some of this staking is done with tasikots (a curved blade with which they scrape and flex the flesh side.) But, get this, about 3 hours per pair is done by mouth. They chew the soles & soften them enough to form the Kamik soles.

Now that I'm home & I've had time & think about this and how these Canadians have worn their teeth down & the gums chewing shoe leather. Surely there is some way to bend and flex and soften this leather without the use of tasikots and chewing. George — you are the mechanical inventor — have you any ideas which would make life easier for these people

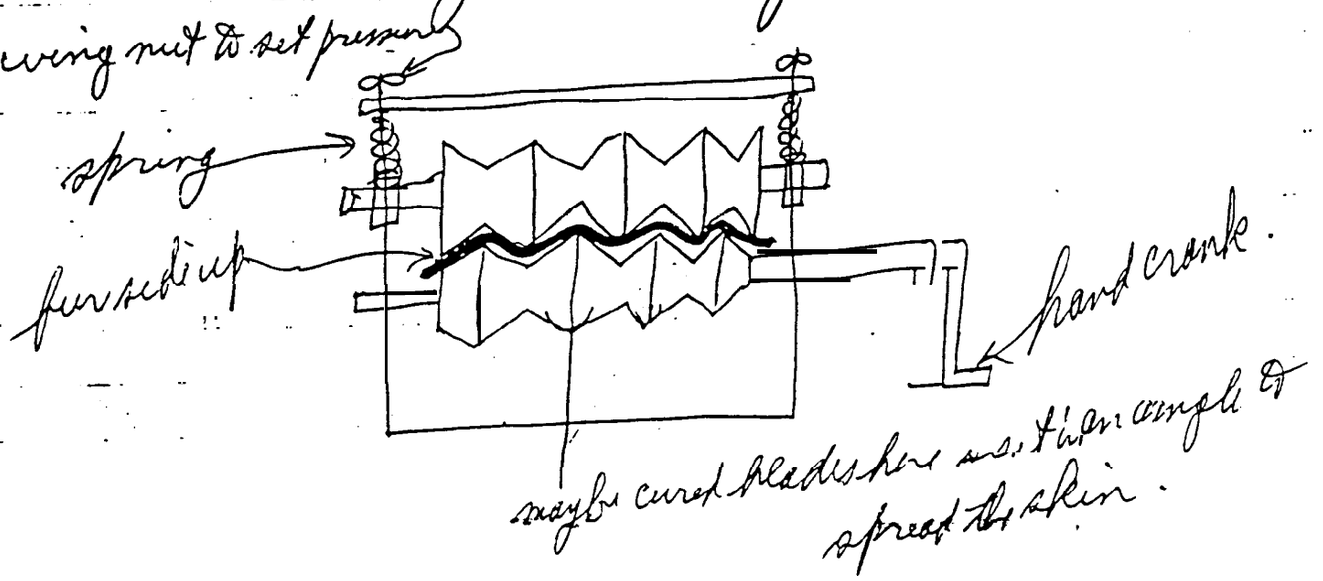
There are some limitations:

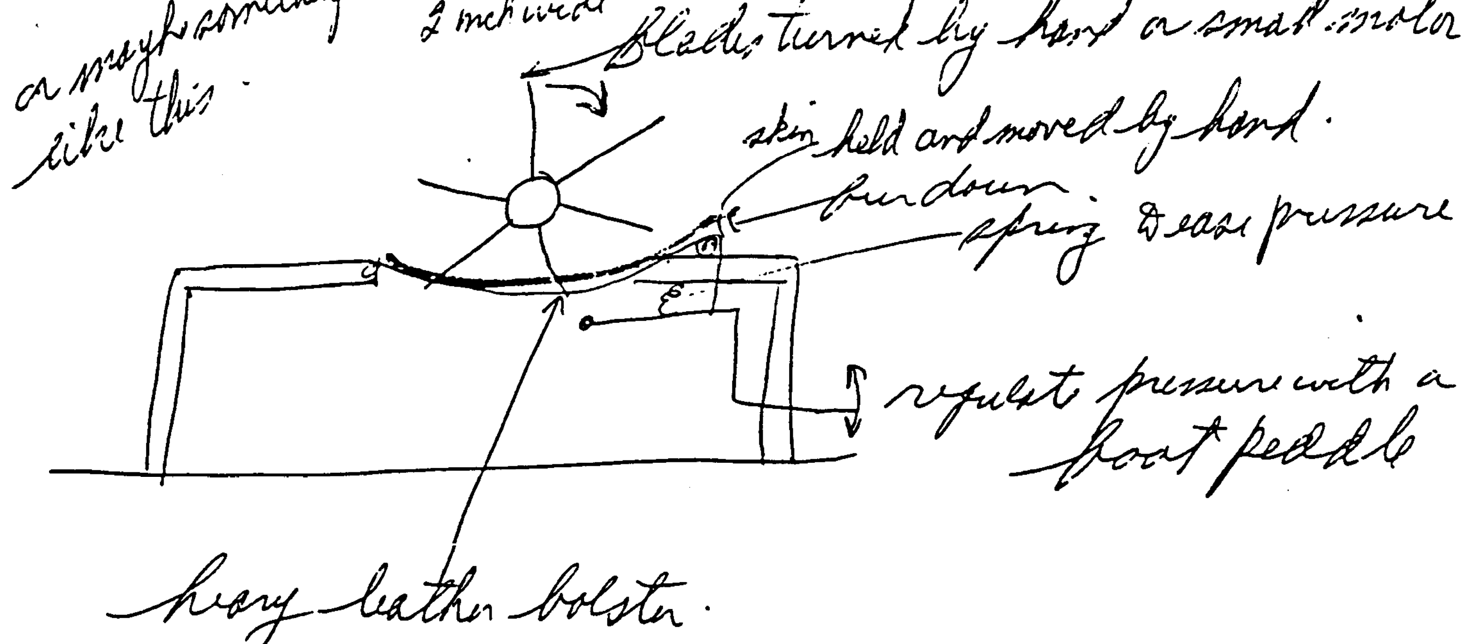
- It would be ideal if the machine could be powered by hand such as a crank. But most settlements now have some electricity so a small motor could be used.
- The skins are up to 45 inches wide but could be doubled over if necessary.
- The fur is easily curled so any rubbing action - especially against the grain - would ruin it. A scraping action on the flesh is now done with a dull curved blade.

I think an old fashioned, 2 rubber roll, hand operated, clothes wringer would help. Just double the skin over, put through the wringer which would flatten the fold as they now do with their teeth.

I was wondering if the "peg and hole" "goosing" principle used on the mollisa could be used at 2 synchronized rolls with a hand crank to force the skin through.

Or maybe something like this would work





Maybe some suitable machine has already been invented and I don't know about it. Does anything show on your old Marcus Ryuner files?

If you have any ideas I sure would like to learn of them. It would be a great service to these native people and much appreciated by me. I want to help them somehow but my mechanical innovative ability is limited.

I hope you received our Christmas card. Marion and I keep wondering how you and all your family are getting along. It has been a long time — too long — since we've seen you. Jan 15/87 we leave for Vancouver, New Zealand, leather congress in Australia, Vancouver & home in early April. Really looking forward to that holiday.

All the best to you & your family..

Stephen S.