Ministry of Forests and Range Cruise Tally Sheet (FS 205) 6

6.1 Form Design - General

All information on the FS 205 is required on all facsimiles of the FS 205, Cruise Tally Sheet.

Measurements taken on samples established in timber sales, cutting permits, etc. will be recorded on a Cruise Tally Sheet that provides the information in this chapter. The front side of the form identifies the plot, records the plot sizes and individual tree measurements while the reverse side provides space for the coding information, remarks and signatures.

Also see the *Call Grade Net Factor Standards and Procedures* for the CGNF tally card details.

Columns 64 to 90 are not required for Loss Factor Cruises.

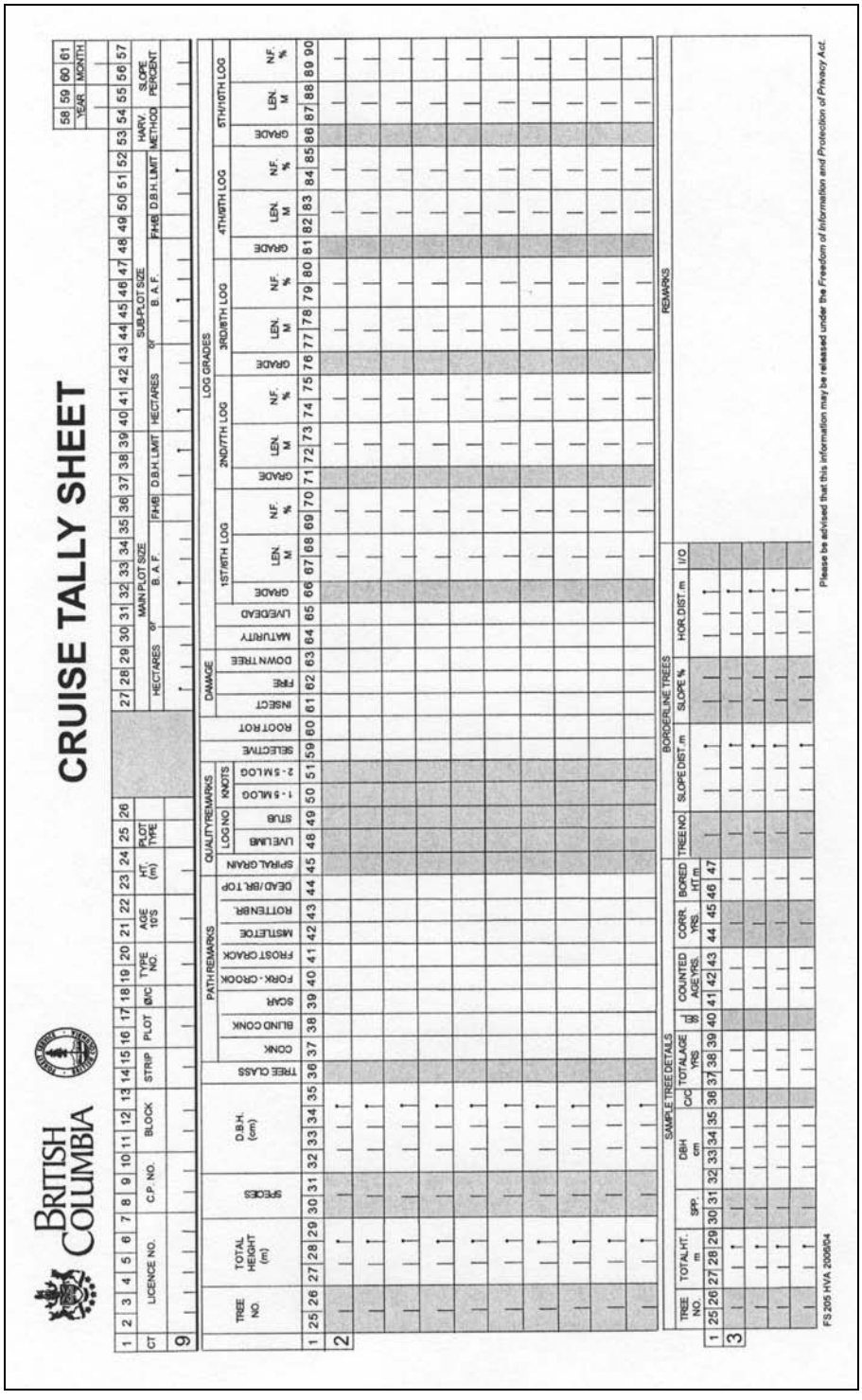

Figure 6.1 Cruise Tally Sheet – FS 205 HVA 2006/01 (front side).

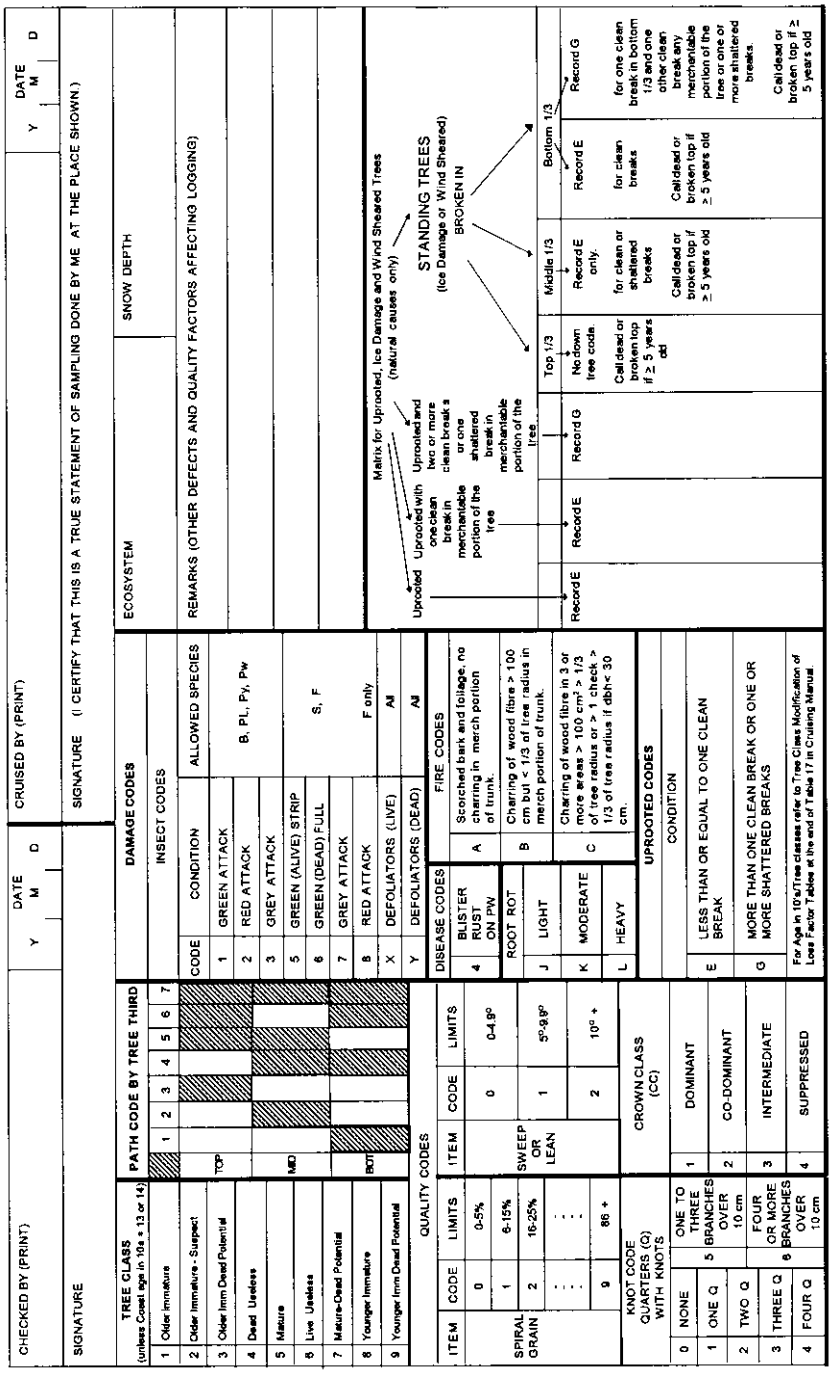

Figure 6.2 Cruise Tally Sheet – FS 205 HVA 2006/01(back side).

