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7.0 HARVESTING

7.1 Operational Planning

Before harvesting activities take place, a lot of planning is required to ensure all operations are safe, environmentally sound, and efficient.

7.1.1 Wood Requirements

In the fall of each year the Mill Accounting Department provides the Woodlands Division with an estimated wood requirement for the coming year, broken down on a monthly basis. Based on this information, a cut and delivery schedule to supply the required fibre throughout the year is developed jointly by the Operations and Planning Departments. This is usually done in the fall, prior to the completion of the **Annual Operating Plan**. Harvesting activities are planned using the following criteria:

- Harvest the **Annual Allowable Cut** (AAC) within each Forest Management District.
- Balance the Mill's requirement for deliveries of Black Spruce, and Balsam Fir.
- Minimize inventories in the woods and the Mill yard, to ensure a supply of the freshest, highest-quality fibre possible.
- Honour the commitment to the Communications Energy and Papermakers Union, to obtain no more than 35% of purchased fibre from non-union suppliers.

7.1.2 Allocation of Harvest

Harvesting Volumes

Based on the above criteria, the entire Mill requirements must then be divided among approximately 7 private contractors – 65% of the allocation to union contractors and 35% to non-union contractors. A portion of the non-union allocation is harvested on exchange or transfer areas, i.e. Corner Brook Pulp and Paper Woodlands timber limits that have been transferred back to the Crown, and from which Woodlands reserves the right to purchase pulpwood and wood chips.

Harvesting methods used (conventional or mechanical) is a major determining factor in the allocation of volumes to contractors (see Section 7.2.1 for a description of harvesting methods). Contractors harvesting wood using conventional methods typically work for 22 weeks during the summer and not at all during the winter. Mechanical contractors work approximately 40-44 weeks per year with downtime during the spring breakup, the summer (for inventory adjustment), and the Christmas season.

After determining the duration of the harvest season by contractor, the Operations

Department subdivides the entire allocation between the contractors based on past performance, number of employees and mechanical capabilities. Once this is completed, a spreadsheet is developed to ensure the Mill's demands for fibre are met, and the previous criteria are followed.

Operating Areas

After successfully completing and balancing the cut and delivery schedule by contractor, Forest Management District, spruce/fir requirements and union/non-union allocations, the next step is assigning an **operating area** for each contractor. This step is probably the most demanding and time-consuming portion of the process. Members of the Planning and Operations Departments use Forest Inventory maps to identify where contractors will work. Factors considered in this decision are:

- Size of contractor allocation (larger contract volumes require larger areas)
- Type of harvesting equipment (feller buncher/processor or harvester, rubber-tired or tracked)
- Commuting distances for contractor's employees (have people working as close to home as possible)
- Amount of timber available in an area and how much new road will be required to access it.
- Season of harvest (environmentally sensitive areas may be scheduled for winter harvesting)

Once harvesting areas are identified, the Planning Department must then complete the map exercise and prepare the **Annual Operating Plan**. The **Annual Operating Plan** indicates areas and volumes in the harvest plan, assigning individual operating areas to contractors.

7.1.3 Woodflow

After completing the **Annual Operating Plan**, the Operations Department is then responsible for developing and implementing a *Woodflow Program* that tracks wood from the stump to the Mill. The Woodflow Program tracks on a weekly basis, all pulpwood harvested and delivered by contractor, location, Forest Management District and species, based on Mill consumption levels. Some key items in this process are:

Inventory levels – Freshly cut wood makes higher-quality paper at a lower cost. It is imperative, then, to deliver fresh wood to the Mill, keeping Mill and woods inventories at a minimum.

Species control – The Mill demands consistent proportions of spruce and fir, as the uniformity of the species mix ensures a better quality of paper.

Production levels –Each contractor’s weekly production level and estimated delivery schedule must be planned and entered into the program.

Mill production levels – Mill consumption is monitored on a weekly basis and is compared to planned consumption levels. If the Mill produces more than expected, Woodlands must supply more fibre. If the Mill consumes less than predicted, Woodlands must reduce production levels accordingly.

