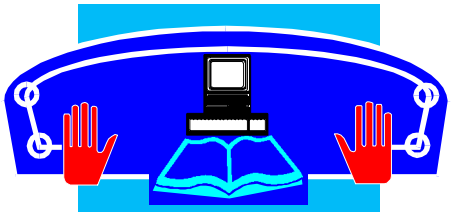

Guidelines And Ground Rules For The Utilization Of Forest Resource In The Northwest Territories; Stage 1

Type of Study: Operations Management

Date of Report: 1975

Author: Cd Shultz And Company

Catalogue Number: 4-1-7

SCHULCO

C. D. SCHULTZ & COMPANY LIMITED

Foresters and Consulting Engineers
Economists and Biological Scientists

32S Howe Street Vancouver, Canada V6C 2AI

May 23, 1975
Our File: T39. 3.12

Mr. Douglas Patriquin, Chief
Research and Evaluation Division
Department of Economic Development
Government of Northwest Territories
Arthur Lain Building
Yellowknife, N.W.T.

Dear Mr. Patriquin:

As you have requested, we have examined certain aspects of the utilization of forest resources in the Northwest Territories and we submit herewith our report. This study supersedes a more extensive proposal and service contract which was issued on July 9th, 1974, by the Division of Industry and Commerce, Department of Economic Development.

The total study program on which we have embarked is in three stages, as follows:

Stage I confines itself to a five-year horizon and deals with improving the performance of existing operations. (A separate study has been made of the feasibility of a poleyard sawmill operation in Fort Simpson and Upper Liard region) .

Stage II will identify long-term possibilities for the expansion of manufacturing and resource use beyond the five-year term. At this stage, also, more intensive examination will be made of selected items identified in Stage I.

Stage III will provide long-term guidelines for the maximum utilization and optimum management of the forest resource.

The report submitted herewith covers the findings of Stage I only.

... 2

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May 23, 1975
Our File: T39.3.12

In summary, our findings are:

1. The most important, and continuing requirement for the viability of the existing operations is the provision of competent management to the publicly-owned plants and of management advice to the privately-owned mills.

2. The second recommendation is the provision of programs of training, directed specifically at native personnel. Such programs would cover concepts of productivity, quality of output and responsibility, in addition to operating procedures.

3. The third requirement refers to product planning and marketing. In this regard we recommend concentration on those products commanding the highest selling price in the market. A further recommendation is that consideration be given to the formation of a central marketing agency which would conduct the marketing of products from publicly-owned mills and supply marketing advice to the private operators.

4. Our fourth recommendation is for the continued retention, at least for the immediate future, of expert consulting advice for the operation of all manufacturing plants in the Territories.

5. Examination is made of operating costs and indications are given of the opportunities which exist for the improvement of these costs.

A considerable amount of additional material will be found in the body of our report which will, we trust, contribute to improved performance of the forest products industry of the Northwest Territories.

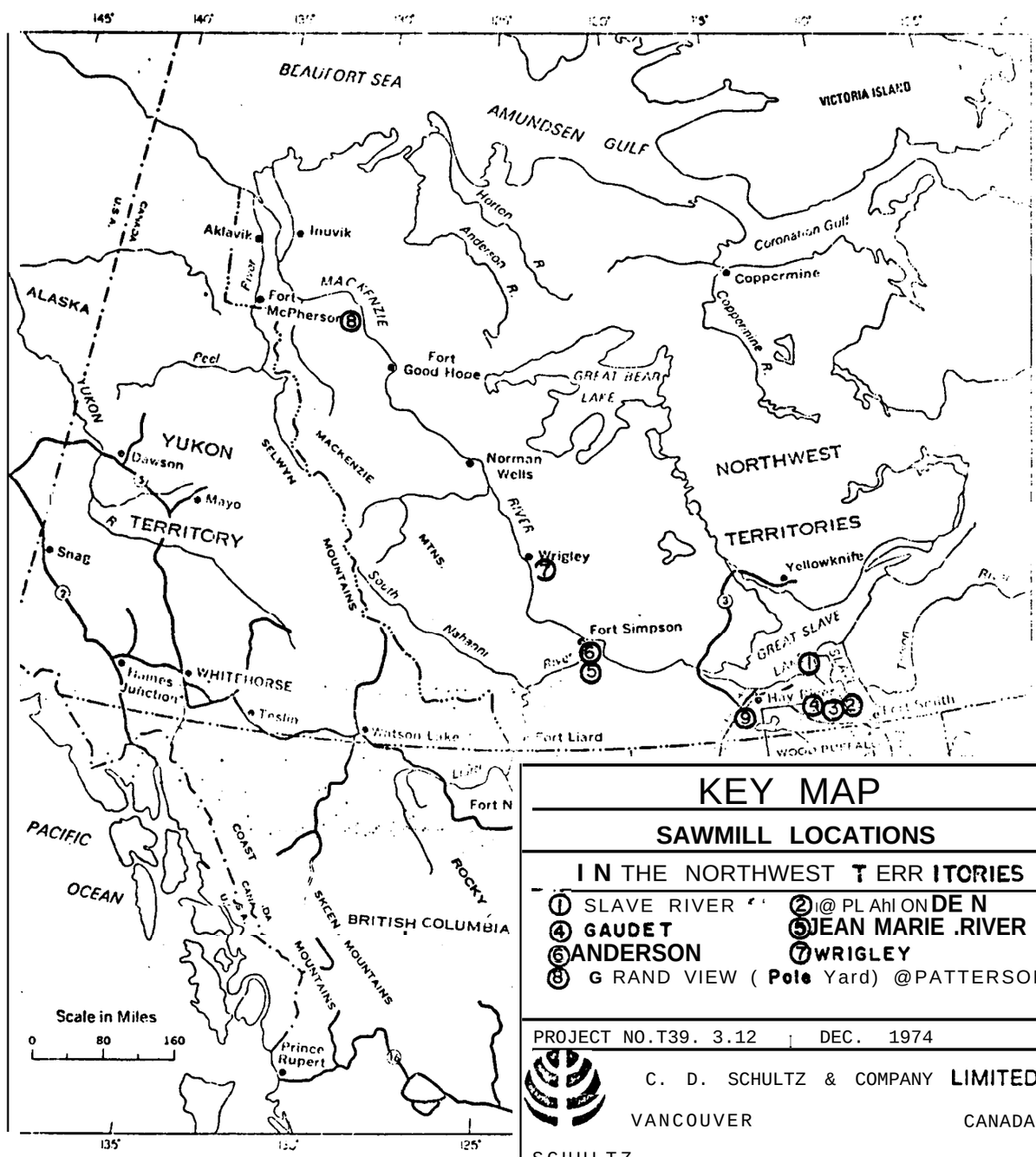
Yours truly,

C.D. SCHULTZ & COMPANY LIMITED

J.R. Blackstock

J.R. Blackstock
Vice President

NORTHWESTERN CANADA



KEY MAP

SAWMILL LOCATIONS

IN THE NORTHWEST TERRITORIES

1. SLAVE RIVER
2. @ PLAHLON DEN
4. GAUDET
5. JEAN MARIE RIVER
6. ANDERSON
7. WRIGLEY
8. GRAND VIEW (Pole Yard) @ PATTERSON

PROJECT NO. T39.3.12 | DEC. 1974

C. D. SCHULTZ & COMPANY LIMITED

VANCOUVER CANADA

SCHULTZ

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APPENDICES

GUIDELINES AND GROUND RULES
FOR THE
UTILIZATION OF FOREST RESOURCE
IN THE
NORTHWEST TERRITORIES

STAGE I

1.0 OBJECTIVES OF THE STUDY

The main objective of this stage of the study is to produce Guidelines and Ground Rules for the upgrading of the existing timber processing operations in the Northwest Territories covering a five-year period.

Recognition is given to social constraints and their effects are discussed. The requirements to insure the financial viability of existing government operations are identified. Areas of expansion are confined to existing operations, government and private. Policies in respect to independent operations are proposed in line with their overall performance.

2.0 TIMBER SUPPLY FOR EXISTING OPERATIONS

2.1 Sources of Basic Data

Forest inventory information for the Northwest Territories is contained in a number of reports of past studies and surveys. The information is of mixed quality and reliability, having been prepared by a variety of agencies, collected at different times and compiled to non-uniform specifications.

The former Federal Department of Fisheries and Forestry prepared a series of Northern Survey Reports for different areas. These documents have been consulted in the development of estimated timber volumes by area for presentation in the present report. Reference was also made to "The Forest Resources of the Mackenzie Delta" by D.H. Wellstead, published in 1968 and to a number of other reports, including this consultant's 1970 preparation for the Government of the Northwest Territories. (In this last-named report, the drainage of the Liard River was given only cursory attention, since this area had been specifically excluded from the terms of reference of the earlier study.) Finally, a number of government officers and private individuals were consulted.

2.2 Location of Timber

In general, stands containing merchantable timber are located on alluvial flats along the major rivers. The bulk of the merchantable timber areas in the Northwest Territories lie within the drainages of the Slave River, Upper Mackenzie, and the lower Liard. The remaining merchantable forest stands are scattered along the Mackenzie River and its

tributaries all the way to the delta area.

According to inventory data and estimates, the total timber volumes are:

Volumes in Million Cubic Feet

Area	Saw Timber
Slave River	47
Buffalo River	2
Liard River	864
Upper Mackenzie River	65
Lower Mackenzie River	37
Mackenzie Delta	134
Arctic Red River	4
TOTAL	1,153

2.3 Available Timber to Existing Mill Operations

2.3.1 Fort Resolution

The area tentatively allocated to this sawmill is the timbered area on each side of Slave River from Slave Lake in the north to Grand Detour in the south. This area should be sufficient to supply the annual requirement of 3 MM B.M. for at least ten years.

2.3.2 Fort Smith

In this area there are three semi-portable sawmills with a total wood requirement of 3 MM B.M. per

year. Their area of operation is along the Slave River from Fort Smith in the south to Grand Detour in the north. It is estimated that their present wood requirements can be sustained for at least ' ten years.

2.3.3 Hay River

This sawmill owned by Mr. Patterson has a capacity of 2 to 3 MC4 B.M. per year. The wood supply has been partly from Territorial Land and from Federal land. With the increased capacity it is expected that the mill can not maintain production at the present location for a very long time. There are some 5 MM B.M. of saw timber available on the J3uffalo River and some unknown volumes located in the Cameron Hills. After these areas have been logged the mill will have to be moved to new location on the Mackenzie River.

2.3.4 Fort Simpson

There are two mills in this area, the Jean Marie River Sawmill with an annual capacity of 1.5 to 2.5 MM B.M. and the Anderson Sawmill with a capacity of 0.5 MM B.M. These two mills have been cutting timber on Territorial land and some on Federal land. It is expected that the wood requirements for the next ten years can be met with timber from Federal land along the Upper Mackenzie River and at the confluence of the Liard River.

