

# **Appendices**

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## Appendix 1 Glossary

Accumulations	Areas where waste are concentrated (e.g., at landings and along roadsides).	
Accuracy	The nearness of a measurement to the actual value of the variable being measured.	
Aggregate Option	Sampling and measurement of a waste reporting unit comprised of an approved aggregation of cut blocks and/or cutting authorities. It cannot cross a District or T.S.A. boundary.	
Allowed Stump Height	The higher of:	
	1.	Timber merchantability specification stump height,
	2.	Height specified in District Manager letter for heavy snow packs,
	3.	The minimum distance from the ground on the high side of a stump up to a point above a physical obstruction which allows for safe falling. Allowed stump height minus TMS stump height = unavoidable piece.
Allowable Annual Cut (AAC)	The rate of harvest determined by the Chief Forester for Timber Supply Areas (TSAs) and Tree Farm Licences (TFLs), and by the District Manager for Woodlot Licences (WLs), and the rate of harvest specified in a licence or in a management and working plan.	
Availability of Cut Blocks	Cut blocks and partially completed cut blocks are available for waste assessments upon completion of primarily logging and the ground is sufficiently free of snow to allow for an adequate assessment to be carried out. Field assessments must be completed within sixty (60) days after primary logging and the survey reports must be submitted to the District Manager within thirty (30) days of completion of the field survey.	
Avoidable Waste	Waste volumes left on the ground that could have been removed safely, were not physically obstructed and were not inaccessible.	

Bias		Measurement bias occurs when the mean of the measured values differs from the mean of the actual values.
		Sampling bias occurs when certain sampling units are more likely to be included than others (lack of randomness).
		Statistical bias occurs when the expected value of the statistic differs from the population parameter.
Breakage		Breakage is defined as any piece, meeting the minimum diameter of the cutting authority, which is shorter than 3 m in length and broken at the large end or at both ends. Normal breakage is not usually recorded.
Bucking Waste		Bucking waste is defined as any pieces less than 3 m in length that has been cut at the large end, or at both ends. It has been cut through improper or careless bucking practices.
Chunk		A short piece of waste that has resulted from end trimming logs, or from breaking logs during extraction operations.
Closure Error		The square root of the sum of the squared sum of latitudes plus the squared sum of departures, which may also be expressed as a ratio to or percent of the perimeter length. A closure error of 1 percent will result in an area error of approximately 2 percent.
Coast		This refers to the Coast Forest Region.
Coefficient of Variation		A relative measure of variation, equal to the sample standard deviation expressed as a percentage of the sample mean.
Confidence		An expression of accuracy of sample estimates, usually assessed by confidence intervals, a specified proportion of which, such as 95 percent confidence intervals, contain the true population parameters.

Contractual Stump Height	The allowed stump height, specified in the minimum utilization standards of the cutting authority, as measured from the ground on the high side.
Cutblock	An area within which the holder of an agreement is authorized to harvest timber, as identified in: a) a cutting permit, or b) the agreement, if the agreement does not provide for cutting permits.
Cutblock Option	Each cutting block will be sampled as a separate population, and reported as a separate waste reporting unit.
Cut Control	The Ministry of Forests procedure for accounting the volumes of timber harvested under a licence as specified under Part 4 of the <i>Forest Act</i> .
Cutting Authority	Cutting Authority means a Timber Sale Licence, a Licence to Cut, a Road Permit, or a cutting permit issued under a Tree Farm Licence, Forest Licence, Timber Licence or a Woodlot Licence.
Dry 4 or Y	Dead and dry lumber reject that is not measured in waste.
Fixed-area Plot Sampling	A sampling method where each plot within a stratum is exactly the same size and shape.
Full Sampling Intensity (FSI)	A full sampling intensity survey on which a sampling error or hectare to plot ratio must be met as specified in Tables 4-2, 4-3, 4-4 and 4-5.
High Side (stumps)	The position where the ground meets the stump on the uphill side, ignoring any root flare, obstacles, vegetation, and loose matter that has accumulated at the base of the tree. Length measurements usually start from 30 cm above this point.
Interior	This refers to the Southern and the Northern Interior Regions.