The entire Woodflow calculations are contained on a spreadsheet that is monitored and updated on a weekly basis. Woodflow is a living document that shows current status of pulpwood inventories and predicts future status for any given period throughout the year.



Figure 7-1. Aerial view of wood inventory at Mill yard.

7.1.4 Pre-Work Meeting

Harvesting operations are conducted in areas approved by the **Newfoundland Forest Service** and the Department of Environment. Before the commencement of any harvesting operation, a pre-work meeting is held between the harvesting contractor and Operations and Planning staff from Corner Brook Pulp and Paper Woodlands. Planning Technicians supply the contractor with aerial photographs and operational maps illustrating **riparian** management zones (buffers), watercourse crossings and other information relating to the harvesting area (see the **Standard Operating Procedures, Planning**). All known operational and environmental aspects are discussed. Whenever possible, the pre-work meeting is conducted in the field.

7.1.5 Environmental Considerations

Today's harvesting operations are conducted so as to minimize **environmental impacts**. Corner Brook Pulp and Paper Woodlands has an *Environmental Management System (EMS)* in place to ensure environmental objectives are achieved. *Harvest and Road Construction Pre-Work Forms* are completed by Planning and Operations staff and the harvesting contractor, and act as a checklist to ensure all *Significant Environmental Aspects* relating to the harvesting area are addressed. These forms can be located on the *Woodlands Computer Network, EMS Manuals/Blank Forms*. The following environmental aspects are reviewed for all harvesting operations conducted on Corner Brook Pulp and Paper Woodlands' timber limits:

- Visual Quality
- Potential for Fuel or Oil Spill
- Potential for Soil Disturbance
- Water Quality
- Fibre Recovery
- Waste Management

Once all the pertinent information is discussed, the Harvest and Road Construction Pre-Work Forms are signed by the Company's Operations Superintendent, Planning Technician and the Contractor - an important step in the EMS process. In addition to following EMS principles, all Corner Brook Pulp and Paper Woodlands harvesting operations must adhere to regulations outlined in ***Environmental Protection Guidelines for Ecologically Based Forest Resource Management (Stand Level Operations)***, Nov. 1998. This document can be viewed in Appendix 3.

7.1.6 Contractor Responsibility and Planning

Contractors may commence harvesting operations after the pre-work meeting. It is then the responsibility of the contractor to plan and conduct forest operations in a sustainable and environmentally-conscious manner. Contractors are required to:

- Flag harvest area boundaries to ensure harvesting operations conform to the approved block configuration.
- Flag all buffer zones and classify any previously unknown or unmapped watercourse, to receive the appropriate riparian management.
- Notify the Operations Superintendent or Company representative of any special features (e.g. raptor's nest) not previously identified, modifying operations to protect the integrity of the feature.
- Minimize the length and frequency of forwarder trails and ensure that they are located per the ***Standard Operating Procedures, Harvesting***. All forwarder trails must be water-barred and cross-ditched where necessary to control water

runoff, especially after an area has been completely harvested.

- Minimize erosion and sedimentation, maintain natural drainage patterns, and ensure safe fish passage in fish streams, when harvesting adjacent to a watercourse.
- Minimize watercourse crossings. When forwarder trails cross a waterbody the operator will use culverts and/or log bridges in combination with a brush mat (and/or snow in the winter) to minimize erosion and soil disturbance. Erosion control measures will be maintained while the forwarder trail is in use and will be deactivated after harvesting operations are complete.
- Retain residual vegetation and wildlife trees as prescribed by Corner Brook Pulp and Paper Woodlands' Planning staff (and legislated by the Newfoundland Forest Service) to allow the harvest area to provide **biodiversity**, structural diversity, wildlife habitat, and visual quality.
- Minimize soil disturbance by matching harvesting equipment to ground conditions and the time of year harvesting occurs.
- Conduct fuel handling and storage in accordance with applicable government regulations and guidelines specified in the Company's Environmental Management System.