2.3.5 Grand View

At the present time the Grand View operation consists of a logging operation and a pole yard. There is probably sufficient timber to sustain this operation for ten years, but the Forest Department may be reluctant to issue permits before the actual timber volumes have been established by inventories and the ecological implications have been determined.

2.3.6 Arctic Red River

This sawmill is no longer in operation. There are plans to move the mill to Fort Simpson.

2.3.7 Fort McPherson

A sawmill in this area has been used to cut rough lumber for sidewalks and construction in the village and the mill is no longer in operation. There is a limited supply of sawtimber available on the Peel River, mostly in the Yukon Territory.

2.3.8 Mackenzie Delta

At the present time there are no mills operating in this area. The woods operations are for poles and piling to be used in the villages and for the oil drilling operations.

2.4 Species and Quality of Available Timber

The main merchantable species is white spruce (Picea glauca . This species extends from the Alberta border in the south to the Mackenzie Delta in the north. Trees growing on alluvial flats commonly attain sizes over 100 feet in height and 16 to 30 inches in diameters. Balsam poplar (Populus balsamifera) is found in pure stands and mixed with white spruce south of Norman Wells. The large mature and overmature trees are often defective.

The bench land usually has a greater variety of species than the alluvial flats. Trembling aspen (Populus tremuloides) , black spruce (picea mariana) , white birch (Betula papyrifera) and in the southern portion lodgepole pine (pinus contorta) and jack pine (Pinus banksi.ana). Trembling aspen, pines and black spruce attain small sawlog sizes.

Non-merchantable species such as willows (Salix SPP.) and alders (Alnus spp.) occur tnrouqhout the area.

2.5 Characteristics of Local Species

White spruce (picea glauca) is a softwood species ‘cry similar in mechanical properties to other spruces. The heartwood and sapwood are practically white. It is nonporous, has a fine, moderately uneven texture. In the Northwest Territories the tree is of relatively slow growth and may take up to 250 years to reach a diameter of 30 inches breast height.

White spruce is easy to work and gives good service in ordinary construction although it is not very durable when exposed to weather. The wood can be sliced or peeled for manufacture of plywood.

Lumber of white spruce is easy to air dry and kiln dry. Stock containing spiral grain or compression wood is subject to twisting, crooking and bowing. White spruce is one of the most important species in the Canadian pulp and paper industry.

Lodgepole pine (Pinus contorta) and jack pine (Pinus banksiana) grow in the south western part of the territory. The two species resemble each other in appearance and properties. The wood is light in color. It is soft and straight grain but often very knotted. Both species contain resin ducts which may be troublesome, when working. The wood is suitable for general construction, mining timber and, if treated, for poles, pilings, and railway ties.

Black spruce (Picea mariana) grows together with other species or in pure stands. The trees very seldom grow to large size and therefore are less important as saw timber. The wood is very similar to that of white spruce but is somewhat heavier, stronger, harder and more durable. It is used for construction lumber, pilings and mine timber.

Balsam poplar (Populus balsamifera) is a hardwood species of light weight with light brown heartwood and nearly white sapwood. The tree is normally of rapid growth and consequently the wood is porous with fine even texture.

The wood is light in weight, weak in bending and compression, poor in ability to stay in place if not properly seasoned. It is moderately easy to kiln dry but difficult to air dry. Balsam poplar is used principally for pallet, box and crate lumber. High grade logs can be cut into veneer and furniture stock. Balsam poplar and aspen are suitable for pulp and paper production.

Trembling aspen (POPUIUS tremuloides) is the most widely distributed species in North America. Aspen is usually a small tree 8 to 12 inches DBH, fast growing but short lived and highly susceptible to decay. The wood is light in weight, weak and soft and has a moderately large shrinkage. It is difficult to air dry and warp easily. Aspen is principally a pulpwood species, but it is also sawn into lumber for boxes and crates material. In the Northwest Territories the aspen is used for pallets and ore containers.

2.6 Area of Operation and Access

At the present time the Territorial government is participating in the operation of the Fort Resolution sawmill and the Jean Marie sawmill at Fort Simpson. The Fort Resolution mill will continue to harvest timber along the Slave River. At the present time logs are trucked over winter roads for approximately 17 miles. The maximum hauling distance will be from Grand Detour at the southern limit. The distance is approximately 65 miles.

The local people prefer that the Jean Marie River Sawmill continue to operate within a short distance of the present location. The hauling cost should be

minimal. Under the present regulations the cost of haul road construction is subsidized by the Federal government.

River drives and towing of log rafts on the rivers may not be allowed due to potential damage to the spawning grounds and fisheries.

2.7 Environmental Impact

The Mackenzie Valley contains the northernmost extension of the boreal forest in Canada. Excavations have revealed evidences of past tree cover 60 to 70 miles further north than at the present time, thus indicating a degeneration of growing condition. Climatic changes, removal of tree cover and destruction of groundcover may easily upset the environmental balance and further' retreat of the tree cover. In the Mackenzie Delta there is evidence that removal of tree cover by man's activities has turned the forest land into tundra.

If the forest is to be maintained as a renewable resource to benefit future generations, it is important that all wood operations are carried out in a planned and orderly manner.

Some of the expected problems are:

a) Accumulation of logging debris will increase fire hazard and insect attack.

b) Selective logging according to tree size often cause extensive blow down of the residual stand. This is wasteful and reduce the productivity of the forest stand.

c) Establishment of natural regeneration after logging is often uncertain due to poor or infrequent seed crops and poor germination conditions on unprepared ground.

d) Clearing of winter roads and landings causes melting of permafrost which may cause erosion and land slides.

e) Obstruction of creeks and river channels caused by debris from logging operations has damaging effects on spawning grounds, fisheries and wildlife.

To ensure a continuous supply of wood the following steps and precautions must be taken:

a) Make up-to-date inventory and forest cover maps of the forest area to determine the annual allowable cut for each operating area or management unit.

b) Expected problem areas should be reserved for environmental protection.

c) Each operator should be required to prepare a plan of logging operations. This will normally include: the estimated volume and areas to be logged annually, method of logging, type of equipment? location of roads and landings, forest protection and slash disposal.

d) On the best sites planting should be considered right after logging before brush cover becomes a problem.

e) Logging debris should be spread out and the mineral soil exposed by mechanical equipment for better germination of natural regeneration.

f) Logging along the riverbanks and creekbeds should be restricted to eliminate erosion and obstruction to water flow.

2.8 Reforestation

2.8.1 In some areas natural regeneration of commercial timber is uncertain. Planting and artificial regeneration should be considered for areas which can be productive.

Some of the apparent advantages of a reforestation program are:

a) Areas which have been burned over or logged would be restocked with desirable species.

b) Losses in production due to the 10 to 15 years delay in natural regeneration would be minimized.

c) The forest rotation period would be reduced thereby increasing yield by possibly 100 percent or more over natural regeneration.

d) The reversion of logged-over areas to tundra would be reduced.

e) Erosion would be reduced.

f) Opportunities for additional employment and training would be made available for local people.

2.8.2 The program would involve site preparation, seed , collection, planting or seeding, and the operation of a nursery.

Despite all advantages with reforestation, the high cost would preclude replanting of all logged-over areas. The best sites and expected problem areas would have to be selected for immediate replanting. Other areas would have to be logged in such a manner that natural regeneration would be practical.

The cost of planting may be treated as part of the total logging cost.

If the annual production was 12 million board feet, the area to be logged would be approximately 1,200 acres. If 50 percent of the area, say 600 acres, were replanted the estimated cost would be:

	cost Per Acre	Cost Per 600 Acres
Site preparation (burning and scarifying)	$ 20	$12,000
Cost of Plants, 600 plants per AC @ 7¢	42	25,200
Labor and Supervision	40	24,000
Total Costs	$102	$61,200

*Total cost per M B.M. = $61,200 / 12,000 M B.M. = $ 5.10

*This cost does not include supervision and the cost of a nursery.

2.8.3 Successful reforestation techniques for these latitudes have not yet been developed. The first tasks in such a program would be the execution of a number of trials and pilot operations, covering the following activities:

Site preparation: burning season and technique, scarification machinery and technique;

Selection of species and provenance;

Seed treatment;

Nursery practice;

planting technique;

Tending of plantations;

2.9 Forest Inventory Program

Forest inventories and cover maps provide essential knowledge for the planning of full utilization of the forest.

Only partial inventories and forest cover maps have been compiled for the Northwest Territories. Many of these are out of date.

A full utilization program would require new inventories, an updating of the old inventories and forest cover maps.

Stage I of this study does not include new inventories for the entire forest region as the annual harvest is restricted to the existing operations.

Forest inventories indicate the species distribution, timber sizes, quality and stand locations. The operator may be required to pay for compiling the inventory as part of his logging cost.

In general a forest inventory project consists of:

a. Air photography

b. Photo interpretation and classification of forest and ground cover

c. Mapping from air photographs and base maps

d. Field sampling of forest for volumes, species and stocking

e. Compilation of areas and timber volumes

f. Summarizing of findings and preparation of cover maps.

For planning of logging operations and road building a photo and map scale of 1:25,000 should be adequate.

2.9.1 Area to be Included in Forest Inventory

Area	Number of Map Sheets 1:25,000	Base Map Gross Area Sq.Miles	Detail Mapping Sq.Miles	Number of Air Photo-graphs 1:25,000
Lower Slave River	44	3,784	1,200	340*
Cameron Hills and Hay River - Ft. Providence	72	6,192	2,000	570
Lower Liard River	64	5,504	2,500	710
Mackenzie River Ft. Providence to Norman Wells	132	11,352	2,300	660
Norman Wells to Grand View	48	4,128	500	150
Grand View to Treeline	156	13,416	9,000	2,550
TOTAL	516	44,376	17,500	4,980

2.9.2 Cost Estimates

The following are rough estimates based on contract fees for air photographs and consultant fees to supervise local staff. The estimates are for a complete inventory of the forested area along the Slave - Liard and Mackenzie Rivers. (The relative costs for smaller areas would be higher.)

*1973 Photographs available.

Air photography 17,000 sq.miles @ $5.00	$ 85,000
Photo interpretation, forest classification	42,000
Mapping and drafting	124,000
Field Sampling	37,000
Compilation	30,000
Disbursement for subsistence and transport	70,000
Supervision and administration	79,000
Total	$467,000
20% Contingency	93,000
TOTAL	$560,000

Cost per sq. mile $\frac{\$560,000}{17,500} = \$32.00$

3.0 STATUS OF THE EXISTING INDUSTRY

3.1 Present Situation

3.1.1 The limited forest resource of the Northwest Territories has not attracted major forest processing companies to the area.

At the present time there are ten portable and semi-portable sawmills, a few primitive pole yards and a recently established operation for processing components for log houses.