6.2 Entry of Data in Divided Spaces or Numbered Columns

Alphabetic fields are left justified as in the species code whereas numeric fields are right justified. It is not absolutely necessary that zeros be entered in spaces not required but their use helps avoid errors in placing the digit in its correct column and it is extremely important that this error is not made. For example, if columns for an item are 8, 9 and 10 and the magnitude of the item ranges from 0 to 999, then column 10 will be used for the units digit, column 9 for the tens digit and column 8 for the hundreds digits. For example:

	8	9	10
4 entered as	0	0	4
54 entered as	0	5	4
954 entered as	9	5	4

6.3 Front Side of Cruise Tally Sheet (FS 205 HVA 2002/04)

6.3.1 Card Type 9

Position 2 - 61 Identity Information

This card is to be completed for every new plot. The data on this card gives the location of the plot, forest type in which it occurs, average age and height, and the plot type.

If more than one sheet is required to code all the tree measurements on a given plot, the strip and plot number should be repeated on the second sheet.

Position 2-7 Licence Number

Enter:

1. For X type licences:

Position:	2	X
	3	Region
	4 and 5	Year
	6 and 7	District No. (Region = 00)

2. A56789 for licence A56789.

3. TFL001 for TFL 1
   TFL038 for TFL 38.

4. L0001 for licence to cut.

5. TL0421 for Timber Licence TL 421.

6. If Unauthorized Timber Harvesting use the ERA case file number in positions 2 to 10.

Position 8 to 10 Cutting Permit

Enter:

- can be either left or right oriented. Each tally sheet must be entered in the same format,
- 001 for Cutting Permit #1 (right oriented) (zero entries may be left blank),
- 38 for Cutting Permit #38 (left oriented), and
- A for Cutting Permit A.

-"X" type = sequential numbering -- CP 001 for the first District or Region compilation for that fiscal year and CP 002 for the next cruise in the same District or Region in the same fiscal year, etc.
-"Y" licence numbers -- **cannot** have a cutting permit. These positions must be left blank.
-"A" licence numbers -- might or might not have a cutting permit number, BUT if there is not a cutting permit number, the positions cannot be left blank. There must be at least one zero in one of these three positions.

Position 11 to 13 Block (within the Cutting Permit)

Enter:

- can be either left or right oriented. Each tally sheet must be entered in the same format,
- 001 for Block #1 (right oriented) (zero entries may be left blank),
- 38 for Block #38 (left oriented), and
- A for Block A (left oriented).

Position 14 to 15 Strip Number or Letter (Number or Letter of Strip on which Plot is Located)

Enter 01 for strip #1.

Strips should be numbered or lettered consecutively without duplication for a Block.

Position 16 to 17 Plot Number or Letter

Will accept alpha/numeric designations, either left or right oriented.

Enter 01 for plot #1.

Plots are to be numbered consecutively without duplication on a strip.

Position 18 O/C This Field Must Be Entered

Enter:

O if original measurements.

C if check cruise measurements.

Position 19 to 20 Type Number

Enter the number given to the type in which this plot is located (corresponds to positions 14, 15 on Card type C).

Position 21 to 22 Age in 10s This Field Must Be Entered

See Section 3.5.6 for the coding of the age in 10s.

Age Limits (years)	Class	Age Limits (years)	Class
21-30	03	91-100	10
31-40	04	101-110	11
41-50	05	111-120	12
51-60	06	121-130	13
61-70	07	131-140	14
71-80	08	141-250	15 to 25
81-90	09	251 plus	26

It is important that these age class limits be observed as they govern the proper selection of loss factors.