Contractors must conduct their day-to-day forest operations in a manner that minimizes environmental impacts, following the guidelines and regulations in the provincial ***Environmental Protection Guidelines for Ecologically Based Forest Resource Management (Stand Level Operations), Nov. 1998*** and Corner Brook Pulp and Paper Woodlands' *Environmental Management System* and ***Forest and Environmental Policy***.

7.2 Operations

7.2.1 Harvesting Systems and Methods

The primary silvicultural system employed by Corner Brook Pulp and Paper Woodlands is the **clearcut silvicultural system**, which is designed to regenerate **even-aged** forest **stands**. The clearcut system is most appropriate for tree species such as balsam fir and black spruce that naturally form large, even-aged stands after disturbance. These are the two predominant tree species on Company limits in Western and Central Newfoundland.

Timber harvesting methods have changed dramatically over the past decade. Prior to the early 1990's, timber was harvested using mostly manual labor methods: felling trees and skidding to roadside landings for processing into 2.50-metre bolts; or cut-and-bunch operations with 2.50-metre bolts brought roadside using forwarders. Using skidders

was not environmentally friendly because of the amount of soil disturbance. The cut-and-bunch system required all wood to be cut in the summer and fall period, resulting in the creation of large inventories of pulpwood for the winter and spring period. Harvesting systems started to change, partially due to unacceptable negative effects on the environment, but also to help meet the Mill's demand for a more even distribution of fresh wood throughout the year.

Harvesting systems are basically subdivided into three major categories:

- **Shortwood**
- Full Tree
- Tree Length

A further distinction normally associated with each major category is the method by which trees are felled and processed:

- Conventional Harvesting (manual)
- **Mechanical Harvesting** (machinery)

Harvesting systems are chosen for a specific operating area based on stand and terrain conditions and other site-specific concerns identified for the area. Harvesting systems used on Company operations are outlined following, grouped by conventional or mechanical methods.

Conventional Harvesting

Manual Shortwood (SW1)

This is a **cut-to-length** system (Figure 7-2) where trees are felled, delimbed (Figure 7-3), topped and cut into 2.50-metre lengths with a chainsaw at the stump. The wood is then picked up and transported to roadside by a forwarder (Figure 7-4). Primarily unionized cutters, working throughout the summer and fall period, conduct this method of harvesting (Figure 7-3).

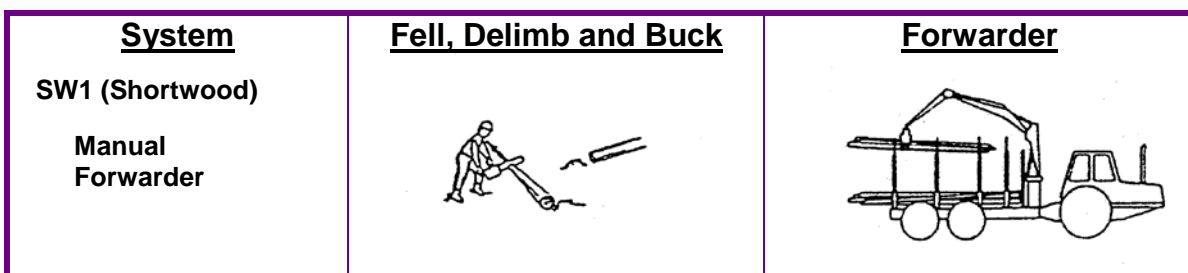


Figure 7-2. Manual Shortwood (SW1) harvesting system.



Figure 7-3. Logger delimits and bucks a tree into 2.50-metre bolts.



Figure 7-4. Rubber-tired forwarder transports the 2.50-metre bolts to roadside.