Licensee	The holder of the cutting authority.
Log Grade	Those log grades that are defined in the Scaling Regulation.
Measure Factor	A visual estimate of the percentage of an accumulation that was physically measured and/or estimated. Recorded as the "measure percent."
Parent Block	A previously surveyed block that is representative, in terms of the level of dispersed waste, to the block being proposed for survey exemption.
Plot Sampling	The estimation of waste within a cutblock or reporting unit from sample plot measurements, and the determination of the sampling error associated with the plot estimates.
Population	The waste component within the waste reporting unit that is to be estimated by sample plot measurements.
Precision	The closeness, to each other, of repeated measures of the same quantity, expressed as Sampling Error or Standard Error of the sample estimate.
Primary Logging	The cutting of timber and the yarding of that timber to a central landing, road side, or drop area in a logging operation.
Primary Logging Completion Date	The date on which the yarding of all the timber that is cut in a cutblock to a central landing, roadside, or drop area in a logging operation is completed.
Reduced Sampling Intensity (RSI)	A reduced sampling intensity which may be applied to cutblocks that qualify (i.e., clean logging or low billing volumes). The plot requirement is one quarter of the minimum full sampling intensity using a C.V. of 100 percent. It applies only on dispersed subpopulation areas.
Reporting Unit	The area for which the waste is measured and reported. It may be either a cut block, several cutblocks, a licence, or part of a licence.

Reporting Unit Number	The unique number assigned by the Ministry of Forests to any one license within a waste reporting unit for a given year.
Reporting Year	The 12-month period in which the cut blocks in the waste reporting unit are first available for measurement. The District Manager will approve the 12-month period.
Radius Class Unit (rad)	The measurement of log or stump diameters to the nearest 2 cm of diameter (1 cm of radius), and as specified in the <i>Scaling Manual</i> .
Reserved Timber	Merchantable timber left after completion of primary logging that is reserved from cutting for silviculture, biodiversity and other specific forest management reasons.
Sampling Error (S.E.)	A measure of the variation among sample means is the standard error of the mean. It can be thought of as a standard deviation among sample means; it is a measure of the variation among sample means, just as the standard deviation is a measure of the variation among individuals. When we increase our confidence level above one standard deviation, i.e. two standard deviations for waste, we refer to the statistic as the sampling error. The waste calculations for sampling error include a finite population correction factor, which implies random sampling without replacement.
Standard Deviation (S.D.)	The Standard Deviation is the square root of variance. It characterizes dispersion of individuals about the mean and gives some idea whether most of the individuals in a population are close to the mean or spread out. On the average, about two-thirds of the unit values of a normal population will be within one standard deviation of the mean. About 95 percent will be within two standard deviations and about 99 percent within 2.6 standard deviations.
Stratum	A non-overlapping sub-unit of a subpopulation for which separate sampling statistics are calculated.
Stratification	The process of delineating strata boundaries within a subpopulation, where each stratum has unique

	characteristics (timber type, logging contractor, season or year logged).
Subpopulations	Subdivisions of the reporting unit or cut block (population). For example, the dispersed and accumulation volumes are each typically treated as subpopulations.
Timber	Trees, whether standing, fallen, living, dead, limbed, bucked or peeled.
Timber Merchantability Specification (TMS)	Means the merchantability specifications for stump height and diameter, log top diameter, slab thickness and log length described in this manual for the Coast and the Interior.
Timber Supply Area	Large contiguous areas of Crown land on which an annual allowable cut is calculated.
Trimming "Waste"	Avoidable waste that results from topping, slashing, bucking and end-trimming in a manner that does not conform to the merchantability specifications.
Unavoidable Waste	That component of the waste that is physically obstructed or cannot be removed for safety or environmental reasons.
Variance	The mean of squared deviations of observations about a sample mean (these deviations or differences from the mean are called residuals).
Waste	Timber except timber reserved from cutting, whether standing or felled, which meets or exceeds the timber merchantability specifications described in this manual, that was not removed from the cutting authority area.

## **Appendix 2 Standing Stem Harvesting**

### **A2.1 Standing Stem Harvesting**

Standing stem harvesting is a new logging method which utilizes a helicopter to selectively log components of a forest stand. Trees selected for harvesting are based on the licensees' pre-determined requirements (e.g., species, diameter, value). A 100% cruise is required for all trees that will be harvested in standing stem harvesting.

Once a tree has been selected, the tree is topped off at the height dependent on the tree diameter and the lifting capacity of the type of helicopter used in the operation. At the stump level, the tree is not cut through and enough holding wood is retained to enable the tree to remain standing.

After the tree has been topped and jugged, the helicopter moves into position, and utilizing a grapple attached to the end of a long cable line, lifts the log straight into the air and gently lowers it to the ground nearby.

### **A2.2 Waste Accounting Methodology**

The harvested trees are scattered over a wide area throughout the cutblock and are often inaccessible, it is not cost effective to utilize a plot system for surveying the site.

