ALBERTA SCALING MANUAL

REMOTE CHIPPING OPERATIONS

9.0 Remote Chipping Operations

The following are procedures for the accounting of chip volumes produced by remote chipping operations. Bush chipping volumes are determined in the similar manner as standard log scaling using scaling populations and sampling. The prime difference is that density sampling replaces log scaling to determine the total volume processed.

Only the resultant volume is entered to the Timber Production and Revenue System (TPRS-Manual Production Entry) however the supporting records are to be maintained by the mill and shall be made available upon request to a departmental forestry officer.

9.1   Objective

The basic objective is to develop a dry weight conversion ratio which, when applied to the net weight of chips hauled, would yield the volume chipped.

The conversion ratio may be developed in two ways:

1. Expressed as a cubic metre (m^3) per bone dry tonne (bdt) value and applied to the weight of the chips expressed in bdt's. (Reference Example 1).

2. Developed as a dry kilogram per cubic metre ratio and applied to a dry weight equivalent (in kilograms) of the chip loads. (Reference Example 2).

Adjustments are made for bark %, with additional considerations given for cull %, and the derivation of the unmerchantable volume chipped.

9.2   Procedures

9.2.1   General

The procedure for meeting the objective is basically in three steps:

1. Weigh and record chip load weights by harvest source.

2. Sample chips for density, bark%, and moisture content% (where applicable).

3. Compile information for the month.

9.2.2 Specific

Step 1 Load Record

This record is a summary of net weights of all chip loads. Sample information regarding moisture content % and bark % may also be documented on this record.

- The information is compiled monthly.

- The load listing is to be specific to each harvest source. It should contain harvest source, load numbers (which are consecutive for each population), date of haul, formTM9 number, and the net weight of each chip load.

- The total monthly number of loads and net weight is determined.

Step 2 Chip Sampling

Chips samples are selected in a random fashion and at an intensity, which has been predetermined to meet a statistical accuracy. The samples should be selected from various areas of the load and should contain a minimum of 1000 grams. The samples should be sealed until tested. Periodically, the mill may be requested to provide samples to the department for independent testing.

There are two basic processes to be undertaken:

1. Bark% may be determined by hand removing the bark and determining its weight relative to the weight of the chip sample. The results are to be recorded on the load record sheet for each load sampled.

2. Wood density is a simple means of deriving total volume and past sampling has indicated a fairly stable value. Basic chip density is determined by either:

   - Utilizing the Canadian Pulp and Paper Association volume displacement method.

   - Methodology described in section 10.1 of this manual.

Density sampling data should be compiled on a document similar to the "Wood Chip Analysis" document in this manual. The accumulated sample data will be used in the volume compilation.

Step 3 Volume Compilation Record

The volumes are calculated on a monthly basis. The information is to be compiled on a form similar to the "Weigh Scale - Remote Chip Volume Compilation Sheet" as shown in Figures 9.2 , Sample 1 and 2. A separate form is created for each source of harvest and the volume is compiled as follows:

a) Summary of Weights

- Net weights are transferred from the load record sheet. The number of loads and the total weight (either bone dry tonne equivalent or green weight) of the chip loads is entered for the harvest source.

- Weights are totaled for the month and accumulated to date.

b) Sample Ledger

- Chip sample data for bark % is entered in this area. The information may either be entered as individual observations or where several samples are required for each month, as a monthly summary total. In example 2 , moisture content % sampling data is entered as with bark%.

The average % is weighted by the number of samples taken relative to the total.

c) Density

- The bulk density or dry ratio information may either be entered as individual observations or where several samples are required for each month, as a monthly summary total. This value is not weighted but calculated as a year to date average.

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d) Calculations: Option 1 - Bush Chip Compilation Sheet (using m3/bdt)

Step 1

The accumulated net weight of chips (bdt) is initially reduced by average bark %.

Step 2

Value from step 1 is reduced by an approved cull %.

