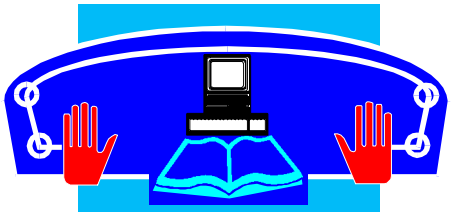

A Feasibility Study Of A Tannery And Craft Production Centre For The Coppermine Area

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Mayor
Hamlet Council of Coppermine
Kugluktom Katimayeen
Coppermine, N.W.T.
XOE OEO

Dear Fred:

We hereby submit to you our final report on Economic Development as per agreement between your Council and the Commissioner of the Northwest Territories dated March 25, 1981.

The report contains four sections related to sPecific projects and one section on development in general.

We realize that the report was due October 30, 1982. However, we deliberately delayed the final version in order to await the decisions from the European market regarding the possible import ban on seal skins, in order that our recommendations could be based on up to date information.

Sincerely,

A.R. Pedersen
for Coppermine Development Corporation

ARP/np

SUMMARY

OF

CONCLUSIONS AND RECOMMENDATIONS

1. From a technical point of view, there can be no doubt that a tannery with production centre for the tanned skins could be established and operated in Coppermine.

2. From a practical and economical point of view, it would be folly to consider the operation now with the present state of the seal skin market and the future possibility of the same fate befalling the general fur market as a result of efforts by the anti leg hold trap lobby.

3. Even should the problems of (2) be resolved in the future, there would have to be improvements locally for disposal of vast quantities of chemical waste fluids to meet public health standards.

4. The population of Coppermine has an excellent record as employees at such places as the Beaufort Sea, various mine sites and the DEW Line, these work sites all being away from home and in dry camps. The work record of the same population when residents of Coppermine is quite different, it has proven very difficult for businesses such as the Bay, the Co-op, CDC and others to hire adequately trained and work reliable staff locally.

5. It is recommended that Government, through education, attempt to improve skill levels and job performance.

   It is further recommended that should the skin market improve in the future to the extent where the tannery/production centre again became a possibility, then the establishment should be as a government financed project. It is just not realistic to expect private enterprise to make the massive capital expenditures necessary for a project which would be marginally profitable, at least though highly labor intensive.

   The role for private business is to make a profit, not to be responsible for economic and job development, which is the responsibility of the government.

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The history of tanning dates back to the very origin of mankind itself. It is mentioned in Genesis 3 - 21, it is also mentioned by the early Egyptians and Hebrews, who have written much about the uses and methods in tanning practiced by the ancients. Direct records, with recipes, date back to the time of the building of the pyramids, nearly 2000 years ago.

An early and primitive record, recorded by the Arabians, is as follows: the skins are first put into flour and salt for three days and are cleaned of all the fats and impurities on the inside. The stalks of the Chulga plant, being pounded between large stones, are then put into water, applied to the inner side of the skin for one day. And the hair, having fallen off, the skin is left for two or three days, and the process is completed.

Early Greeks and Remans contributed much to the science of skin tanning as well, and some of their methods are still the basis used today. The word tan was coined by the Remans, who used leather and tanned skins as a basis for money. Hence the word pecuniary, which is derived from the Latin word for hide.

The first settlers in America found that the Indians were extremely well versed in the process of skin tanning. The Crow and Navajoe tribes were especially adept in the skin dressing and taught the pioneers the process of the soft buckskin tan, which even today has hardly been improved upon. The hair was either removed by allowing the skins to decompose or by applying a solution of lye made from their campfire ashes. After which, the skins were rubbed with a composite mixture of brain and liver. The hides were then stretched and pegged to the ground to dry, then later smoked over a small fire and they became thoroughly soft and water repel lant. A process which is essentially in use today on the tanning of moosehide.

Up to the latter part of the 18th century, the most common tanning agent used was oak bark. The hides were soaked for months and months in vats of water with layers of crushed oak bark between them. Later on, it was discovered that other plants contained tanning solutions, such as the soumac, the hemloc, the mimosa and chestnut barks, also the fruits of the dividivi plant, the volania and others.