Mechanical Harvesting

Mechanical Shortwood (SW3 and SW4)

When trees are felled and **cut-to-length** mechanically, two systems are employed:

1. The trees are felled, delimbed, and cut to desired bolt lengths at the stump by a tracked or rubber-tired shortwood harvester (Figures 7-5 and 7-7).
2. The trees are felled with a feller buncher then delimbed and cut to desired bolt lengths at the stump with a processor (Figure 7-6).

With both systems, the shortwood logs are then picked up from the cutting area and transported to roadside by a forwarder (Figure 7-8). Forwarders used vary in size and wheel configuration. Corner Brook Pulp and Paper Woodlands currently uses 4-6-or 8-wheel forwarders ranging in capacity from 8 to 16 tonnes. All forwarders exhibit low ground-bearing pressure, so are useful on wet and sensitive sites.

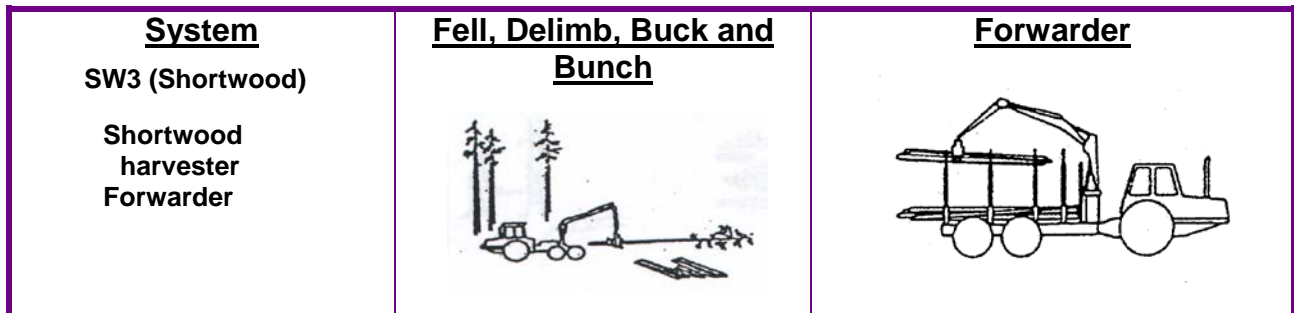


Figure 7-5. Mechanical Shortwood (SW3) harvesting system.

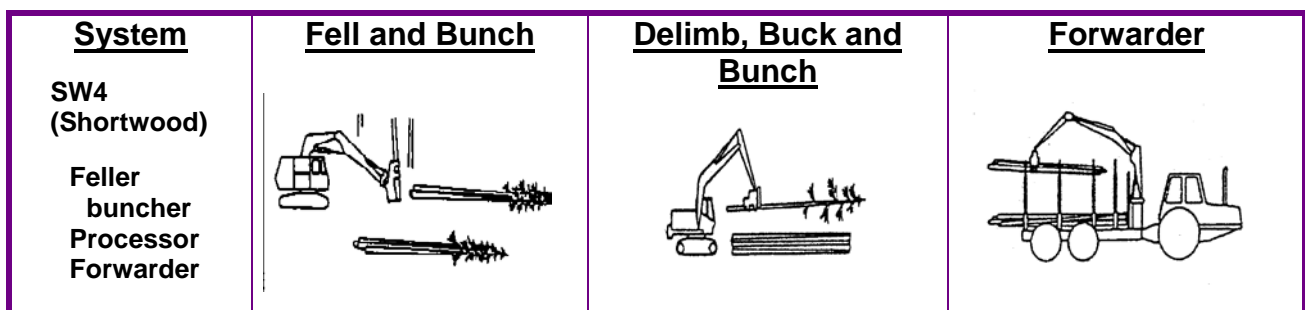


Figure 7-6. Mechanical Shortwood (SW4) harvesting system.



Figure 7-7. 1270 Timberjack Harvester.



Figure 7-8. Timberjack 1010B Forwarder.

Harvesting System Breakdown

Figure 7-19 below provides a breakdown of the proportion of wood produced by Corner Brook Pulp and Paper Woodlands’ contractors using the harvesting systems described in the previous section.