Step 3

The value from step 2 is converted to m3 by multiplying by the bulk density (m3/bdt) value. A monthly running volume total is maintained:

Figure 9.1 - Bush Chip Compilation Sheet (using m3/bdt)

					TM44	WEIGHT SCALE - BUSH CHIP VOLUME COMPILATION SHEET							
						BUSH CHIPPING							
					DISPOSITION:				REPORTING PERIOD:				
SUMMARY OF VOLUME					SAMPLE LEDGER				MERCHANTABLE FACTORS				
TOTAL	LOADS	TOTAL			SAMPLE	BARK %	CUT	TOTAL	MERCH	%	WEIGHTED	BULK
No.		VOLUME (BDT)		CULL %	No.		BLOCK	SCALE	SCALE	MERCH	% MERCH	#
1	259	5479.851		2.5								
2												
3												
4												
5												
TOTAL	259											
THIS MNTH TOTAL		5479.851			95	0.74						
LAST MNTH ACCM TOTAL		16575.231			302	1.050						
THIS MNTH ACCM TOTAL		22055.082			397							135
					WT AVG	0.976						YTD AVG
					MULTIPLIERS							
LESS BARK (BDT)		215.218				0.010						
LESS CULL (BDT)		551.377		0.025								
SUBTOTAL (BDT)		21288.487										
CONVERSION TO m3												
m3/BDT	2.590	55137.182										
LAST MNTH TOTAL (m3)		43675.734										
THIS MNTH TOTAL (m3)		11461										
MERCHANTABLE (m3)		0										
MONTHLY VOLUME (m3)		11461										

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Calculations: <u>Option 2 - Bush Chip Compilation Sheet (using kg/m3)</u>

Step 1

The accumulated net green weight of chips (kg) is initially reduced by average moisture content %.

Step 2

Value from step 1 is reduced by the average bark %.

Step 3

The value from step 2 is converted to m3 by dividing by the dry ratio (kg/m3) value. A monthly running volume total is maintained.
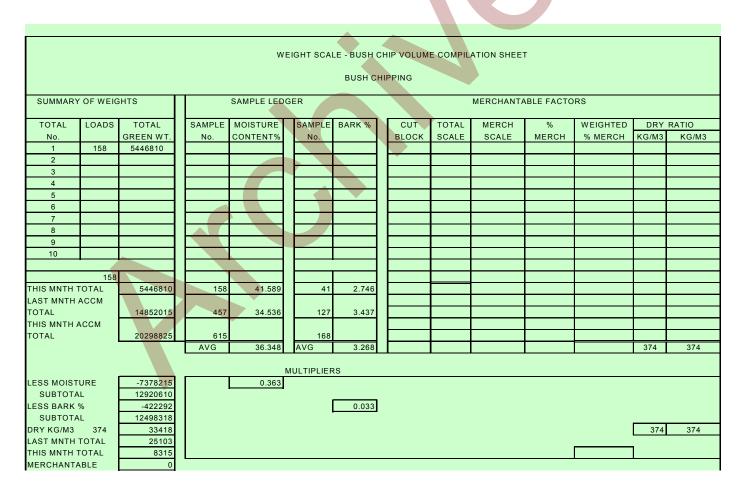
WEIGHT SCALE - BUSH CHIP VOLUME COMPILATION SHEET
BUSH CHIPPING

SUMMARY OF WEIGHTS			SAMPLE LEDGER				MERCHANTABLE FACTORS					DRY RATIO	
TOTAL No.	LOADS	TOTAL GREEN WT.	SAMPLE No.	MOISTURE CONTENT%	SAMPLE No.	BARK %	CUT BLOCK	TOTAL SCALE	MERCH SCALE	% MERCH	WEIGHTED % MERCH	KG/M3	KG/M3
1	158	5446810											
2													
3													
4													
5													
6													
7													
8													
9													
10													
	158												
THIS MNTH TOTAL		5446810	158	41.589	41	2.746							
LAST MNTH ACCM TOTAL		14852015	457	34.536	127	3.437							
THIS MNTH ACCM TOTAL		20298825	615		168								
			AVG	36.348	AVG	3.268						374	374