The main sawmills have been established at the request of native people with government aid. It was hoped that through this medium, the people could be trained to operate their own industry to produce useful products from a renewable resource.

3.1.2 A measure of success has been achieved in the following areas:

a) Some local people have been trained and partially trained as machine operators, technicians, and skilled workers.

b) Lumber, pallets, poles, posts and other products have been successfully processed to acceptable market standards.

c) People have earned money which has given them a sense of accomplishment.

3.1.3 Some of the problem areas are:

a) Lack of competent management and administration.

b) Insufficient planning of finance resulting in serious shortages of working capital.

c) Weather and road conditions which impede the deliveries of goods and services.

3.1.4 Private sawmill operators generally have been unsuccessful with a few exceptions. They operate intermittently and are motivated by a quick, often elusive profit **with** a low capital investment.

3.2 Ownership and Capacity

3.2.1 Government and private operations are listed with potential production:

Government	**1975** Potential Production
Slave River Sawmill	3,000 MB.M.
Jean Marie River Sawmill	2,000 M B.M.
Fort McPherson - Non-Active	
Arctic Red River - Non-Active	
Private	
Gaudet	1,000 MB.M.
Plamondon	2,000 MB.M.
Patterson	2,000 MB.M.
Anderson	500 MB.M.
Wrigley	
Kimbal - Unknown	
Total -	10,500 MB.M.

Jean Marie River Co-op Sawmill is owned by the Co-op and operated with Government assistance and because of the Government management responsibility is referred to as a Government sawmill.

A minor volume of rough lumber has been produced by individuals with makeshift equipment in the Fort Providence area, possibly 50 M B.M. in a single year. None is scheduled for 1975.

The value of the 1975 potential lumber production at $150 per M B.M. would be $1.8 million.

The value of the milling facilities is estimated to be about $1.3 million, excluding the logging equipment.

3.2.2 At the present time there are no business licenses or other requirements other than a permit from the Northwest Lands and Forest Service. The government provides a subsidy for road building. Where the operator constructs an access road which connects with the highway, the Forest Service will contribute 50 percent of the cost, up to a maximum of $20,000. Tenure of millsites is usually established by means of a government lease.

3.3 Infrastructure

3.3.1 Radio telephones and stations, conventional telephones and government mail are generally used for communicating.

3.3.2 Local sources of supplies and services are limited but improving. Saws, special mill equipment, and mobile equipment are usually supplied from Alberta or British Columbia.

3.3.3 Fuel and lubricating supplies are usually stored in large quantities as seasonally required.

3.3.4 Food, clothing, and household needs are available in most settlements.

3.3.5 Most of the sawmills are manned by Indians who are local residents. Employees with special training and skills are usually brought in from other areas.

3.3.6 Dwellings, buildings and equipment installations are usually portable or semi-portable. The most satisfactory dwellings are custom built or properly designed for Arctic conditions. Logging camps are uncommon.

3. 3.7 Oil or propane gas are used extensively for heating and cooking.

3. 3.8 Unused sawmill by-products are usually burned or disposed of as land fill.

3. 3.9 Sawmills are usually located with road or water access adjacent to, or at variable distances up to sixty miles from settlements or villages. Some sawmills are completely isolated for short periods.

3.4 Markets

3.4.1 Stage I of the study program is confined to existing operations. C.D. Schultz Preliminary Report of 1970 estimates a domestic market of 17 MM B.M. by

1975, which could be serviced by local sawmills.

Furniture stock and interior trim were not included in this estimate. Aspen and balsam poplar can be' utilized for these products.

Existing sawmill operations have timber cutting permits for 10.5 MM B.M. in the current season.

Approximately 80 percent of the population and 75 percent of the lumber market is in the south Mackenzie district. The main sawmills are located in this area within 125 miles of Hay River.

Hay River being adjacent to water transportation is the best distribution point. Access is also available to a highway, railway, and major air service.

Yellowknife uses a large volume of lumber but is not a dominant distribution center.

The Mackenzie Delta area consumes large volumes of poles, posts, and piling. This trend will probably increase with the expansion of the oil and gas industries. Some sawmill by-products are also being used in this area.

Sources of supply for poles, posts, and piling are currently being considered in the timber belt of the Mackenzie Delta at Fort Simpson.

This report does not include the harvesting and marketing of forest products from the Upper Liard River area.

3.4.2 The volume of forest products being used annually in the Western part of the Northwest Territories is calculated as follows:

	M B.M. 1975
a) Shipments in, and local production	30,000
b) Uses:	
Industrial	5,000
Government	5,000
Domestic	20,000
Total:	30,000

c) Average per capita x population @ 1,000 B.M. =
27,000 x 1,000 = 27,000 M B.M.

3.4.3 Classification of Product Use:

Poles, piling and posts	4,000
Timbers	1,000
Small timbers and plank Dimension	17,000
Boards and coverage material	8,000
Total:	30,000

- continued

3.4.3 - continued

By-products

Sawdust Shavings Bark Wood fibre	}	No use at present
Grand Total:		30,000

3.5 Performance - Technical and Financial

The forests of the Northwest Territories could be described as fringe-type timber which is slow-growing, scattered in patches over great distances and necessarily must be logged and processed when seasons are favorable. The quality of the timber is comparable to spruce and poplar throughout central Canada.

The timber offers little attraction to processing companies outside the Northwest Territories. To the people of Northwest Territories the timber is precious. It is a renewable resource which is a valuable source of building material for local needs. It provides income for those engaged in the primary and secondary phases of the industry.

Supplies are expensive. Transportation and communications are difficult. The area comprising one-third of Canada is populated with less than 40,000 people, the majority of whom are natives.

The native people desire to develop the forest processing industry in their respective villages and settlements. The opportunity to do this in an orderly, sensible and viable manner requires the leadership advice, and assistance of highly skilled, dedicated and educated people.

The needs to deal with the problems are:

a) An orderly master plan of development by stages.

b) An infusion of capital and working capital.

c) Organization and key people to implement the program and provide leadership for the people.

d) Effective control and direction of planning and expenditures.

3.5.1 Sawmill operators in the Northwest Territories are mainly long-term residents or indigenous people with limited means and previous milling experience.

3.5.2 Most of the sawmills have been erected piecemeal with new and secondhand equipment. Much of this was purchased because it was available at reasonable cost.

3.5.3 In the initial stages this situation was inevitable. It emphasizes the probability that the lumber industry in Northwest Territories will be developed for local people to serve domestic markets.

3.5.4 The production during the past five years of all the Territorial sawmills was less than five million board feet per year. Only one operation in Hay River was reported to be financially viable.

3.5.5 The continued operation of the existing sawmills will depend on financial, technical, marketing, and administrative assistance as the Department of Economic Development of the Government of Northwest Territories is making available at the present time.

3.5.6 Strong pressure is being exerted by native people on the government for assistance to upgrade and expand mill performance.

3.6 Projected Developments

Current plans for the existing industry for the next five years include the following:

Slave River and Jean Marie Cooperative Sawmills will continue to operate at their present location.

The owners of existing private operations report that they intend to remain in operation.

The native Band at Fort Good Hope has proposed that a sawmill be established in conjunction with the existing poleyard. Fred Sorenson operates the poleyard with native labor and would also operate the sawmill. The estimated Capital Costs, Operating Costs, and Sales data have been obtained from the poleyard operator (F. Sorenson), oil company representatives, a building supply company in Inuvik, and local residents. Further study is required to confirm the viability of this operation.

3.7 Description of Government Involvement

3.7.1 Federal-Territorial Division of Responsibilities

Government responsibility for economic development in the Northwest Territories (N.W.T.) "is split between the Federal and Territorial Governments, following the provisions of the Northwest Territories Act and practices evolved subsequently.

The Federal Government retains management and control over all non-renewable resources and certain renewable resources, including oil, gas minerals, water, lands, forests, marine mammals and fish. The Territorial Government is responsible for management and control of game, and for most government functions and services that have to do with the people.

In those sectors in which the Federal Government has resource responsibility, it also has responsibility for control of exploration and exploitation of the resource. The Territorial Government is responsible for development of industry based on use of resources as inputs, i.e., processing of resource inputs and subsequent stages of production.

The Federal Government has overall responsibility for management and protection of the forest resource in the N.W.T., and collects stumpage fees from timber operations. Control is exercised through the issuance of cutting permits for harvesting the timber. Permits are issued through the

Northwest Territories Lands and Forest Service, (N.W. L.F.S.) which has its headquarters in Fort Smith. The N.W.T. L.F.S. reports to the Regional Manager of Water, Lands, Forests and Environment in Yellowknife, and then through the Regional Director of Resources (Yellowknife) to the Northern Natural Resources and Environment Branch of the Department of Indian and Northern Affairs.

The Government of the N.W.T. has the governmental responsibility for development of industry based on the forest resource, including sawmills and any further processing of products. Within Designated Control Zones or Block Land Transfer Areas established around communities, in which authority over land has been transferred from the Crown to the Commissioner, the Territorial Government exercises powers similar to the N.W. L.F.S. including control of the forestry resource and collection of stumpage fees, through the Commissioner's Land Ordinance.

3.7.2 The Government of the Northwest Territories

The Department of Economic Development is involved in the lumber and forest products industry through a number of programs operated by the Division of Industry and Commerce. These include:

1) Northwest Territories Lumber Grade Stamping Agency Purpose

   To improve through grading, the quality of lumber being produced by mills in the N.W.T.

To administer a continuing program designed to train personnel of mills to become qualified graders and log scalers, and to control through licensing and inspection, the grading of lumber produced in the mills in the N.W.T.

To provide a coordinating service to the mills and to prospective buyers with regard to requirements for lumber.

Terms of Reference

To grant to mills with qualified graders on staff the right to use the official stamp of N.W.T. Lumber Grade Stamping Agency.

To license qualified personnel as graders and scalers.

To provide regular inspections by a qualified inspector to ensure Canadian Lumber Standards are being maintained.

To charge a minimum of 25¢ for M B.M. of all lumber produced.

Chief Inspector

G. Carlson, Forest Technician, N.W.T. Lands and Forest Service.

2) Tote Trail Assistance

Tote trails are low standard roads designed to provide access to a resource project which is in the exploration or development stage. Winter' roads are included in this category. Tote trails may be constructed to whatever standard that will provide suitable access to the property= Tote trail contributions are financed and administered by Territorial Government from Federal funds. Amounts may be up to 50 percent of construction but still not exceed $20,000.

3) Financial Assistance to Industry

Limited funds are available for grants to assist industries or to purchase inventories, in order to finance working capital needs.

4) The Department is currently providing financial and managerial assistance to two sawmills (in Fort Resolution and Jean Marie River) , the purpose of which is:

The provision of management services to those operations which would otherwise not be capable of maintaining continuity of operations.