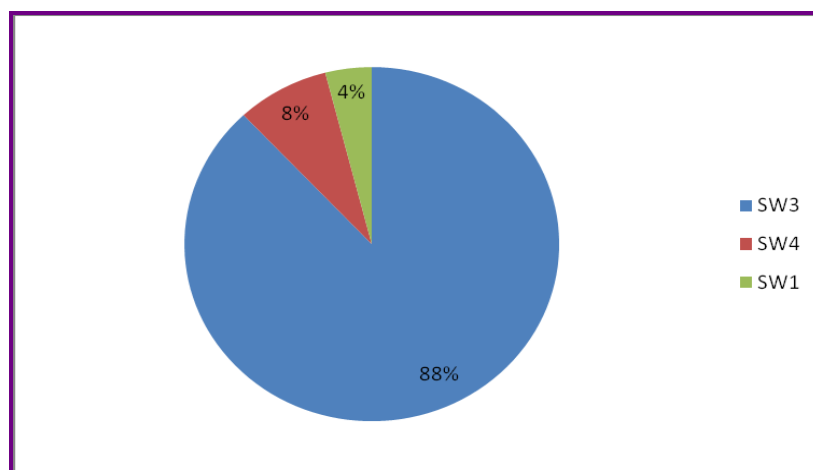


Figure 7-9. Proportion of wood produced, by harvesting system.

7.2.2 Pulpwood/Sawlog Integration

Corner Brook Pulp and Paper Woodlands has exchange agreements with several local sawmills whereby Woodlands supplies the sawmills with sawlogs from Company limits in exchange for an equal volume of pulpwood or woodchips, or a combination of both, from private or **Crown land**. All agreements are on the basis of “no loss of fibre” to Corner Brook Pulp and Paper Woodlands

Integrated operations occur on union, non-union, mechanical, and conventional operations, and the production of sawlogs depends on the following factors:

- Demand for sawlogs.
- Sawlog specifications versus stand characteristics.
- Location of the contractor in relation to the location of the sawmill where sawlogs are required.
- Use of mechanical or conventional methods.

Before a contractor begins harvesting operations, the Operations Superintendent includes in the harvesting instructions whether or not the contractor is required to cut sawlogs. If the contractor is required to cut sawlogs, the specifications and quantity of the sawlogs for each sawmill is provided. A contractor may be required to cut stud and random length logs and deliver these to several different sawmills, in addition to cutting and delivering pulpwood to Corner Brook.

7.2.3 Controls

Operational Controls

Safety Inspections

Refer to Section 4.1.3 for details.

Quotas and Reporting

All Corner Brook Pulp and Paper Woodlands' contractors work under a signed contract, which states the volume of wood to be produced over a specific period of time. To ensure accurate tracking of this volume, reports are generated which show the volume of pulpwood and logs delivered by contractor on a weekly, monthly and year-to-date basis. Descriptions of such reports can be found in Section 8.5. To compliment delivery reports, the contractor reports weekly the amount of inventory held at roadside and in the woods. The total delivered plus inventory allows the Operations Superintendent to accurately monitor the progress of each contractor and ensure that cut and delivery schedules are being met.

Contractors are also required to submit weekly reports indicating man-hours worked. Mechanical contractors are required to submit production reports to help monitor the efficiency of equipment on Corner Brook Pulp and Paper Woodlands operations. Prompt and accurate reporting is important to all contractors to ensure their operations run efficiently and to receive full points towards the *Contractor Incentive Program*. A collection of reports required from contractors can be found in the ***Contractors Reports Binder***.

MultiDAT Data Recorders

In 2006, the Company started a project with a local contractor in the North Harbour area, to test and use multiDAT recorders in mechanical harvesting equipment. MultiDAT is an electronic datalogger developed specifically for use in off-road equipment. It is used by managers to collect all types of information that can help

improve the productivity of operations or the utilization of equipment. MultiDAT serves a number of functions and allows the user to record machine functions, machine movement, machine location, operator's comments, give immediate feedback to the operator, and analyze the data and produce reports. MultiDAT recorders are simply electronic service recorders which are activated by a motion sensor.