MULTIPLIERS

LESS MOISTURE	-7378215	0.363
SUBTOTAL	12920610	
LESS BARK %	-422292	0.033
SUBTOTAL	12498318	
DRY KG/M3 374	33418	374 374
LAST MNTH TOTAL	25103	
THIS MNTH TOTAL	8315	
MERCHANTABLE	0	

Figure 9.2 - Bush Chip Compilation Sheet (using kg/m3)

9.2.3 Optional Considerations

Information on cull percent and the volume of unmerchantable volume chipped are outside the scope of these procedures. However, if methods can be established (which are satisfactory to both the mill and departmental scaling supervisor) to derive these values, then such information may be incorporated in the compilation of the volumes.

9.3 Wood Chip Conversion Factors

Conversion factors are a useful aid in converting the weight of wood chips from trucks to a dry weight equivalent or to solid wood volume.

9.3.1 Determination of Moisture Content

Samples are taken at random from the chip trucks. Usually a total of about 20 L of chips are removed for sampling from various areas in the load.

These samples are placed in an airtight container, such as a plastic bag, and are tightly sealed until they are tested.

The following procedures are followed in testing:

(1)   The sample (about 250 g) is weighed to the nearest gram in the container in which it was stored.

(2)   After the chips are transferred to a drying tray, the empty container is weighed. This weight is subtracted from the total weight to give the green weight of the chips before drying.

(3)   The sample is placed in an oven preheated to 103^0 C. There it is dried until it reaches a constant weight. This usually takes about 20 hours under normal conditions.

(4) The sample and tray are weighed together. The empty tray is then weighed and subtracted from the total weight to give the net dry weight of the chips.

(5)   Calculate the moisture content (MC) to the nearest 0.1% as follows:

$$MC \% = \frac{(\text{Green weight} - \text{Dry weight}) \times 100}{\text{Green weight}}$$

9.3.2   Conversion Factor of Weight to Solid Wood Volume

The volume of the sample is determined by the water displacement method, as follows:

(1) Determine the net green weight of the sample as described under the section for determining moisture content (Section 8.1).

(2) The chip samples (about 500 g) are wrapped in a cloth and immersed underwater for about 12 hours until they are saturated.

(3) The cloth containing the chips is placed in a submersion basket equipped with a lid and then immersed. Prior to weighing, the material must be stirred and compressed underwater to remove any air bubbles.

(4) The basket is to be hung from the fixture at the bottom of the scale and weighed underwater along with the cloth and chips.

(5) The surface water is to be removed from the material by one of the following methods.

        a. Place the basket, cloth and chips in a centrifuge and run it for about three minutes. The centrifuge should spin at about 1200 rpm; or

        b. Empty the chips onto clean paper towels and spread them out in a single layer being sure to recover all the material. Drain for 20 minutes, turning the chips two or three times to completely remove surface moisture.

(6) All the chips are to be placed on a tray and weighed. The weight of the tray is then subtracted to obtain the net weight in air.

(7) The cloth is placed in the immersion basket and the two weighed underwater. The cloth should be stirred and compressed to remove air bubbles. The combined weight of the basket and cloth is subtracted from the total weight underwater to get the net weight in water.

(8) The solid volume of the sample is as follows:

Volume = Weight in air - Weight in water.

(9) The weight conversion is calculated as follows:
Ratio = Net green weight/solid volume.

(10) The density may be calculated using the following steps:

    a. Convert the green chip weight to an oven-dry equivalent using the moisture content factor.

    b. Calculate the density as follows:

$$\text{Density} = \frac{\text{oven dry weight}}{\text{volume}}$$