To provide assistance in the area of financial planning, cash flow projections, cost accumulation for product costing and subsequent cost analysis for decisions involving alternatives (eqUiPment product decisions) and to provide further assistance in negotiating required

levels of capital and operating funding from Commercial Sources and other government agencies e.g., I.E.D.F.

To provide assistance by locating and obtaining the services of such competent managerial and technical staff as may be required to promote efficient sawmill operations.

To develop effective wood product marketing programs and channels to take maximum advantage of the N.W.T. lumber markets as well as South of 60° latitude.

To canvass the lumber market in full and obtain sales for all produce produced through the operation of the mill.

3.8 Regulations and Policies

The Federal Government issued the 'Territorial Timber Regulations" in 1962 which empowered the Forest Service to:

a) Issue cutting permits.

b) Issue licenses.

c) Collect fees and stumpage assessments ($1.00 per M B.M.).

In sawmill operations the stumpage assessment has been based on the outturn of lumber which represents about 40 percent of the actual volume of timber cut.

Assessments for stumpage on poles and piling are based on lineal footage.

The Forest Act is to be revised during March, 1975. It is expected that the stumpage will increase substantially.

The "Territorial Land Act" of 1950 also contains regulations which require that land use permits"be obtained before proceeding with logging and milling developments. Instructions are issued to licensees.

The Forest Officer is empowered to include special clauses in any cutting permit which may involve:

- Fish Protection
- Forest Protection
- Wildlife Protection
- Water Conservation
- Soil Conservation
- Slash and Debris Disposal
- Pollution Control
- Easement Regulations for Roads, Power Lines, etc.

Harvesting policies cannot maximize benefits for all people. Processing industries are subject to the sensitivity of the general public and groups who have special interests.

Some of these are: Environmentalists, people interested in selection of special species and products, road systems engineers, recreation, wildlife and fisheries groups, parks boards and several others.

Cooperation and understanding must be promoted to overcome problems which may arise when a proposal is made to establish a forest processing industry.

There are no positive guarantees that the forest industry can expect timber in perpetuity unless they can show that it is in the interest of the majority of the people.

4.0 OPERATING REQUIREMENTS AND CHARACTERISTICS OF EXISTING GOVERNMENT OPERATIONS

4.1 Timber Requirements

4.1.1 The timber needs for the existing Northwest Territories Government sawmills are:

Sawlogs	M B.M. (Estimated) 1975	1976	1977	1978	1979	(5 Years) Total
Slave River Sawmill	3,000	4,000	5,000	5,000	5,000	22,000
Jean Marie Sawmill	2,000	3,000	3,000	3,000	3,000	14,000
TOTAL	5,000	7,000	8,000	8,000	8,000	36,000

4.2 Capital Investment, Cost and Profit Potential

4.2.1 The capital cost, operating cost and profit potential before taxes is estimated under present operating conditions as follows:

4.2.2 Slave River Sawmill:

1. Capital Cost (Replaceable value of existing equipment PLUS equipment required for normal operations)

a) Logging

1 Crawler tractor	$100,000	
2 Rubber-tired skidders		Contract
3 Logging trucks		Contract
1 Gravel truck	20,000	
Tools, power saws, etc.	100,000	
TOTAL	$220,000	

b) Sawmill

Power	$ 50,000
Sawing equipment	100,000
2 Fork-lifts	70,000
Sorting equipment	30,000
Planer	30,000
Shop equipment & tools	40,000
TOTAL	$320,000

c) Buildings

Shop & garage	$ 10,000
Store room	7,000
Power House	7,000
Office	5,000
Sawmill building	15,000
Utilities and site preparation	40,000
TOTAL	$ 84,000

d) Working Capital Allowance $435,000

e) Recapitulation - Capital Requirements

Logging	$220,000
Sawmill	320,000
Buildings	84,000
Working Capital	435,000
TOTAL CAPITAL REQUIREMENT	$1,059,000

2. Operating Cost (Present)

	Per M B.M.
a) Logging (Contract	
Falling)	
Limbing)	
Skidding)	
Roads & Landings)	52.00
Hauling)	
Yarding, bucking & sorting (at sawmill))	
Stumpage)	
Supervision & overhead	**8.00**
TOTAL	$60.00
b) Sawing	
Labor	41.18
Fuel & Power	3.49
Repairs & supplies	8.52
Supervision & overhead	.12
	$53.31
c) **Equipment Lease-Purchase ($26 .00 - $19. 31)**	**$ 6.69**

		Per M B.M.
d)	Planning	$ 12.73
e)	Administration and Sales	15.91
	TOTAL COST of Lumber for Sale PerM?3.M.	$148.64
f)	Gross Profit per M B.M.	
	Mill net price	133.50
	Production cost	149.64
	Profit (Loss)	($15. 14)

4.2.3 Jean Marie River Co-op Sawmill

1. Capital Costs (Replaceable value of existing equipment in operating condition)

a)	Logging	
	1 Crawler tractor	$30,000
	1 Rubber-tired skidder	20,000
	1 Gravel truck	10,000
	Tools, power saws, etc.	20,000
	TOTAL	$80,000

b) **Sawmill**

Power	$ 25,000
Sawing equipment	50,000
2 Fork-lifts	40,000
Planer	20,000
Shop equipment tools, etc.	10,000
TOTAL	$145,000

c) Buildings

Shop	5,000
Store room	5,000
Power house	3,000
Office and camp	15,000
Utilities and site preparation	15,000
TOTAL	$ 43,000

d) Working Capital Allowance $257,560

e) Recapitulation - Capital Requirements

Logging	$ 80,000
Sawmill	145,000
Buildings	43,000
Working Capital	257,560
TOTAL CAPITAL REQUIREMENTS	$525,560

2. Operating Costs (Present)

		Per M B.M.	
a)	Logging		
	Falling	3.49	
	Limbing	1.86	
	Skidding		
	Roads and landing	19.18	
	Yarding and sorting		
	Stumpage	1.00	
	Supervision and overhead	17.09	
	TOTAL	$42.62	$42.62
b)	Sawing		
	Labor	39.01	
	Loading	10.92	
	Fuel and power	3.34	
	Repairs and supplies	8.34	
	*Supervision and overhead		
	TOTAL	$61.61	$61.61
c	Planing		
	Labor	11.27	
	Fuel and power	1.67	
	Repairs and supplies	1.26	
	Warehousing	.63	
	Loading	2.72	
	**Shipping, tallying and grade stamping		
	*Supervision and Overhead		
	TOTAL	$17.55	$17.55

*provided by Territorial Government.
**Included in Labor COStS.

		Per M B. M.
d)	Administration and Sales	$ 7.00
	Cost of lumber for sale per M B.M.	128.78
e)	Annual Gross Profit	
	Mill net price	133.50
	Production cost	128.78
	GROSS PROFIT	$ 4.72

4.3 Labor Requirements

4.3.1 Included in the summary of labor requirements are Slave River and Jean Marie River Co-op. Some duplications exist between logging, sawing and planer personnel due to seasonal overlapping.

It is assumed that all employees will be local people except for technicians brought in. Trainees, employed for limited periods are not included.

Daily rates include 20 percent fringe benefits.

4.3.2 Labor Requirements - Slave River Sawmill

	Days	# Men	Daily Rate	Total	Per M B.M.
Logging (Basis 3 MM B.M. 1975 Production)					
Supervisor	100	1	$100	$10,000	
Failers	80	4	54	17,280	
Slashers	80	2	40	6,400	
Equipment operators	100	4	50	20,000	
Watchman	100	1	40	4,000	
Mechanic	100	1	50	6,000	
TOTAL		13		$63,680	$21.22
Sawmill (Basis 3 MM B.M. 1975 Production)					
Supervisor	120	1	$100	$12,000	
Mechanic	120	1	50	6,000	
Fork-lift operators	120	2	50	12,000	
Sawyer	120	1	60	7,200	
Tail Sawyer	120	1	50	6,000	
Edgerman	120	1	50	6,000	
Trimmerman	120	1	45	5,400	
Pilers	120	4	45	21,600	
TOTAL		12		$76,200	$23.40
Planer (Basis 3 MM B.M. 1975 production)					
Supervisor	60	1	$100	$ 6,000	
Planerman	60	1	50	3,000	
Trimmerman	60	1	45	2,700	
Grader	60	1	60	3,600	
Pilers	60	3	45	8,100	
Fork-lift	60	1	50	3,000	
TOTAL		8		$26,400	$ 8.80

4.3.3 Labor Requirements - Jean Marie River Sawmill

	Days	# Men	Daily Rate	Total	Per M B.M.
Logging (Basis 2 MM B.M. 1975 Production)					
Supervisor	100	1	$ 80	$ 8,000	
Failers	80	3	54	12,960	
Slashers	80	2	40	6,400	
Equipment operators	100	3	50	15,000	
Watchman	100	1	40	4,000	
Mechanic	100	1	50	5,000	
TOTAL		11		$51,360	$25.68
Sawmill (Basis 2 MM B.M. 1975 production)					
Supervisor	120	1	$ 80	$ 9,600	
Mechanic Foreman	**120**	**1**	50	6,000	
Fork-lift operator	120	1	50	6,000	
Sawyer	120	1	60	7,200	
Edgerman	120	1	50	6,000	
Trimmerman	120	1	45	5,400	
Pilers	120	3	45	16,200	
TOTAL		9		$56,400	$28.20
Planer (Basis 2 MM B.M. 1975 Production)					
Planerman	60	1	$ 50	$ 3,000	
Trimmerman	60	1	45	2,700	
Grader	60	1	60	3,600	
Pilers	60	3	45	8,100	
Fork-lift operators	60	1	50	3,000	
TOTAL		7		$20,400	$10.20

4.4 Production Output

4.4.1 Optimum daily production objectives in Territorial Government sawmills can only be reached if the lQg diameter average exceeds 16 inches.

Since the average diameters are 12 inches for Slave River and nine inches for Jean Marie, the production output by volume is restricted accordingly.

When production is interrupted due to equipment failure it is assumed that the crew will be delegated to other work or temporarily laid off.

4.4.2 Suggested 1975/76 Production Output of Northwest Territories Government Operations: Lumber.

Product	Slave River Sawmill		Jean Marie Sawmill		Grandview Sawmill	
	%	M B.M.	%	M B.M.	%	M B.M.
Timbers 8″ X 8″ to 12″ x 12″	4	120	6	150	26.7	400
Plank - Rough Sawn	10	300	10	250	20	300
Dimension 2" x 411 x 6" (Narrow widths)	50	1,500	48	1,200	23.3	350
Dimension 2" x 8" x 10″ (Wide widths)	25	750	28	700	20	300
Boards	11	330	8	200	10	150
TOTAL LUMBER	100%	3,000	100%	2,500	100%	1,500

4.5 Training

4.5.1 The role of trained technicians and workmen in the forest industry is extremely important. Processing lumber from logs is an art which involves skill and the practical application of science.

Training is the medium which assists people to work together competently and safely to achieve common objectives. Native people demonstrate inherent dexterity in their ability to master the necessary skills.