In about 1900, a chemist called Schultz, discovered the process of chrome tanning, and that was later perfected by others. His experimentation with the chromium salts, together with a soap, oil, fat liquor process, which in reality is only a modification of the old Indian method of softening the deerskin by dressing it with fat, gave the industry its greatest modern development.

Nowadays, mineral tanning, with metallic. salts, has mostly replaced the vegetable tanning, for all but a very small percentage of very heavy leathers. Modern processes and machinery have speeded up the production and has greatly affected the

the industry. Because of the requirement for a great deal of machinery, it has consolidated the industry into a relatively small number of large tanneries, each specializing in particular types of leather production. Most of these tanneries are located in large cities and seaports to be closer to world markets and transportation no doubt.

Development of synthetic materials, plastics and other substitutes has of course reduced the use of leather. It's perhaps an interesting fact that 80% of all the leather produced in North America is now used in the manufacture of shoes, and the remaining 20%, most of it goes into items such as gloves, jackets, other garments and novelty items.

For the purpose of considering a tannery for Coppermine, there is no question that the majority of tanning in square footage at least, would be in seal skins, also caribou hides. Both of these items would be a leather tanning process, rather than a fur dressing process. There is also no doubt that any tannery would prefer to handle fresh skins, rather than dried or salt cured skins. And as most of the hunting in the Coppermine area takes place close to town, I will outline the steps required in the tanning of fresh hides, as it is an easier process than when the skins are either dried or salt cured.

The process to be outlined is quite lengthy, but I do want to go into some detail to emphasize the-complexity of the process, of the materials required in the process, chemicals, etc. and of the capital equipment required to carry out the process.

The first steps to restore any lost moisture to the skins by soaking them in paddle vats, which contain a solution of detergents. This detergent accelerates the penetration of water. The fresh hides, skins, will then be put through a fleshing machine, if this is necessary. The soaked, fleshed skins are then transferred to an unhairing drum, which contains a liquid solution of calcium hydroxide and sodium sulfide. A high PH level of 12 results in the dissolution of the hair, loosening the outer layer and the destruction of certain soluable proteins. The collagen, a leather making protein, is not affected by this process. Chemical concentration, temperature and the agitation has to be very carefully controlled, and is very depending on the purpose for which the skin is intended after tanning. Water absorption is also increased at this point by the alcaline conditions of the solution, which swells the skin to nearly twice its normal thickness.

A process known as baiting, which is the remover of the remaining unhairing chemical and other undesirable substances follows this process. The skins are washed in water, in drums rotating at approximately 10 rotations per minute, very, very slow. Neutralization of the leftover calcium hydroxide is completed by the addition of such chemicals as

ammonium sulfate and ammonium chloride. An enzyme is added once a satisfactory PH level is achieved, which removes still more of the undesirable components, such as hair, roots, pigments, colors, leftover proteins, etc.

Acid, either phosphoric or sulfuric is added to lower the PH level and thereby maintain an environment in which the tanning agent will remain in solution, is carried out next. Salt is also used prior to the addition of the acid to prevent excessive swelling of the skin. The skins are left in this pickling solution for several hours after which the fluid is discharged, removed, in preparation for the addition of a tanning agent. Now the tanning agent that's most commonly used are broken into either mineral or vegetable tannings. Mineral tanning agents come from the salts of various elements, mostly chromium, aluminium and zirconium. The vegetable tanning agents, also known as the bark tanning agents, are extracts of various plants and trees. The tanning agent, either mineral or vegetable, transforms the raw collagen fibers of the hide to a stable non-protresable metrix.

The most common tanning method today appears to be the chrome tanning process, probably due to the speed of the process, and to the quality of the leather produced. Chrome tanning agents are prepared by reacting the socium bichromate, sucrose, molasses, and sulfuric acid to produce basic chromium sulfate or chrome.

Most Often, the chrome tanning can be done in the same drums that were used for the earlier baiting and pickling process. The chrome tanning agent is measured into the drums, the skins are stirred for up to 6 hours, depending on the degree of tanning that you desire. The skins after this, take on a blueish green color, its known as blue chrome leather. When you feel that the tanning is complete, the sodium bicarbonate or some other mild base is added to increase the PH and fix the chrome into the protein metrix.