The project involved installing multiDAT units equipped with GPS units and Multipads on 5 harvesters and 2 forwarders. The Company currently has 70 multiDAT units installed in various machine configurations including harvesters, forwarders, graders, plow trucks, dump trucks, excavators, a grinder as well as silviculture equipment.

When the operator enters the cab of a particular machine at the beginning of a shift, he/she is required to enter a 3-digit operator code into the MultiDAT. Once logged in, the multiDAT senses when the machine is in motion. If the operator starts work within 5 minutes of logging in, the multiDAT asks for an activity code. The operator then chooses from codes located on the face of the multiDAT and continues to work. When the machine is sitting idle without any motion for longer than 5 minutes, the operator is prompted to enter a reason why he/she is stopped. This allows the company to monitor and evaluate the machine's performance while on the jobsite.



Figure 7-10. MultiDAT data recorder.

Each multiDAT is equipped with an internal GPS unit with an exterior antennae mounted on the roof of the machine. The movement of the machine is recorded on

the internal memory of the multidat and all data is downloaded along with utilization information.

Data Acquisition and Transfer (Contractor Harvesting Equipment)

In order to use the information collected by the multiDAT, the data must first be acquired by the foreman. The multiDAT has a shortwave RF modem connected to it. The foreman's pickup truck is equipped with a downloading station and two modems. As the foreman drives around the jobsite and completes his/her regular daily work, the multiDAT automatically connects with the downloading station and downloads GPS and utilization data through the short range RF radio system. In order for the automatic transfer to take place, the foreman must come within approximately 1 kilometer of each piece of equipment. The downloading station saves the data on a PC located inside the box. If there is adequate cell coverage in the area where the operation is taking place, the computer dials a predetermined ftp data site and downloads all of the data. If there is no cell coverage at a particular jobsite, the modem continues to search for a signal as the foreman drives home in the evening. This data transfer can be set up to take place once a day, or several times throughout the day.

Data which is downloaded to the ftp data site is then downloaded into FERIC multiDAT software. Reports can then be produced for particular machines and operators for any selected period of time.

Data Acquisition and Transfer (Remotely Operated Equipment)

Equipment such as graders, scarifiers and other road maintenance equipment use cell modems to transfer data from the multiDAT to an office computer. The modem at the office dials to the equipments modem, and if cell coverage is adequate, it will transfer the data and append the database.

MultiPAD

MultiPAD's are units mounted in the cab of mechanical equipment that display utilization data to the operator. This is a very simple unit that displays the operator code as well as the level of utilization a particular operator is achieving. When an operator logs in and starts work right away, the utilization is displayed as 100%. When the operator stops for any reason, his/her utilization begins to drop. This allows the operator to monitor and evaluate his/her utilization while working.

Navigational System

Currently the Company uses Garmin marine-type GPS units to display the operating area map which shows all harvestable wood and all buffers. GPS positions collected by the MultiDAT unit are displayed on the map indicating the location of the harvester. Track logs are turned on so that the operator can see where the machine has been working. This system is a great help for night shifts and shift changes.



Figure 7-11. GPS unit displays the operating area map.

GPS Data Usage

GPS data can also be exported from the multiDAT software into ArcPAD as a tracklog. This tracklog can then be overlaid on the harvest area block and buffered to show where the harvester has cut. Forwarder tracks can then be overlaid on top of the harvester tracks to ensure all areas have been travelled by a forwarder. This information can be mapped by hour, day, shift, week or whatever time period is requested.

Length Tests

Corner Brook Pulp and Paper Woodlands requires that all contractors produce pulpwood and sawlogs that measure 2.50 metres in length. Contractors are required to do periodic length checks to ensure that their equipment and operators are meeting this specification. This is verified by a length measuring system using lasers that determine the average width of nearly all loads that enter the mill yard.