Since 100% of the trees are cruised, the difference between the scaled volume and the cruised volume is used to derive the waste volumes for standing stem harvesting. Applicable for this harvesting method only, if the scaled volume exceeds the cruised volume, there is no waste to be reported for the block.

To submit a waste assessment for standing stem harvesting blocks, create a separate Reporting Unit, enter the volume of waste as an Ocular Estimate using the grade breakdown from the cruise and include a copy of the cruise summary as an attachment.



### Appendix 3 Waste Rate Determination

The determination of the waste rate is dependent on whether there has been timber harvesting on a cutblock.

#### A3.1 Cutblocks with Harvesting

For cutblocks with harvesting, the waste rate for the cutblock is derived from the weighted average stumpage rate charged for the sawlogs (graded sawlogs on the Coast, grade code blank sawlogs and/or grade code 1 and 2 sawlogs in the Interior) in invoices issued during the 12-month period ending one month after the month in which primary logging on the cutblock area was completed. The formula to be used is:

$$WR = TS/TV$$

Where:

WR	=	Waste Rate for the cutting authority.	
TS*	=	Total billed sawlog stumpage (sum of Upset Stumpage*, and Bonus Bid) for the twelve-months prior to one month after the month primary logging was declared completed on the cutblock.	
		*	Include silviculture and development levies.
TV*	=	Total billed volume (accumulated volume in cubic metres that derived the total billed stumpage for the sawlogs) for the twelve-months prior to one month after the month primary logging was declared completed on the cutblock.	

\*Effective April 12, 2007, TS and TV will exclude (on the Coast only), all coniferous species X grade, and Hemlock and Balsam, U grade.

#### A3.2 Cutblocks with No Harvesting

If there has been no harvesting on the cutblock, but there has been harvesting from the cutting authority, then the waste rate for the cutblock is derived using the average of the cutting authority's four quarterly timber appraisal stumpage rates (plus any bonus and levies where applicable) in effect during the twelve-months preceding the date of the cutting authority's expiry, surrender, termination or cancellation, as the case may be. The formula to be used is:

$$WR = ACASR$$

Where:

WR	=	Waste Rate for the cutblock.
ACASR	=	Average Cutting Authority Stumpage Rate over the four quarters preceding the expiry, surrender, termination or cancellation date.

#### Example 1

If Cutting Authority A (CP A) became effective on September 5, 2003, and expires on September 4, 2005, then the ACASR is the simple average of the four quarterly stumpage rates for CP A as at October 1, 2004, January 1, 2005, April 1, 2005 and July 1, 2005.

#### Example 2

If Cutting Authority B (CP B) became effective on April 20, 2005, and is surrendered on September 5, 2005, then the ACASR is the simple average of the April 20, 2005 and July 1, 2005 stumpage rates for CP B.

### A3.3 Deciduous Waste Rate

For deciduous species, the waste rate is either the appraised stand as a whole reserve rate, or if there is no appraised rate, use the specified fixed rate for the species in the Coast or Interior Appraisal Manuals, plus any bonus bid and levies where applicable.

### A3.4 Occupant Licence to Cut

For OLTCs that require the licensee to deck the timber but do not allow the licensee to remove the timber, the waste rate is based on the Average Sawlog Stumpage Rates by District and Species as per Section 7.1 of the *Coast Appraisal Manual* or Table 6-1, Average Sawlog Stumpage Rate by Forest Zone and Species in the *Interior Appraisal Manual*.

## Appendix 4 Riparian Management Zone (RMZ)

### A4.1 Assessment Method

For waste assessments to be conducted within the riparian management zone, the assessment method should commensurate with the silvicultural system used, as follows:

•	single tree selection	-	100 percent piece scale, or 50 m <sup>2</sup>
•	group selection	-	100 percent piece scale or (circular or rectangular) plot of 50 to 400 m <sup>2</sup> that best fits the group selection harvested area.

Refer to Section 4.7 for assessing partial cutting (variable retention) cutblocks, and Section 5.7.2 for stratum codes.

### A4.2 Stream Clean-out

For stream clean-out conducted in accordance with the Riparian Management Area Guidebook, the waste classification procedures are as follows:

1. Where a log is left across a creek, classify the log as unavoidable for environmental reasons.
2. If a creek was machine cleaned and it was reasonable to recover the log pieces, classify the pieces as avoidable.
3. If a creek was hand cleaned and the log was bucked into small segments and thrown out of the creek channel, classify the pieces as unavoidable.