A shrinkage temperature of the hide can be used to measure the rate at which the tanning is proceeding. The tanning process itself increases the resistance of the skin to heat. Because of that, as tanning progresses, the shrinkage temperature increases considerably. Its considered that full tanning is complete when there is no shrinkage at 100°C.

When the tanning is complete, the skins are squeezed to remove excess moisture. The moisture content of the hide following the squeezing or wringing should be between 50 and 60%. The skins should be kept covered in stacks to prevent too much drying at this stage.

Depending on the purpose for which the skins are to be used, and the thickness of the skins that have been tanned, those moist skins should then be sorted and those that need it, will be split and shaved to a uniform thickness, which is determined by the thinnest part of the skin. A splitting machine, with

an endless horizonal blade, feeds the skin through a set of rollers that allows the top grain of the skin to come out in a uniformly thick piece. The inner portion, the vellum portion on it, the portion of the skin closest to the flesh, also known as the split side, is further processed. Usually it ends up into a sueded type of leather.

Shaving can also be used on those parts of the top grain of the skin that may have been too thin to come into the contact with the rotating splitting knife. This shaving operation is quite similar to the fleshing machine. The split hides can then be kept for further processing.

The top grain hides are then put back into the tanning drums for the process of retanning, coloring and the process known as the fat liquoring process. Other tanning agents are used, vegetable extracts, sintans and so on, each with specific properties.

After the skins have been washed and a weak base has been added, it is necessary to adjust the temperature and then the particularly chosen retan material is added. The holding time of the skins in the retan solution is usually quite short, one or two hours, depending to some degree on which retan agent is used. As soon as the retan procedure is finished, dyes, which can be commercial or any type of dye and really any color, can be dissolved in the water at a high temperature and added to the drum. The PH has to be carefully controlled at this stage to regulate the depth of color and degree of penetration. The dye combines in this process with the skin fibers, which forms an insoluble compound which becomes chemically part of the skin itself.

The fat liquoring process is the last of the wet chemical processes in the operation of tanning a skin and it basically involves adding oils to the skins to improve its softness. The by now dyed, if dyeing was chosen, skins should be washed and then the temperature again adjusted to approximately 50°C and at that point, the fat liquor is added. You should use an emulsifying agent to mix the oil in the water well and enhance the penetration into the leather. The level of firmness or softness which is desired in the skin can be controlled by the people tanning in their choice and type and amount of fat liquor added to the solution.

After this process, the skins should be passed through a setting out machine. This is a machine similar to the fleshing machine that stretches and smoothes the skin. The skin at this stage is still very high in moisture, its between 55 and 60% usually, but its quite compressed from the setting out operation.

Several drying procedures are used for the skins now. The most common of these is referred to as pasting. The pasting process involves sticking the wet skin to plates which are coated with a special adhesive, which are then slowly moved through a drying

box . This adhesive paste, which is composed of a starch-like materi al , releases the skin very easily when the drying process is complete. The skins are pasted on to the drying boards with the grain side up and then slowly moved through the drying kiln, in which of course, the temperature and humidity must be very carefully controlled. The drying time is approximately four to six hours and it should result in a final moisture content of the skins of between 10 and 12%.

When the hide leaves the kiln, its quite brittle, and it then has to be tempered or wetted back again, usually using a spray of water to readjust the moisture content of the skin to approximately 25%.

After this process, the skin goes to a machine known as a staking machine, which very vigorously moves the leather back and forth, flexing it and it makes it very pliable and soft. And then after that again, it is hung up in a forced air dryer. A buffing operation can then follow if it is desired to enhance the characteristic of the grain of the skin and then the skin can finally be finished off by an application of a wide variety of lacquers and sealants. Very often, skins are then pressed under very high pressure to smooth out any wrinkles. This process can also be used to emboss the product with a desired design. That is of course up to the tannery, what they wish to produce there.

It is noticable that throughout the process of tanning any skin, there is a great tendency to continually stretch the skin. The reason for this is of course that tanned skins are sold on the basis of square footage and, therefore, the greater square footage through stretching of the skin within reason, that can be achieved, the greater revenue can be derived from the final product.