Contractor Key Performance Indicator (KPI)

Corner Brook Pulp and Paper Woodlands has a *Contractor Key Performance Indicator Program*, to raise awareness and interest while improving the overall level of professionalism in the workplace. This program consists of items under the following categories:

- Safety
- Environment
- Quality
- Operations

This new program is now part of the signed contract. It constitutes a holdback of 2% or an incentive of 2% on the roadside price based on the contractor's performance in the KPI program. This is evaluated 3 times per year (Jan- Apr, May-Aug, Sept-Dec).

Environmental Controls

Corner Brook Pulp and Paper Woodlands' commitment to protecting the environment is outlined in its **Forest and Environmental Policy** (Section 2.2 of this manual). To assist in meeting the objectives of this policy and to improve performance, harvesting operations are regularly monitored by reporting environmental incidents, and conducting internal inspections.

Internal Inspections

The EMS Compliance Inspections were developed internally by the Operations Superintendents in 1997 and are revised and updated every year to ensure all operations comply with Company policy, environmental management system, standard operating procedures, and government regulations. A list of the EMS Compliance Inspections can be seen in Table 7-1. The inspection forms and procedures for conducting these inspections can be found on the *Woodlands Computer Network* in the *EMS Folder*.

Table 7-1. List of EMS Compliance Inspections.

Inspection	Conducted By	No. Of Items Inspected	Inspection Frequency
No. 1	Contractor	32	Monthly
No. 2 EMS	Operations Superintendent or Designate	68	Three times per year
No.3 Contractor Post-Harvest Inspection	Operations Superintendent	16	Upon Completion of a Harvesting Area

The contractor or their foreman/supervisor conducts the *No. 1 Inspection* and reports it at the monthly Safety and Environment Meeting. The 32 items in this inspection are checked again, along with others, by the Operations Superintendents (or a designate) during the *No. 2 Inspection*.

Staff from the Company's Planning and Development Department conduct inspections on road construction operations. Every attempt is made to carry out a minimum of two *No. 2 Inspections* on each contractor during the summer operating

season. As with harvesting operations, contractors are not advised when inspections will take place.

When a harvesting operation is completed, the Company conducts the No. 3 (Post-Harvest) Inspection.

A Contractor must achieve a minimum score of 90% in order to receive a passing grade in the *No. 1* and *No. 2 Inspections*. The results of these inspections play a major role in the amount of incentive (or holdback) the contractor may earn (or lose) as part of the *Contractor KPI Program*.

External Monitoring

The **Newfoundland Forest Service** conducts regular compliance inspections on all of Corner Brook Pulp and Paper Woodlands' operations and forwards the results to the Company. All issues of non-compliance or major concern are dealt with as deemed appropriate. There are also random checks conducted by Fisheries and Oceans Canada, as well as the Department of Environment, and all issues of concern are dealt with as required.

7.2.4 Transportation of Fibre

Corner Brook Pulp and Paper Woodlands trucks roundwood to the mill in Corner Brook from its harvesting operations in 6 Forest Management Districts across the Island, however an increasing amount of **wood chips** is also delivered to the mill from integrated sawmill operations. The chart below shows the proportion (%) of each type of wood fibre for 2009, based on the delivery method.