An effective training program for logging and sawmill personnel can be divided into classroom and "on the job" training. (See Appendix V for outline of Classroom Training course for Sawmill Personnel.)

4.6 Management

4.6.1 General Conditions

Due to the sparse population, extreme climate, lack of living and service facilities, and other infrastructural problems a manager's duties are very difficult in Northwest Territories sawmills.

The management function requires a person with a wide variety of talents and experience combined with the desire and dedication to operate a viable operation.

Individual units are too small to support the cost of employing qualified managers.

Past experience indicates that government aid programs offer the greatest hope to provide the management for a viable forest industry in the Northwest Territories.

4.6.2 Basic Requirements

In Stage I of the "Guidelines" study, emphasis is placed on upgrading existing government sawmills and independent operations.

Since individual operations cannot afford a general manager, the Department of Economic Development presently provides management.

A production manager is required at each sawmill. General and sales management, administration, and long range planning should be a government responsibility. Staff training is presently the operating manager's responsibility.

Progress is already evident at Slave River and Jean Marie operations during 1974.

This policy should remain in effect at least for the next three to five years.

The function of the operating manager is to:

a) Manage the company's logging, milling and shipping operations in an efficient and profitable manner.

b) Provide for training and upgrading of the work force on a progressive basis.

c) Develop sound administrative procedures and business practices.

d) Develop planning strategy, budgets and long and short-term recommendations for the Board of Directors.

e) Hire suitable personnel within the established framework of the established policies of the Company.

f) Maintain sound accounting, administrative and business practices and submit regular records and reports to the Board of Directors.

g) Provide supervision of staff such as woods foreman, mechanic, accountant, and of milling operations.

h) Provide a budget forecast of products and production for the sales outlet.

i) Keep good communications at all levels within the company.

j) Create a good company image.

k) Promote good housekeeping, attractive, well presented products and uphold all safety regulations.

4.7 Operating and Cost Schedules

4.7.1 Planning

A knowledge of basic relationships among costs is a useful planning tool for managers.

Cost relationships can be a guide for evaluating operating performance and locating variances where cost improvements should be made.

Target costs can be established which will assist an. operator in planning strategies for implementing alternative production procedures.

Historical cost data kept up-to-date over a period of time can be useful in preparing operating budgets.

Some factors which limit continuous operation throughout the year are:

1. Cold Weather - waterways are frozen from November to June which restricts shipping by barge.

   During extreme temperatures below, 20" Fahrenheit, men and equipment cannot function normally or efficiently.

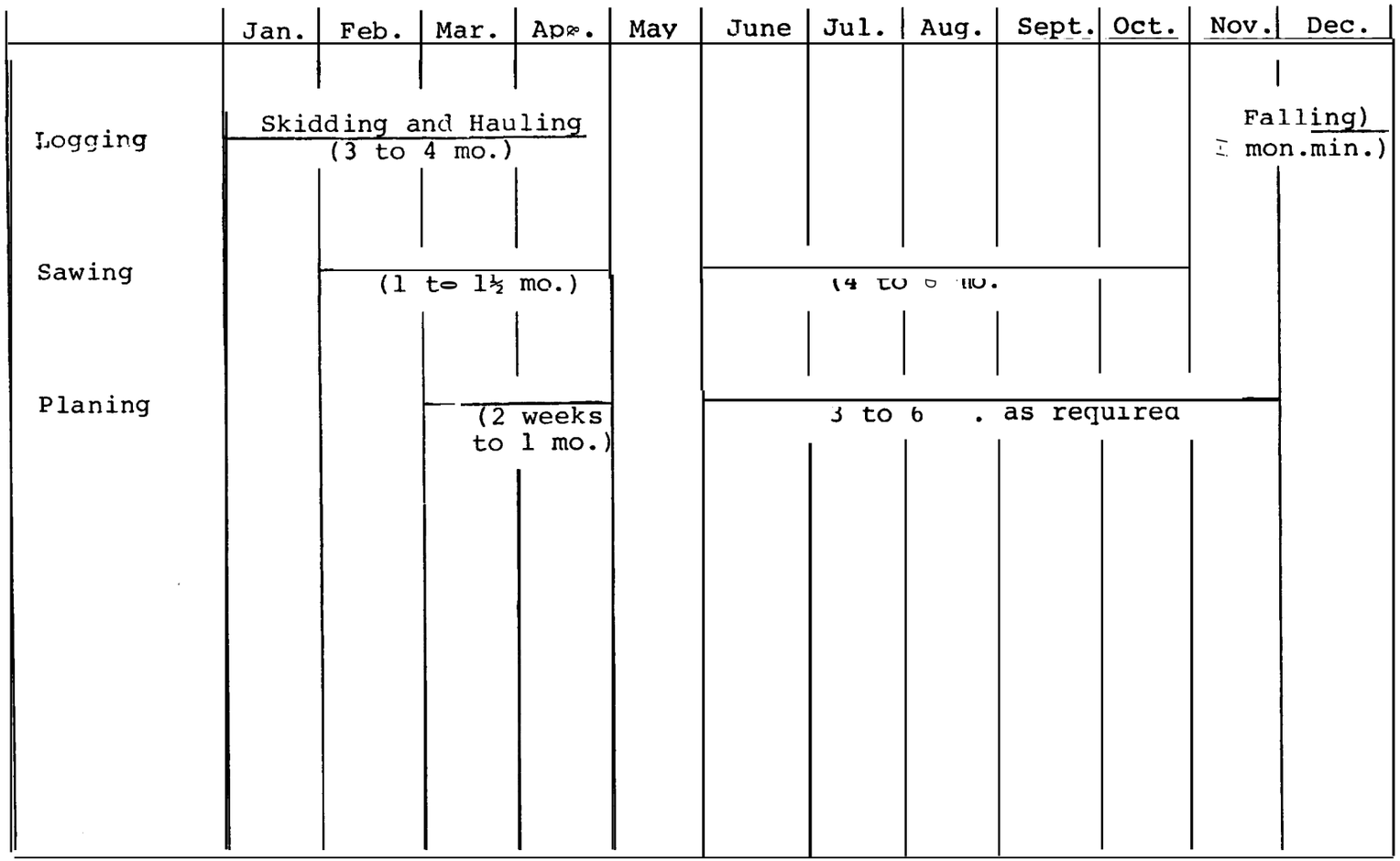
2. Break up - this is the season when (warm weather) the ground becomes too soft and boggy to permit mobile equipment to operate.

The following schedule is a guide for logging and milling operations: (see next page)

SCHULTZ

LOGGING, SAWMILLING, AND PLANING SCHEDULE

Operating Periods - Optimal Seasonal Ranges



4.7.2 Cost Relationship and Target Costs.

The following table illustrates the cost relationship of each stage of operation related to the anticipated average price of lumber F.O.B. mill on a Percentage basis. The base price F.O.B. mill is expected to average $150 per M B.M. for 1975. (Lumber sales managers confirm this.)

The percentage of cost for each stage would be escalated with inflationary trends but not necessarily in direct relation to short-term lumber prices. Lumber prices may increase to $200 per M B.M. for limited periods during the peak of the building season.

Column I represents a six-year average for primarily spruce interior type sawmills. (Stumpage on competitive basis.)

Columns 2 and 3 represent target objectives for Slave River and Jean Marie River Sawmills under present conditions.

for primarily spruce interior-type sawmills.

TARGET COST RELATIONSHIP TABLE

1975 Targets, NOT ACTUALS.

Description	1 6 year Industry Average cost $ Per M B.M.	%	2 Slave River Sawmill Per M B.M.	%	3 Jean Marie Sawmill Per M B.M.	%
Log Cost						
Stump age	12.00	8	1.00	.5	1.00	.5
Labor	22.50	15			25.68	7.
Supplies	7.50	5	Contract		8.42	6.
Depreciation	7.50	5	52.00	34		
Overhead	7.50	5	7.00	5.5	7.00	5.5
Total	57.00	38	60.00	40	42.10	29
Sawing						
Labor	15.00	10	23.40	16	28.20	20
Supplies	6.00	4	12.00	8	12.00	8
Depreciation	4.50	3				
Overhead	4.50	3	7.81	5	7.00	5
Total	30.00	20	43.21	29	47.20	33
Planing						
Labor	5.10	3.4	8.80	6	10.20	7
Supplies	2.40	1.6	2.40	2	3.00	2
Depreciation	3.00	2.0				
Overhead	4.50	3.0	4.50	3	4.50	3
Total	15.00	10.0	15.70	11	17.70	12
Shipping						
Labor	3.00	2.0	included		included	
Supplies	2.25	1.5	in		in	
Overhead	2.25	1.5	planing		planing	
Total	7.50	5				
Cost of Lumber Sold	$109.50	73	$118.91	80	$107.00	74
Sales Realization	$150	100	$150.00	100	$150.00	100

39% (Would be 49% with $1.00 stumpage)

50%

2%

4%

SCHULTZ

SUMMARY AND INDICATION OF PROFITABILITY

	Industry Average (3,000 M B.M.) Annual cut	Slave River Sawmill (3,000 M B. M.) Annual cut	Slave River Sawmill (5,000 M B.M) Annual cut	Jean Marie Sawmill (2,000 M B.M) Annual cut
Sales Realization	450,000	450,000	750,000	300,000
Cost of Lumber Sold	328,500	356,730	594,550	214,000
Gross Profit	**$121,500**	$ 93,270	**$155,450**	$ 86,000

Cash flow projections have been compiled for the following cases: (See Appendix VI)

Case 1) Slave River Sawmill operating at existing costs and present lumber prices.

2) S.R.S. operating at target objective costs and increased lumber prices.

3) S.R.S. operating at target objective costs, increased lumber prices and production.

4) Jean Marie River Sawmill operating at existing costs and present lumber prices.

5) Jean Marie River Sawmill operating at target objective costs and increased lumber prices.

5.0 OPPORTUNITIES FOR EXPANSION AND IMPROVEMENT

5.1 Products and Marketing

The creation of a central marketing agency should be considered.

The functions of the Marketing Agency would be:

a) Keep a revolving inventory of all lumber, by size, grade, state of manufacture, location.

b) Keep up-to-date information concerning markets, prices, trends, demand, products in short supply and over supply, shipping tariffs, government taxes, etc.

c) Conduct direct negotiations with customers concerning lumber sales, payment schedules, discounts and trade practices.

d) Act as a controlling body to regulate advances for financing working capital equipment payments and other business expenditures.

5.1.1 Present Situation

No firm policies have been established toward setting up market objectives and forecasts for the production of existing mills. Sales contracts between mills and customers have been plagued with late lumber deliveries and non-performance.

The sawmill operators have not created a good image for the industry. A grade stamping program for lumber standards has been instituted but reports have not been kept up-to-date. The Canadian Lumber Standards Association is willing to be helpful and cooperative.