The process of tanning which has just now been outlined, is the process for basically tanning leather, tanning skins from which the hair is removed. Any possible potential tannery in Coppermine would of course also have access to a large number of fine furs, primarily white foxes which could be tanned. However, after a very careful analysis of that process for tanning fine furs, and the realization of the relatively high value that these furs still have as compared to the seal skins or caribou hides, it is my conviction that the tanning of fine furs should not be contemplated for a tannery in Coppermine. The process is several times more complicated than the one just outlined and any mistakes made in the tanning process could be extremely costly. Also the weight per skin of fine furs is relatively small and the shipping of these skins to a recognized and expert established old southern tannery would be relatively small per skin as compared to the leather type hides previously described. So, for the purpose of this report, I will not deal with the tanning process of fine furs in detail.

The report on the feasibility of establishing a tannery in Coppermine has been delayed for some months. This was done de-

liberately in order to be able to present a report which, hopefully, will be up to date and valid for some time to come. At the time when the report was supposed to have been presented, at the end of October, there was still too many uncertain factors in regards to the seal skin market. There was such factors as the upcoming meeting of the European Parliament. At which meeting on the agenda appeared an item to ban the importation of Canadian seal skins and the product made from Canadian seal skins. I felt it was necessary to wait for a result of the meetings of the European Parliament. These results did come in, but they were very inconclusive. In as much as the European Parliament decided not to impose any import restriction, but merely to permit each member of the European community to make their own decisions. Therefore, further delay became necessary to await these individual decisions, and, relatively recently, the most important of these decisions was handed down when the West German government announced that they had banned the importation of Canadian seal skins and products made from Canadian seal skins.

This one nation ban effectively kills the seal skin market for the forseeable future. Traditionally, the European market has bought between 75 and 80% of the total Canadian raw seal skin production. Of this amount, West Germany alone accounts for 75%, so the West German ban is virtually as strong a ban as the entire European community ban would have been.

Unfortunately, for people living in the Arctic, this ban applies equally to all seal skins, there is no distinction between seal-skin pups and adult seal skins, the types of seal, whether they're harp seals, common seals, ring seals, harbor seals, whatever they may be, or by the method used in killing these seals. To the southern market, a seal is a seal and unfortunately, by banning the seal skins and the products thereof, there really is no market left for the product. Not only is there no market for the raw skins, there is also no market for the tanned seal skins, and there is likewise no market for any product made from the tanned seal skins.

As I outlined earlier, it is perfectly feasible from a technical point of view to tan skins in Coppermine. However, from an economic point of view, it is impossible to consider a tannery at this time. It simply does not make sense to tan a skin which cannot be sold and then to produce something out of that skin, which again cannot be sold. My recommendation, therefore, is that at this time, or at least until such time as the market drastically changes, and this change would probably have to come by the development of markets elsewhere in the world to make up for those lost in Europe. But until such time, we should not entertain the idea of establishing a tannery in Coppermine at this time.

The capital costs for machinery to operate a tannery of the scale that we had planned for Coppermine, based on the number of skins which we thought we had available to us now, the machinery required is quite numerous, we require large tubs

for soaking, great big laundry machines for washing and cleaning the skins, we need the very large tanning drums, we need the cleaning machines, scales to weigh things out on, we need the paddle vats, fleshing machines, machines to cut thin, dressing benches, centrifuge and heating rooms, the kilns, the buffing machines, the splitting machines, many other types of machines and the estimated cost of this, and it is rather difficult to get precise costs, because the tanning industry is a very, very closed-knit circle and they are very reluctant to give out precise information as to the cost of anything. But a reasonably good estimate would be that the cost of this machinery would be between $250,000.00 and $300,000.00. This does not count the building which would be necessary to house this. Such a building would have to be large, extremely well ventilated, concrete floor and have access to tremendous amounts of water. Also the disposal of the used tanning chemicals, the process of disposing of these chemicals in a method that would be satisfactory to the public health requirements presently do not exist in Coppermine. The chemicals used are quite dangerous chemicals if not handled and disposed of properly.