## Appendix 5 Waste Benchmarks

### 1. Benchmarks

Waste benchmarks will be in effect until **September 30, 2015**, unless terminated earlier.

On an individual cutblock basis, the following waste benchmarks in cubic meters per hectare will be used for monetary billing of avoidable waste:

Coast	Immature	Mature
Normal	10 m <sup>3</sup> /ha	35 m <sup>3</sup> /ha

Interior	Dry Belt	Transition Zone	Wet Belt
Normal	4 m <sup>3</sup> /ha	10 m <sup>3</sup> /ha	20 m <sup>3</sup> /ha

The waste benchmark volume of a cutblock is derived by multiplying the value of the benchmark with the total of the dispersed, accumulation and standing trees sub population areas reported in a waste assessment of the cutblock.

### 2. Benchmark Calculations and Billings

Avoidable waste volumes in sawlog grades X or better (Coast), 1 and 2 (Interior) from the dispersed, accumulated and the standing tree subpopulations of the cutblock will be applied to the benchmarks.

Where the avoidable waste volumes in sawlog grades are below the established benchmark for the cutblock, no monetary billing of avoidable waste in sawlog grades will be made.

Where the avoidable waste volumes in sawlog grades are above the established benchmark for the cutblock, monetary billings will be made on the sawlog grade volumes exceeding the benchmark.

Avoidable waste volumes in grade Y or 4 will not be applied to the benchmark but will be billed monetarily in all cases.

### 3. Benchmark Eligibility

The benchmarks are administered on an individual cut block basis, regardless of whether the cutblock is in the Cutblock, the Aggregate or the Ocular Reporting Unit. Therefore, each cut block must be individually assessed to determine whether the avoidable waste within the cutblock is above or below the benchmark.

No waste benchmarks will be applied to log decks that in the determination of a forest officer are subject to scaling at a scale site or being field scaled. Such log decks must be clearly marked by the licensee and not to be included in the waste assessment.

Waste benchmarks do not apply to the unharvested cutblocks.

No waste benchmark will be applied to an area of a cutblock where the wasted timber volume compromised the site-specific forest management objective(s). The area must be delineated, waste assessed and billed separately from the remaining area of the cutblock.





 <b>BRITISH COLUMBIA</b>	<b>COAST</b> <b>Worksheet for Waste Billing Against Benchmarks</b>	Ministry of Forests 
<b>To be Completed by Licensees</b>		
Licence No.	CP No.	Cut Block
Timber Mark	Reporting Unit No.	
Primary Logging Completion Date	Cut Block Net Area	ha
Location	Stand/Site Type	
<b>Calculations</b>		
Avoidable waste sawlog (X or better)	= _____	M <sup>3</sup> /ha..... (A)
Established benchmark	= _____	M <sup>3</sup> /ha..... (B)
(A) - (B)	= _____	M <sup>3</sup> /ha..... (C)
If (C) < or = 0.0000, stop		
If (C) > 0.0000, proceed as follows:		
Waste Monetary Reduction Factor (WMRF) =	(C)/(A) = _____	.....(D) (to four decimals)
<b>To be Completed by Forest Service</b>		
<b>Processing</b>		
If (C) is < or = 0.0000, on FS 702, code:		
Avoidable all species sawlogs (X or better):		\$0.00/m <sup>3</sup>
Avoidable all species grade Y:		\$0.25/m <sup>3</sup>
Unavoidable all species all grades:		\$0.00/m <sup>3</sup>
If (C) is > 0.0000, request average sawlog rate from HBS		
Average coniferous sawlog rate (HBS) =	\$ _____/m <sup>3</sup>	.....(E)
Deciduous sawlog rate =	\$ _____/m <sup>3</sup>	.....(F)
On FS 702, code		
Avoidable hembal (J or better) and all other conifer (U or better)	(D x E) = \$ _____/m <sup>3</sup>	
Avoidable hembal U and grade X all species = D x \$0.25/m <sup>3</sup>	\$ _____/m <sup>3</sup>	
Avoidable deciduous species sawlogs: (D x F) =	\$ _____/m <sup>3</sup>	
Avoidable all species grade Y: \$0.25/m <sup>3</sup>		
Unavoidable all species all grades: \$0.00/m <sup>3</sup>		
Approved by Forest Officer (signature)	Date	

Figure A5.1 Sample of Worksheet for Waste Billing Against Benchmarks (Coast).