Recent experience at Fort Resolution illustrates that lumber can be well manufactured, grade stamped and attractively packaged.

Lumber by-products, such as bark, wood waste and shavings, are now burned.

Some poles and pilings are currently marketed, mainly in the Mackenzie Delta.

5.1.2 Lumber Grading Authority

The Northwest Territories Grade Stamping Authority was organized as a functioning body in 1970. It"" is licensed under the Authority of the Canadian Lumber Standards Association which is made up of members of the Sawmill Processing Industry.

The principal reasons for establishing and maintaining a licensed lumber grading program are:

1. Purchases of lumber are guaranteed a standard of measure and quality which is identified on the lumber.
2. Lumber suppliers are protected against **lawsuits** due to failure in stress graded lumber.

3. Building codes and financial lending institutions require grade stamped lumber.

4. Established prices can be justified by identifying the relative values of each grade.

5.1.3 Annual Marketing Plan and Forecast.

A plan and annual forecast is required which includes:

1. An analysis of the local market requirements by product.

2. An estimate of the production volume of each operation including each product.

3. An estimate of the cost of producing the products.

4. A forecast of the probable price structure of each product.

5. Policies must be established for price structures, credit risks, discounts, guarantees, claims, quality control and general trade practices.

5.1.4 Steps to be Taken in a Market Survery.

The steps which would be necessary to estimate the market requirements for lumber in the Northwest Territories are:

1. Establish the volume demand by customer, by contacting building contractors, retail yards, mining companies, oil companies, government, railways and transportation , companies.

2. List volumes moved by major truck companies, railways and water transportation companies.

3. List all building permits and estimate volumes used.

The information should include: estimated prices past and future; volumes by sizes and quality requirements; shipping schedules and payment contract arrangements.

Market acceptance of local products should be analysed.

This information will provide a necessary and useful guide for lumber producers in the Northwest Territories. It is too involved for a single company and should be done by a professional analyst.

5.2 Possible Uses of Local Timber Resources

5.2.1 Posts, poles and pilings are the simplest products to process and the most valuable. The subject of poles and piling has been dealt with in another study.

Lumber represents the greatest volume of demand. The local market for lumber exceeds the local supply. At present less than 50 percent of the volume of timber harvested is converted to lumber. This can be increased to more than 60 percent with the use of narrow kerf saws. Stage I of this project does not include recommendations for band-saw equipment.

Approximately 10 percent of the timber volume is bark. At present most of this is burned as waste or used for land fill.

Upwards of 35 percent of the wood volume is unuseable wood, sawdust and shavings. A small amount of this is used for fuel. Some residue in the form of chips, sawdust and shavings is being used by oil companies.

5.3 Economic Opportunities

5.3.1 Background

Government and private sawmills historically have been uneconomic in the Northwest Territories. Without financial assistance, business management advice and direction, opportunities for success have been limited.

In the past two years the cost of labor, standing timber, equipment and supplies, lumber and transportion has accelerated rapidly in North America and throughout the world.

The economic climate for a wood processing industry in the Northwest Territories has improved.

Lumber originating outside the Northwest Territories has two economic disadvantages in competition with locally produced lumber for local markets such as:

a) Higher stumpage rates up to $18.00 per M B.M. compared to $1.00 for Northwest Territories.

b) Freight rates which vary from $10.00 to $60.00 per M B.M. depending on the distance.

The development of a local forest processing industry appears to be timely.

5.3.2 Recapitulation of Economic Benefits

The economic benefits for the existing operations would include wages for workmen, profits, spinoff to secondary industries and trades people.

5.3.3 Based on the 1974/75 production forecast the direct wage benefits would be:

	# Men	$ 000	
Government Mills			
Slave River Sawmill	33	170	
Jean Marie River Sawmill	27	130	
	60	$300	$300
Private Mills			
Gaudet	10	40	
Plamondon	20	80	
Patterson	25	100	
Anderson	5	20	
TOTAL	60	$240	$240
GRAND TOTAL	120		$540

5.3.4 The gross income of forest products is subject to market fluctuations. The following is an estimate for the 1975 season production.

	Low	Medium	High
Government Mills (Lumber)			
($130, $150, $180 per M B.M.)			
Slave River	$ 390,000	$ 450,000	$ 540,000
Jean Marie River	260,000	300,000	360,000
($150, $175, $200 per M B.M.)			
TOTAL	$ 650,000	$ 750,000	$ 900,000
Private Mills			
($130, $150, $180 per M B.M.)			
Gaudet	$ 130,000	$ 150,000	$ 180,000
Plamondon	260,000	300,000	360,000
Patterson	325,000	375,000	450,000
Anderson	65,000	75,000	90,000
TOTAL	$ 780,000	$ 900,000	$1,080,000
GRAND TOTAL	$1,430,000	$1,650,000	$1,980,000

5.4 Market Analysis of Present Output

5.4.1 1975 Consumption Estimate

C.D. Schultz 1970 Report estimated a per capita use of 1,000 B.M. lumber products per annum or more than three times the Canadian National average.

The total usage of lumber in 1969 was 25 MM B.M. of which 12.5 MM B.M. was yard lumber of the type which can be produced locally.

The 1974 population is estimated to be 27,126 (See Appendix I) which would indicate a usage of 13.5 MM B.M. yard lumber.

5.4.2 Classification of Forest products to be Used - 1975

		M B.M.	
a)	Yard Lumber		
	I - Housing - 2% of 27,000 540 homes @ 15 M B.M.	8,100	
	II - Industrial, Mining Oil, Commercial, etc.	6,000	
	Total		14,100
b)	Prefabricated Buildings		
	I - Housing	8,100	
	11 - Others - Utility and Business Buildings	5,000	
	Total		13,100
	TOTAL LUMBER CONSUMPTION 1975		27,200 M B.M.

Poles and Piling:

5.4.3 1975 Markets By Product

Lumber	M B.M.
Dimension 2" x 4" to 2" x 12"	16,000
Boards, Sheathing, Coverage	8,000
Timbers	2,000
Others	1,200
Total Lumber	27,200

5.4.4 Local Markets by Area - 1975

	Population	Total Market	Market To Be Serviced Locally
I - Lumber			
Mackenzie Delta	7,639	7,700	3,800
Slave-Mackenzie Area	19i487	19,500	9,800
Total	**27,126**	**27,200**	**13,600**

5.5 Factors Affecting Markets Locally and Outside Northwest Territories

5.5.1 Outside Influences

The main influence on lumber markets outside the Northwest Territories originates in Canada south of the 60th parallel. In 1973, Canada produced about 14 billion board feet of lumber of which over 80 percent was exported to the United States and other countries offshore.

The Northwest Territories are normally compelled to pay prices prevailing in the Canadian and export markets, plus the transportation costs from lumber producing areas. Conversely, if the Northwest Territories exports lumber south of the 60th parallel, the price structure and demand is influenced by external conditions.

All lumber, whether imported to, or exported from Northwest Territories is subject to freight costs which have a direct influence on the price structure and demand.

Canada does not depend on the Northwest Territories for its lumber requirements and, in this competitive market, lumber must meet size specifications and grade standards as required by the Canadian Lumber Standards Association and the Canadian Building Code Regulations.

5.5.2 Local Factors

Northwest Territories lumber production has averaged less than 10 percent of the local demand.

Sawmill operators have had very little information concerning lumber prices and market conditions to guide them. Production performance and quality control have been poor. Often the lumber was not sawn to standard sizes.

These factors have not induced local lumber users to support the local producers.

If local sawmill operators produce lumber to required standards and deliver shipments within contract dates a local market exists which can absorb the entire local production.

With low stumpage costs, shorter hauling distances and excellent quality timber, local sawmill operators have some distinct advantages over outside suppliers in the local market.

5.6 Identification and Assessment of Other Products

5.6.1 Primary Objective

The main objective in each sawmill is to recover the maximum volume of lumber with minimum waste. "Other Products" will include roundwood specialties and by-products from sawmill waste.

When sawing softwood lumber the most commonly used products should be selected for their high values as far as possible such as:

2"x 12 11, 10" and 8" - lengths 12 , 14' and 16' for joists

2" x 6" - 16' and longer for ceil: ng joists and rafters

2" x 4" - 8' and 16' for studs, framing and rafters

Timbers, plank, and some boards may also be sawn to order but it is unwise to inventory large quantities.

5.6.2 Other Products

Piling, poles and posts can be selected from camp run logs and sold for $200 or more per M B.M. Only limited quantities are required. The specifications are rigid and restrict the use of timber to a narrow classification.

Aspen and balsam poplar can be utilized for mine blocking, studs, pallets, furniture components, and other lumber where strength is not a primary factor.

Sawmill by-products such as sawdust, shavings, edgings and trim-ends should be utilized as fuel, insulation, land fill, oil absorbent, or any use which is economic. The limited volume of sawmill by-products precludes feasibility studies for composition board or other products in Stage I period of development.

Some sawmill by-products may have to be burned in an incinerator.

5.7 By-Products of Existing Operations

5.7.1 Percentages of All Products

The following is an approximate breakdown by volume percentage of all products recovered from log input:

a) By-Products

I -	Log trim loss, defective wood, undersize ends, breakage, flared butts	3%
II -	Sawdust	18%
III -	Edgings and slabs	16%
IV -	Lumber trim ends	5%
V -	Shavings	8%
	Total	50%
b)	Lumber	50%
	GRAND TOTAL	100%

5.7.2 Relative Values

At present, there is no value in by-products from lumber processing in the existing sawmills. Some waste wood is retrieved for fuel for which no charge is made.

A temporary market exists for wood chips, shavings and sawdust as an absorbent for oil drilling operations in the Mackenzie Delta region. The reported value is $50 per *unit.

*A Unit is roughly equivalent to 85 cubic feet of solid wood or 1 M B.M. lumber volume.

The volume of lumber by-products has been so small that no one has bothered to find markets for it. As the volume of lumber by-products increase a study should be conducted to explore market potential.

In areas where the population is more dense, ' lumber by-products are converted to pulp, particle-board, fireplace logs, and a variety of products which range in value from $4.00 to $50.00 per *unit.

5.8 Planning Requirements for Sustained Operations

Planning requirements for sustained operations include:

a) Updating of forest inventories and production of new maps to establish reliable information at location of standing timber, its volume and growth.

b) Development of harvesting policies which will be compatible with the interests of:

   Processing industries, environmentalists, fisheries and wildlife management? recreation, watershed topography, soil preservation, road systems and forest protection.

c) Calculation of the allowable annual cut by development area.

d) Forest management plans by development area.

*A Unit is roughly equivalent to 85 cubic feet of solid wood or 1 M B.M. lumber volume.

e) Feasibility studies for industrial development.

f) A program for implementation.