Coast

See Section 9.1.5.7 for the procedure to assign the age in 10s and tree classes on the Coast if there are any trees 121 to 140 years old in a plot.

Position 23 to 24 Height in Metres

Enter the height to the nearest 1 m for the dominant and co-dominant trees of the major species in the plot. This classification applies to the plot area only and is based on sample tree heights taken on the plot.

Position 25 Plot Type

- Blank or "M" for measured plot,
- "C" for count plot, and
- "S" for stump cruise.

Position 26 This column is not in use.

Positions 27 to 39 Main Plot Size (this field is required unless 100 percent cruise)

These positions describe the plot size of the main stand element being sampled and the minimum DBH.

Position 27 to 30 Hectares (Fixed Plot)

Enter plot size in hectares for circular or rectangular shaped fixed plots: Leave blank if prism plots or 100 percent cruise.

The following plot sizes are recommended:

Size (hectares)	Circular Plots Radius (metres)	Square Plots One Side (metres)
0.005	3.99	7.07
0.010	5.64	10.00
0.02	7.98	14.14
0.03	9.77	17.32
0.04	11.28	20.00
0.05	12.62	22.36
0.06	13.82	24.49
0.08	15.96	28.28
0.10	17.84	31.62
0.20	25.23	44.72

Positions 31 to 35 Basal Area Factor (BAF Variable Plots) m^2/ha

Enter the BAF for the main stand element being sampled. It must be entered to three decimal places.

Imperial/Diopter Conversions

BAF (m^2/ha) = BAF (sq. ft./acre) x 0.229568
where 1 square foot per acre = 0.229568 m^2/ha

BAF (m^2/ha) = 10,000/(1+ (200/diopters)^2)
Where 1 diopter represents a right-angled deflection of one unit per one hundred units in distance or 0.5728888° (decimal degrees).

Position 36 Prism Sweep

Enter:

- F (full 360º plot or walkthrough plot) - All trees, and
- B (border 180º plot) - All trees in measured 1/2 of plot.

Position 37 to 39 DBH Limit

The minimum DBH to which the trees on the main plot are measured to meet the merchantability specifications for appraisal purposes. Examples:

Coast CGNF Cruises:

1. Immature - code 12.0 cm (trees less than 141 years old).
2. Mature - code 17.5 cm (trees greater than 140 years old).

Coast Loss Factor Cruises:

1. Immature - code 12.0 cm (trees less than 121 years old).
2. Mature - code 17.5 cm (trees greater than 120 years old).

Interior Cruises:

1. PL with other species code 12.5 cm.
2. PL absent from cruise code 17.5 cm.

> The MAS determines the compilation level of the cruise. Measured trees below this minimum can be tallied but, based on diameter, will be ignored in the compilation. For count-plots the minimum DBH tallied must be the same as the DBH entered on the Map Area Statement (MAS) Section 7.2, Positions 19 to 21.

Positions 40 to 52 Sub-Plot Sizes

In stands with an excessive number of stems in the lower diameter classes, a sub-plot may be established for these lower diameter classes. To prevent unnecessary error, the same sub-plot size should be maintained throughout the timber type. The sub-plot size should never equal or be larger than the main plot size.

Position 40 to 43 Hectares (Fixed Plot)

Smaller plot areas may be required and the following are acceptable in addition to any listed under the main plot (Positions 27 to 30).

Hectare	Radius (m)
0.005	3.99
0.008	5.05
0.010	5.64
0.020	7.98

Position 44 to 48 Basal Area Factor (BAF) Variable Plots

See description as per Main Plot entries in Positions 31 to 35.

Position 49 Prism Sweep

See description under Main Plot entries in position 36.

Positions 50 to 52

The minimum DBH to which trees on the subplot are measured.