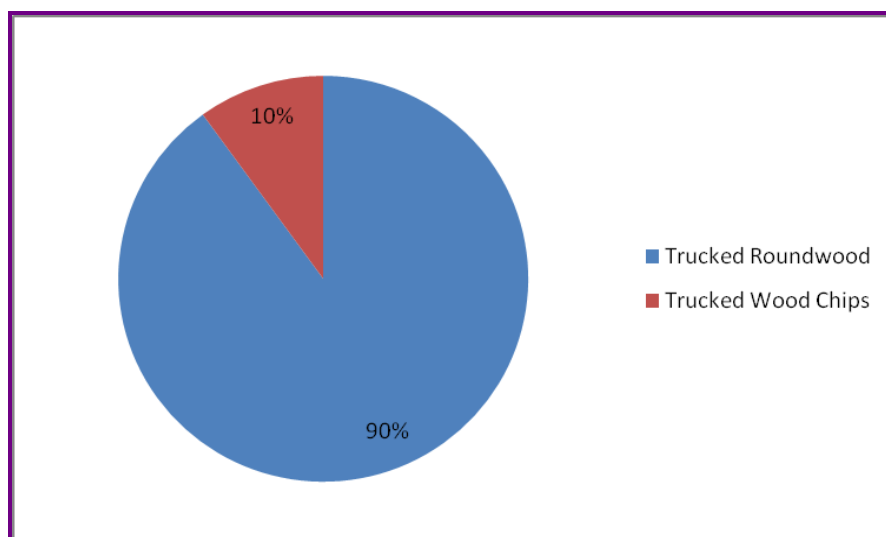


Figure 7-12. Wood fibre delivery methods.

Methods of Loading and Transport

Roundwood

There are two different methods used to load roundwood onto trucks:

1. **Forwarder:** “Hot logging” is practiced on 50% of the cut-to-length operations. Each truck has two trailers, one at roadside being loaded directly by a forwarder, and the second in transit to the Mill.
2. **Loader:** Wood that has been piled at roadside is loaded onto trucks using a large tracked or rubber-tired loader.

Corner Brook Pulp and Paper Woodlands employs approximately 50 tractor-trailer owner-operators to deliver pulpwood from Woodlands’ operations to the mill yard in Corner Brook. The wood is scaled at the mill yard which operates 16 hours a day, 5 days a week. The wood is then off-loaded by large-wheeled loaders and fed directly to the mill in-feed, or stockpiled for later use.

There are presently two types of trailer units in use on Corner Brook Pulp and Paper Woodlands’ operations, Tri-axle (60%) and B-Trains (40%). The Tri-axle configuration is comprised of one trailer unit with two stakes at the center, separating two independently bound loads. The B-Train unit is a double-trailer unit comprised of a front train and a second, “back” train, attached by a fifth wheel.

Trucking operations run approximately 10 months of the year, usually reduced in April and May. Approximately 60% of truck/trailer units have on-board weigh scales, which ensure trucks are not overloaded. Load-binding systems, comprised of chains or cables, are tightened on a continuous basis as the load is in transit. These and other safety features assist in the safe transport of wood on Corner Brook Pulp and Paper Woodlands’ forest access roads and Provincial Highways. All trucks working for Woodlands must meet Provincial Highway Regulations as well as Company requirements. To ensure this is being done, the following system checks are in place:

- Use of load aligner drums and truck ramps stationed on forest access roads to ensure loads are safe before entering Provincial Highways.
- Enforcement of Provincial Highway Regulations at weigh scales.
- Regular inspections of trucks by Supervisors and Operations Superintendents.
- Annual inspection of all trucks for specific items (e.g. fifth wheel, brakes, front end), normally done by an independent third party.
- International Road Dynamics (IRD) hardware and software have been installed on some pulpwood trucks across Company operations. There are

currently 40 on-board computers (OBC's) on pulpwood trucks. IRD monitors fuel consumption and other parameters including idling, harsh braking, speed, GPS tracking, shift change, shift change parameters, revving, etc. Data is collected from the trucks electronic control module and then downloaded via a wi-fi connection to a PC at CBPPL Woodlands office. Various authorized users can generate reports from the data.

Wood Chips

Wood chips are loaded at the integrated sawmill, blown directly into chip vans by the chipper or loaded by a wheeled loader.

There are approximately 8-10 chip vans delivering wood chips to the mill, half are Tri-axle configuration and half are B-Train units. Chips are off-loaded at the Mill by means of a chip dumper, which raises the chip van dumping chips directly into a bin.

Details of Company policies and procedures with respect to the safe and environmentally sound transport of all forms of fibre can be found in the ***Standard Operating Procedures, Harvesting.***