5.9 Attitude of Federal Government

The administration of the forest land, with the exception of minor private and municipal lands, is the responsibility of Northern Natural Resources and Environmental Branch of the Department of Indian Affairs and Northern Development. The Regional administration center is at Fort Smith with district offices at Fort Smith, Fort Simpson, Inuvik, and Yellowknife. Sub-district offices are at Hay River, Norman Wells, and Fort Liard.

It is the policy of the Department to see that forest resources are developed and utilized to the greatest benefit of people of the Northwest Territories. Employment opportunities and production capabilities are to be optimized in N.W.T. industries. Timber cutting permits and land use permits are issued by staff of this Department. They also collect fees and stumpage payments and inspect operations.

At the present time the "Territorial Timber Regulations" of 1962 are being revised. Increases in stumpage may be expected as the markets improve. New regulations may be included in the Act, regarding protection of the forest and the environment. In addition, all wood operations must comply with the current "Territorial Land Use Regulations" based on the "Territorial Lands Act" of 1950 with subsequent amendments.

The Department appears to be in favor of continuing to support the present wood industry on the Slave and the Upper Mackenzie Regions. It is reluctant to issue permits for a major industry in the other areas before, a proper inventory has determined the standing timber volumes and annual allowable cut for a sustained yield operation.

At the present time the Department advises that it lacks the funds and the staff to embark on a major survey of the forest resources.

6.0 RECOMMENDATIONS

Recommendations for the improvement of existing operations in the short-term must recognize the stage of development and readiness for change of the native people who will be most affected. In this regard, the consultant's contacts with the various native communities and with the different operations have led to the conclusion that variations are significant. Certain common requirements can, however, be stated. These follow.

6.1 The aspirations of the native people should be recognized and served in the planning for forest industries and the operation of these industries over the next five years. These aspirations include:

The opportunity to use inherent talents and for self-expression.

The ultimate ability to sustain themselves independently of assistance from government and other agencies.

The opportunity to vary their occupation from time to time and to pursue traditional, seasonal activities. --

The opportunity to improve their standard of living, including housing.

The opportunity to develop new skills.

The retention of their status as an individual entity.

Existing Government mills will provide a pool of trained personnel for future expanded operations.

6.2 Some assistance will be necessary in the short-term future if the native people are to be successful in operating forest industries. This assistance will include:

adequate financing of the operations;
competent management and direction:
training programs;
marketing services;
continuation of outside consulting services.

6.3 Private operators may also require assistance in the following areas:

adequate allocation of timber and advance information of the capability of the resource to sustain expansion plans;

- marketing advice;
assistance in obtaining consulting services.

6.4 Operating levels and plans for expansion of existing operations must be governed by available timber supply. In some cases, known timber supply is limited, however, expansion may still be possible through improved utilization, rather than through increased log deliveries.

6.5 Close liaison with other organizations and levels of government should be maintained in all matters related to the development of the forest industry. This is particularly necessary in view of the authorities and regulations related to managing and allocating forest resources in the Northwest Territories.

6.6 Product planning should emphasize items in high demand and/or commanding premium prices. Examples are:

Spruce: Rafters, joists and load bearing dimension.
Poles, posts, piling.
Timbers, plank, boards.

Aspen: Short length lumber (non-stress bearing).
Furniture components, crating.
Pallets, mine blocking.

All Species: Unsalable by-products should be minimized, such as sawdust, edgings, shavings, and trim ends.

6.7 Viability of the existing operations will be improved as the operating costs of the various phases drop from their present levels towards the target cost figures indicated in Section 4.8.2. At present, the Northwest Territories operations have the advantage of lower than average stumpage payments. At the same time, they have some inherent disadvantages. Thus the precise target figures may never be achieved but they do indicate those areas in which the greatest opportunities for improvements exist.

6.8 Specific operating recommendations for the improved performance of each of the existing forest products enterprises are provided through the services of a sawmill consultant. These recommendations are supplied throughout the operating year and are formulated for the purpose of guiding each operation towards improved efficiency, higher revenues and lower operating costs.

APPENDICES

APPENDIX I

POPULATION

APPENDIX I

POPULATION*

1. Mackenzie Delta - Arctic Coast Area

Arctic Red River	118
Fort McPherson	735
Aklavik	733
Tuktoyaktuk	645
Sachs Harbor	155
Holman Island	263
Cambridge Bay	773
Paulatuk	103
Bathurst Inlet	
Coppermine	691
Gjoa Haven	306
Spence Bay	226
Inuvik	2,891

TOTAL POPULATION

Carried Forward 7,639

*Department of Local Government

Brought Forward		7,639
2. *Slave* -Mackenzie River Area		
Fort Simpson	747	
Fort Liard and Nahanni Butt	354	
Jean Marie River	51	
Wrigley	201	
Fort Norman	268	
Norman Wells	327	
Fort Franklin	367	
Port Radium	99	
Colville Lake	70	
Fort Providence	635	
Yellowknife Indian Village) Yellowknife)	7,200	
Rae Edzo	1,268	
Lac La Martre	175	
Snare and Rae Lakes	80	
Snowdrift	239	
Fort Resolution	672	
Hay River	2,619	
Fort Smith	2,372	
Enterprise	62	
Fort Good Hope	355	
Pine Point	1,326	
TOTAL POPULATION	19,487	19,487
GRAND TOTAL		27,126

APPENDIX II

TIMBER VOLUMES

APPENDIX II

TIMBER VOLUMES CUT ACCORDING TO
PERMITS ISSUED AND DUES PAID

Year	Lumber M B.M.	Roundwood MC.F.	Fuelwoods Cords	Dues $
1968-69	2,736	83	7,038	3,540
1969-70	5,030	187	1,263	5,794
1970-71	3,873	221	2,427	5,952
1971-72	1,405	336	2,696	5,392
1972-73	2,814	240	3,810	5,315
TOTAL 5 Years	15,858	1,067	17,234	25,993

TOTAL VOLUMES IN M C.F. FOR 5 YEARS

Year	Lumber	Roundwood	Fuelwood	Total
1968-73	2,782	1,068	1,379	5,229
		224,004		
		225,072		
AVERAGE PER YEAR	556	214	276	1,046

APPENDIX III

TIMBER PRODUCTION BY AREAS
ACCORDING TO PERMITS ISSUED
1973 - 1974

Location	Sawtimber M B.M.	Roundwood Cu.ft.	Fuelwood Cords	Revenue $
Inuvik		180,960	825	1,339.32
Norman Wells		4,794		11.25
Fort Smith	7,074	3,315	100	1,440.55
Hay River	2,850	26,474	114	462.80
Yellowknife		13*	612	187.75
Ft. Liard		1,272	80	3.25
Ft. Simpson	750	7,176	127	795.72
TOTAL	10,674	224,004	1,858	$4,240.64

*Land Clearing

APPENDIX IV

MEAN BREAK-UP AND FREEZE-UP DATES

APPENDIX IV

MEAN BREAK-UP AND FREEZE-UP DATES

On locations along the Mackenzie River.

Based on observations between 1952 to 1963.

Mean break-up date is when the water is free from ice.

Mean freeze-up date is when the water is frozen over.

Location	Break-Up	Freeze-Up
Aklavik	May 31	October 12
Fort Good Hope	June 1	November 8
Fort Norman	May 27	November 14
Norman Wells	May 29	November 13
Fort Providence	May 12	December 18
Fort Providence	May 17	November 26
Fort Smith (Slave River)	May 15	November 15

APPENDIX V

SUGGESTED OUTLINE FOR TRAINING COURSE FOR SAWMILL PERSONNEL

APPENDIX V

SUGGESTED OUTLINE FOR TRAINING COURSE FOR SAWMILL PERSONNEL

Length of course: 20 sessions,

1-1/2 to 2 hours each

Proceedings: Lectures take about 20 minutes followed by questions, discussions, slides, or other illustrative material.

Typed copies can be provided taken from taped recordings or previously prepared by lecturers.

Details may be arranged through C.D. Schultz & Company Limited.

OUTLINE OF THE COURSE

DAY 1:

1. Introduction

Description 'of the objectives of the course such as:

a) why it is necessary,
b) the subject areas to be covered,
c) what the person attending the course is expected to do,
d) what the course will do for the person.

Question Period - Discussion.

2. People and Work Habits

The role which people play in the wood processing industry. Factors which enhance and limit their usefulness and effectiveness.

A description of the physical and mental requirements to do the job.

A guide to the volume and quality of work which can be accomplished in a given time.

Question Period - Discussion.

3. Timber Supply

A description of available timber by specie, size, quality and volume. An analysis of possible recovery of quality and value by product volume.

Organizing delivery and storage of logs from booms, etc.

Question Period - Discussion.

4. The Mill

The wood processing plant as a tool to convert logs to useful and valuable products.

General and overall description of the milling operations and the function of each station.

Question Period - Discussion.

DAY 2

5. Production Methods

The importance of improved methods in production and maintenance. The value of increased recovery from the log.

Question Period - Discussion.

6. Secondary Processing Equipment

Description of pony headsaws, edgers and sawmill resaws. Their function, swamp areas required, programming production and grade recovery. Operating techniques.

Question Period - Discussion.

7. Planers and Moulders

Purpose of planing. Description of the equipment, function and maintenance. General layout of planers, trimming and chain, including Eudloaders.

Question Period - Discussion.

8. Dry Kilns

Description and function of dry kilns. Types of kilns. Use and operating techniques. preparation of lumber to be dried types of stripping equipment and operation. Calculation of moisture content of lumber. Use of moisture meters.

Question period - Discussion.

DAY 3

9. Product Presentation

Quality control in sawing, trimming, drying, planing, end stamping, wrapping, bundling and crating. Use of palletts and modular containers.

Question Period - Discussion.

10. Shipping

Yard storage, types of mobile handling equipment and operation. Stowing on rail cars, barges, trucks and ships. Calculation of weights and volumes for shipping costs. Invoicing and compiling bills of lading.

Question Period - Discussion.

11. Economics

Guide lines for Elementary Economics of Sawmilling. Budgetting and preparation of cash flow.

Question Period - Discussion.

12. Safety

The importance of an up-to-date safety program within the plant. Personal contact to impress employees. cost of W.C.B. settlements to the industry.

Question Period - Discussion.

DAY 4

13. Job Relations

The importance of human relations on the job. The individual. Obtaining co-operation.

Question Period - Discussion.

14. Job Relations (continued)

Reviewing steps used in settling grievances. Analysing grievances before decisions are made.

Question Period - Discussion.

15. Leadership and Loyalty

Obtaining results from people. On the job instructions and results.

Question Period - Discussion.

16. Responsibility of Supervisor

Training the new employee and choosing an operator or supervisor.

Question Period - Discussion.

DAY 5

17. Saw Maintenance

Band and circular saws benchin9 tensioning, fitting, swaging, shaping, sharpening and welding.
Track and wheel alignment, balancing, grinding, strain and carriage maintenance.
Use of all saw equipment, power requirements and capacity.