Position 53 to 54 Harvesting Method

The harvesting method which will be used:

SL	=	heli selection – land drop	Coast
SW	=	heli selection – water drop	Coast
FL	=	heli single standing stem – land drop	Coast
FW	=	heli single standing stem – water drop	Coast
HW	=	helicopter clearcut - water	Coast
HL	=	helicopter clear-cut - land	Coast
HC	=	helicopter clear-cut	Interior
HS	=	helicopter selective	Interior
CC	=	cable clear-cut	Both
CS	=	cable selective	Both
LC	=	sky line clear-cut	Both
LS	=	sky line selective	Both

HO	=	horse	Interior
SC	=	ground system-clear-cut	Both
SS	=	ground system - selective	Both
SP	=	specified operation	Interior

Position 55 to 57 Slope Percent

Record the most severe slope measurement in any direction to a point 15 m slope distance from plot centre. If slope is missing, it will be compiled as a zero. Plot slope in a border plot must be measured from within the 15 m arc in the plot. Plot slope must be recorded in count plots.

Position 58 to 61 Date

Record the year and month that the fieldwork was performed. The date must be recorded by the cruiser and entered into the cruise compilation.

6.3.2 Card Type 2

Position 1 Tree Details

This card contains the individual tree details or quality and size measurements.

Positions 2 to 24 Common to Card Type 9

Position 25 to 26 Tree Number

Number consecutively preferably from 1 for each plot (no duplicate numbers on any plot). Plot trees selected as sample trees maintain the same number in Sample Tree Details.

Positions 27 to 29 Total Height

When a height is measured or estimated and entered here, it will be used in the calculation of that individual tree's volume. The height must be recorded to the nearest 0.1 m.

Positions 30 to 31 Species

Enter the appropriate commercial species symbol. Genus Symbol letters must be "Capitalized" or upper case. Species symbols should be upper case also (entry is left oriented).

Genus Symbols - These symbols must always be entered for the proper implementation of the volume equations and loss factors.

Species Symbols:

1. The specific symbol for broadleaf maple (Mb), the pines (Pl, Pw, Pa, Py), aspen (At) and cottonwood (Ac) must be entered for the proper implementation of the loss factors and volume equations.

2. The species symbols for other species such as the spruces, hemlock and balsams should only be used when positive identification can be made in the field and the appraisal requires it, however, they must be combined by genus for the harvest method summary. Species specific symbols for *abies amabilis* and *lasciocarpa* must be entered for Interior cruises. Call Grade Net Factor cruises must use species specific symbols for Tsuga mertensiana. Tsuga heterophylla can use H or Hw.

Commercial Tree Species Names and Symbols

Common Name of Genus/Species	**Scientific Name of Genus/Species**	**Genus Symbol***	**Species Symbol***
Alder	*Alnus*	**D**	
Red Alder	*A. rubra*		Dr
Balsam	*Abies*	**B**	
Alpine fir	*A. lasiocarpa*		Bl
Amabilis fir	*A. amabilis*		Ba
Grand fir	*A. grandis*		Bg
Birch	*Betula*	**E**	
Common paper birch	*B. papyrifera*		Ep
Alaska paper birch	*B. neoalaskana*		En
Cedar	*Thuja*	**C**	
Western red cedar	*T. plicata*		Cw
Cypress	*Chamaecyparis*	**Y**	
Yellow cedar	*C. nootkataensis*		Yc
Douglas-fir	*Pseudotsuga*	**F**	
Douglas-fir	*P. menziesii*		Fd
Hemlock	*Tsuga*	**H**	
Mountain hemlock	*T. mertensiana*	CGNF cruises	**Hm**
Western hemlock	*T. heterophylla*	CGNF cruises	**Hw or H**