	<b>INTERIOR</b> <b>Worksheet for Waste Billing Against Benchmarks</b>	Ministry of Forests 
<b>To be Completed by Licensees</b>		
Licence No.	CP No.	Cut Block
Timber Mark	Reporting Unit No.	
Primary Logging Completion Date	Cut Block Net Area	ha
Location	Stand/Site Type	
<b>Calculations</b>		
Avoidable waste (sawlog grades 1 and 2)	= _____	M <sup>3</sup> /ha..... (A)
Established benchmark	= _____	M <sup>3</sup> /ha..... (B)
(A) - (B)	= _____	M <sup>3</sup> /ha..... (C)
If (C) < or = 0.0000, stop		
If (C) > 0.0000, proceed as follows:		
Waste Monetary Reduction Factor (WMRF) =	(C)/(A) = _____	.....(D) <small>(to four decimals)</small>
<b>To be Completed by Forest Service</b>		
<b>Processing</b>		
If (C) is < or = 0.0000, on FS 702, code:		
Avoidable all species sawlogs (grades 1 and 2):		\$0.00/m <sup>3</sup>
Avoidable all species grade 4:		\$0.25/m <sup>3</sup>
Unavoidable all species all grades:		\$0.00/m <sup>3</sup>
If (C) is > 0.0000, request average sawlog rate from HBS		
Average coniferous sawlog rate (HBS) =	\$ _____ /m <sup>3</sup>	.....(E)
Deciduous sawlog rate =	\$ _____ /m <sup>3</sup>	.....(F)
On FS 702, code		
Avoidable coniferous species sawlogs (D x E) =	\$ _____ /m <sup>3</sup>	
Avoidable deciduous species sawlogs: (D x F) =	\$ _____ /m <sup>3</sup>	
Avoidable all species grade 4: \$0.25/m <sup>3</sup>		
Unavoidable all species all grades: \$0.00/m <sup>3</sup>		
Approved by Forest Officer (signature)	Date	

**Figure A5.2 Sample of Worksheet for Waste Billing Against Benchmarks for Blocks.**

## Appendix 6 Coast Grading

Due to the timber pricing changes made to Hembal U grade and all coniferous X grade, the followings grade rules apply to blocks surveyed after May 1, 2006.

### A6.1.1 Bucking Waste and Long Butts

- Old Growth - No change other than default to J grade.
- Second growth:
- Bucking Waste with less than an 8 rad top default to U grade,
- Bucking Waste with an 8 rad or larger top default to J grade.
- A piece of bucking waste that is less than 50% of it's original log diameter (at the butt) with a broken end and gross length of less than 0.4 metres is not required to be measured. All three criteria must be met or the piece must be recorded. The piece cannot be folded (accounting for volume) to become less than 0.4 metres.

All Bucking Waste that is 50% or more of the original log diameter and meets the TMS must be measured and recorded.

### A6.1.2 Stumps

- Old/Second Growth:
- < or = to 12R default to U grade,
- > or = to 13R default to J grade.
- Unavoidable grades are the same as avoidable grades.
- Severe Ring shake = X grade. (Severe ring shake is defined as covering at least 50% of the volume of the stump).
- Stumps cannot be graded as U, X or Y grade due to rot or missing wood.

### A6.1.3 Logs

Use the following rules:

- Logs less than 5 meters in length and bucked on the butt end will be graded as if they were 5 metres long.
- Logs (except spruce and cypress) with an undercut butt and less than 5.0 metres to the point where 8 rads disappears cannot be better than U grade. Spruce and Cypress



logs with an undercut butt and less than 4.0 metres to the point where 8 rads disappears cannot be better than U grade.

- Logs broken at both ends or broken at the butt end will be graded according to the scaling grade rules.
- Logs greater than 12.8 metres in length, the diameter used for determining the grade of the entire log is the diameter (inside bark) measured at the point 12.8 meters from the large end. Do not pencil buck, scale and grade as one piece.

#### **A6.1.4 Standing Trees**

Use the following rules:

- Old Growth/Second Growth.
- Trees that are greater than 12.8 metres to the timber merchantability specifications top diameter will be pencil bucked in 12.8 metre segments with each segment classified and graded accordingly.

For example, a 15.0 metre tree would be entered as a 12.8 metre log and a 2.2 metre piece of bucking waste with each piece graded according to its dimensions. However, if the grade of all pieces in the pencil bucked tree is the same, then record the tree as one piece.

#### **A6.1.5 Breakage**

- Where there is evidence of intentional or excessive breakage, classify as avoidable, and grade the piece as if it were a 5 metre long log.

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