Question Period - Discussion.

18. Fire Prevention

Fire hazards, location and type of fire fighting equipment? care of equipment.

Question period - Discussion.

19. General Review

Review and discussion of all subjects.

20. Conclusion

Film - Sponsored by one of the major companies.
Talk - By Executive from industrY.

APPENDIX VI

CALCULATIONS OF CUMULATIVE CASH FLOW FOR SLAVE RIVER AND JEAN MARIE RIVER CO-OP SAWMILLS, BASIS FIVE YEARS

APPENDIX VI

SLAVE RIVER SAWMILL

YEAR		1	2	3	4	5
Percent Rated Production		100	100	100	100	100
Gross Profits:	Sales $400,500 Cost $356,730	43,700	43,700	43,700	43,700	43,700
Interest 12% on Working Capital	$ 71,346					
Capital Debt	206,000					
	$277,346	33,281	33,281	33,281	33,281	33,281
Profit before Depreciation and Income Tax		10,489	10,489	10,489	10,489	10,489
Depreciation 20% of $206,000		41,200	32,960	26,368	21,094	16,875
Operating profit before Income Tax (loss)		(30,711)	(22,471)	(15,879)	(10,605)	(6,386)
Interest on Sinking Fund 10%			1,048	2,202	3,471	4,867
Total Profit before Income Tax.			(21,423)	(13,677)	(7,134)	(1,519)
Income Tax:	25% up to $50,000 50% over $50,000					
Net Profit		(30,711)	(21,423)	(13,677)	(7,134)	(1,519)
Cash Flow Profit plus Depreciation.		10,489	11,537	12,691	13,960	15,356
Cumulative Cash Flow		10,489	22,026	34,717	48,677	64,033

Basis of Calculation - Annual production 3,000 M B.M. ;
Lumber price as at January 1975 - $133.50 per M B.M. ;
Cost of Lumber sold - $118.91 (Target Average)

SLAVE RIVER SAWMILL

YEAR	1	2	3	4	5
Percent Rated Production	100	100	100	100	100
Gross Profit: Sales $667,500 cost 594,550	72,950	72,950	72,950	72,950	72,950
Interest 12% on: Working Cap. 118,910 Capital Debt 206,000 324,910	38,989	38,989	38,989	38,989	38,989
Profit before Depreciation and Income Tax	33,961	33,961	33,961	33,961	33,961
Depreciation 20% of $206,000 (Capital Debt)	41,200	32,960	26,368	21,094	16,875
Operating profit before Income Tax.	(loss) (7,239)	1,001	7,593	12,867	17,086
Interest on Sinking Fund 10%		3,396	3,625	7,104	10,711
Total Profit before Income Tax		4,397	11,218	19,971	27,797
Income Tax: 25% up to 50,000 50% over $50,000		1,099	2,804	4,992	6,949
Net Profit	$7,239)	3,298	8,414	14,979	34,746
Cash Flow Profit plus Depreciation	33,961	36,258	34,782	36,073	51,621
Cumulative Cash Flow	33,961	36,258	71,040	107,113	158,734

Basis of Calculation - Annual production 5,000 M B.M.
Lumber price January 1975 - $133.50 per M B.M.
Cost of Lumber sold $118.91 (Target Average)

SCHULTZ

SLAVI? RIVER SAWMILL

YEAR	1	2	3	4	5
Percent Rated Production	100	100	100	100	100
Gross Profits: Sales S450,000 Cost $356,730	93,270	93,270	93,270	93,270	93,270
Interest 12% on Working Capital $ 71,346 Capital Debt 5206,000 $277,346	33,281	33,281	33,281	33,281	33,281
Profit before Depreciation and Income Tax.	59,989	59,989	59,989	59,989	59,989
Depreciation 20% of $206,000	41,200	32,960	26,368	21,094	16,875
Operating Profit before Income Tax.	18,789	27,029	33,621	38,895	43,114
Interest on Sinking Fund 10%		5,529	11,267	17,270	23,438
Total Profit before Income Tax	18,789	32,558	44,888	56,165	66,552
Income Tax: 25% up to $50,000 50% over $50,000	4,697	8,139	11,222	15,582	20,776
Net Profit	14,092	24,419	33,666	40,583	45,776
Cash Flow Profit plus Depreciation.	55,292	57,379	60,364	61,677	62,601
Cumulative Cash Flow	55,292	112,671	172,705	234,382	296,983

Basis of Calculation - Annual production - 3,000 M B.M.
Lumber price forecast $150.0(1 per M B.M.
Cost of Lumber sold $118.91 per M B.M. (Target Average)

SCHULTZ

SLAVE RIVER SAWMILL

YEAR	1	2	3	4	5
Percent Rated Production	100	100	100	100	100
Gross Profits: Sales $750,000 Cost $594,550	155,45C	155,450	155,450	155,450	155,450
Interest 12% on Working Capital $118,910 Capital Debt 206,000 $324,910	38,989	38,989	38,989	38,989	38,989
Profit before Depreciation and Income Tax.	116,461	116,461	116,461	116,461	116,461
Depreciation 20% of $206,000	41,200	32,960	26,368	21,095	16,876
Operating Profit before Income Tax	75,261	83,501	90,093	95,366	99,585
Interest on Sinking Fund		9,133	18,310	27,617	37,126
Total Profit before Income Tax	75,261	92,634	108,403	122,983	136,711
Income Tax: 25% up to $50,000 50% over $50,000	25,130	33,817	41,701	48,991	55,855
Net Profit	50,131	58,817	66,702	73,992	80,856
Cash Flow Profit and Depreciation	91,331	91,777	93,070	95,087	97,732
Cumulative Cash Flow	91,331	183,108	276,178	371,265	468,997

Basis of Calculation - Annual Production - 5,000 M B.M.
Lumber Price Forecast $150.00 per M B.M.
Cost of Lumber sold $118.91 per MB.M. (Target Average)

SCHULTZ

JEAN MARIE RIVER CO. OP SAWMILL

YEAR	1	2	3	4	5
Percentage of Rated Production	100	1O(I	100	100	100
Gross Profits: Sales $300,000 Cost $214,000	86,000	86,000	86,000	86,000	86,000
Interest 12% on 20% of Working Capital ($42,800)	5,136	5,136	5,136	5,136	5,136
Profit before Depreciation and Income Tax	80,864	80,864	80,864	80,864	80,864
Depreciation - (Grant)					
Operating Profit before Income Tax	80,864	80,864	80,864	80,864	80,864
Interest on Sinking Fund 10%		5,293	10,851	16,686	22,814
Total Profit before Income Tax	80,864	86,157	91,715	97,550	103,678
Income Tax: 25% up to $50,000 50% over $50,000	27,932	30,578	33,357	36,275	39,339
Net Profit	52,932	55,579	58,358	61,275	64,339
Cash Flow Profit and Depreciation	52,932	55,579	58,358	61,275	64,339
Cumulative Cash)?1ow	52,932	108,511	166,869	228,144	292,483

Basis of Calculation - Annual Production 2,000 M B.M.

Lumber price Forecast $150.00 perM B.M

Cost of Lumber sold $107.00 perM B.M (Target Averac

JEAN MARIE RIVER CO-OP SAWMILL

YEAR	1	2	3	4	5
Percentage of Rated Production	100	100	100	100	100
Gross Profits: Sales $267,000 cost $214,000	53,000	53,000	53,000	53,000	53,000
Interest 12% on 20% of Working Capital - $42,800	5,136	5,136	5,136	5,136	5,136
Profit before Depreciation and Income Tax	47,864	47,864	47,864	**47,864**	**47,864**
Depreciation - (Grant)					
Operating Profit before Income Tax	47,864	47,864	47,864	47,864	**47,864**
Interest on Sinking Fund 10%		3,589	7,412	11,427	**15,641**
Total Profit before Income Tax	47,864	51,453	55,276	59,291	**63,505**
Income Tax: 25% Up to $50,000 50% over $50,000	11,966	13,226	15,138	17,145	19,252
Net Profit	**35,898**	**38,227**	40,138	42,146	**44,253**
Cash Flow Profit plus Depreciation	**35,898**	**38,227**	40,138	42,146	**44,253**
Cumulative Cash Flow	**35,898**	**74,125**	114,273	**156,419**	**200,672**

Basis of Calculation - Annual Production - 2,000 M B.M.

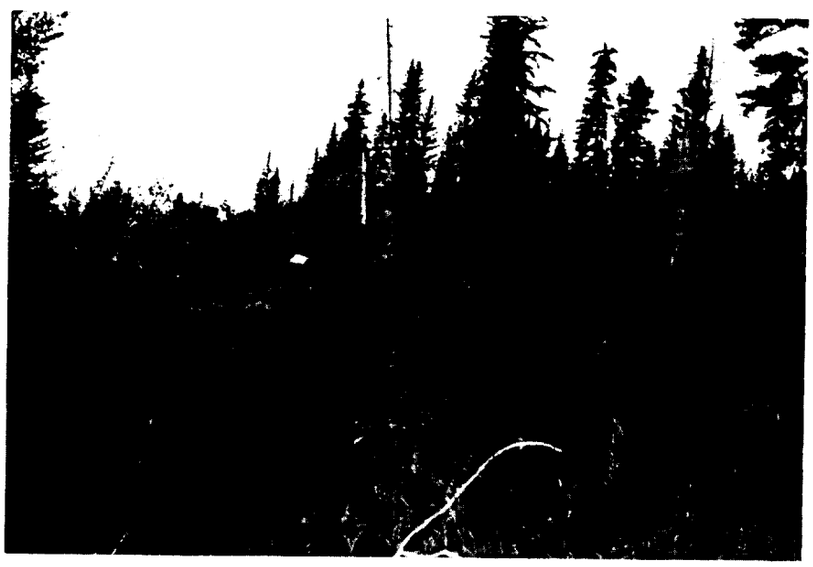
Lumber Price - January 1975 $133.50 per M B.M.

Cost of Lumber Sold $107.00 per M B.M. (Target Average

APPENDIX VII

PHOTOGRAPHS

INMATURE ASPEN-SPRUCE STAND
- NEAR HAY RIVER



NO SOFTWOOD REGENERATION 5 YEARS AFTER LOGGING
- SLAVE RIVER

FAIR SPRUCE REGENERATION 8 - 10 YEARS
AFTER LOGGING - SLAVE RIVER

SAWLOGS ON GREAT SLAVE LAKE
- FORT RESOLUTION

ASPEN SAWLOGS, PATTERSON SAWMILL
- HAY RIVER

CONTRACT LOGS IN MILL YARD
- JEAN MARIE RIVER SAWMILL

SMALLWOOD TO BE BURNED

FENCE POSTS - FORT RESOLUTION

EDGER AT PATTERSON SAWMILL
- HAY RIVER

ANDERSON SAWMILL YARD - FORT SIMPSON