Larch	*Larix*	**L**	
Alpine larch	*L. lyallii*		Li
Tamarack	*L. laricina*		Lt
Western larch	*L. occidentalis*		Lo
Maple	*Acer*	M	
Broadleaved maple	*A. macrophyllum*		**Mb**
Pine	*Pinus*	P	
Lodgepole pine	*P. contorta*		**Pl**
Western white pine	*P. monticola*		**Pw**
Whitebark pine	*P. albicaulis*		**Pa**
Yellow pine	*P. ponderosa*		**Py**
Poplar	*Populus*	A	
Aspen	*P. tremuloides*		**At**
Balsam poplar	*P. balsamifera*		**Ac**
	sub. sp. Balsamifera		
Black cottonwood	*P. balsamifera*		**Ac**
	sub. sp. trichocarpa		
Spruce	*Picea*	**S**	
Black spruce	*P. mariana*		Sb
Englemann spruce	*P. engelmannii*		Se
Sitka spruce	*P. sitchensis*		Ss
White spruce	*P. glauca*		Sw
Yew	*Taxus*	**T**	Optional
Western Yew	*T. brevifolia*		

* The bolded symbols are the standard to be used for operational cruises. *Species* symbols which are not bolded may also be used if required. The symbol(s) chosen must be used consistently in all plots. The genus symbols M (maple), P (pine) and A (poplar) cannot be used. The genus and species symbol is required for Mountain hemlock in Call Grade Net Factor cruises.

Positions 32 to 35 DBH

Enter the diameter in centimetres and decimal centimetres at breast height (1.3 m above the high side) of each tree equal to or above the contract specification. Whole numbers are recorded as decimals (e.g., 12.0 not 12).

Position 36 Tree Class (see Section 3.5.6 for Detailed Descriptions)

The tree class must be consistent with the age in 10's reported by plot.

Positions 37 to 44 Pathological Remarks

Refer to the box entitled "Path Code by Tree Third". This indicates the numerical coding to be used in this section. The tree is schematically divided into thirds, with the bottom (BOT) blocks representing the bottom third, the middle (MID) block the middle third, and the top (TOP) block the top third. The shading indicates in which third or thirds the defects occur based on the codes 1 through 7. The applicable numerical code is shown to the left of the blocks. Thus, if the defects occur in the bottom third only, "1" is entered in the defect column. If a defect occurs in both the middle and top thirds, "5" is entered; etc.

Path Code by Tree Third							
	1	2	3	4	5	6	7
TOP							
MID							
BOT							

The column heads under "PATH REMARKS" are self-explanatory except for the last two: "Rotten Br." means "Rotten Branch"; "D. or B. Top" means "Dead or Broken Top". All the suspect characters listed must be noted where they occur.

Refer to the Cruise Compilation Loss Factor Table for pathological occurrence by species and forest inventory zones.

Examples:

1. A suspect tree has conks on the middle and upper thirds of the trunk and an open basal scar on the lower third. Under "Conk" enter "5" and under "Scar" enter "1".

2. A suspect tree has a fork on the middle third, blind conks on the upper third and a broken top. Under "Fork" enter "2", under "Blind Conk" enter "3" and under "D. or B. Top" enter "3".

3. A suspect tree has a fork on the middle third, with a frost crack extending from the ground to the fork; one of the leaders of the fork is broken and the leader is not of merchantable size. Under "Fork or Crook" enter "2", under "Frost Crack" enter "4".

Positions 45 to 51 Quality Remarks Optional in Interior

The quality information will be collected on all age classes and will apply to all commercial living trees plus dead potential standing or down trees found on the plot and on the largest leader on a forked stem. This is in addition to the eight pathological indicators of decay which can also be considered as affecting the quality of products obtained from a given tree.

Quality remarks must include information on all items indicated under this heading. Codes are indicated in the "Quality Code" box on the back of the plot sheet.

Position 45 Spiral Grain

Also known as "twist". The direction of the grain can best be seen in exposed wood such as the open scars in living trees or dead trees with sloughing bark. Spiralling bark fissures and frost cracks provide the next best evidence of the characteristic.

Spiral grain or twist shall be estimated at the halfway point between stump height and 10.3 m and expressed as a percentage.

- Determine the most severe spiral grain on the 1 m section at 5.3 m above the high-side. The offset from the vertical line in centimetres is the percent spiral grain per metre. Use the spiral at DBH as a guide for estimation.

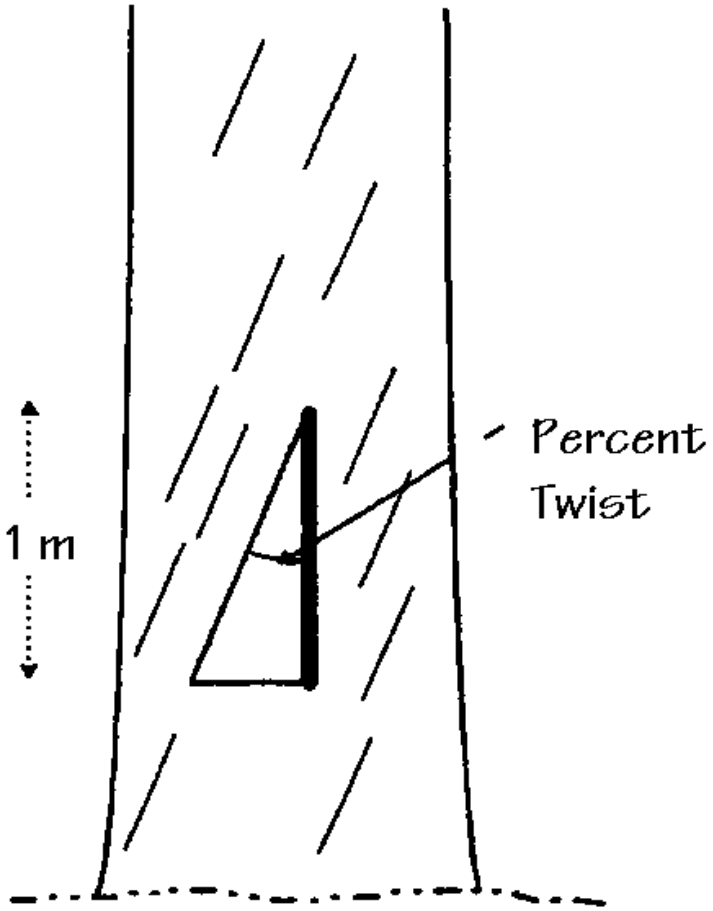

Figure 6.3 Determination of Percent Twist.

Recording Code	% Displacement	Recording Code	% Displacement
0	0 - 5%	5	46 - 55%
1	6 - 15%	6	56 - 65%
2	16 - 25%	7	66 - 75%
3	26 - 35%	8	76 - 85%
4	36 - 45%	9	86 +

Position 46 Sweep

Currently not required.

Position 47 Lean

Currently not required.

Log Number

"Logs" are individual 5 m lengths and are numbered starting at the top of a 30 cm "stump".

Position 48 Live Limb (Grade Change)

Definition: The 5 m log where quality changes from: *no knots* to *knots or knot indicators* or from *small knots* to *large knots* or from *well spaced knots* to *excessive knots*.

The purpose of recording live limb is to identify the first grade change as you move up the tree.

This will assist the log grade algorithm to better determine the cruise grade distribution produced by the cruise compilation program.

If the branching is consistent in frequency and size from the base to the merchantable top diameter of the tree, record live limb as a one (1).

The grades on trees smaller than 60 cm DBH are not affected by the live limb code. On deciduous trees, live limb is recorded as the 5 m log where the natural forking starts. Record live limb for the dead potential tree classes.

Position 49 Log No. of 1st Stub

Enter the log number on which the first stub or first branch occurs, irrespective of diameter or length. This may occur on the same log as the Base of Crown or at some point below.

Any stub, live or dead branch, is considered when identifying the log number of the first stub (see the following section for discussion of epicormic branching).

Positions 50 and 51 Knots, 1st 5 m and 2nd 5 m

The location of clear surface area in the first two 5 m logs indicates the potential grade of a log. The location of the four quarters on the second 5 m log must be the same as the location of the four on the first 5 m log.

A clear quarter must be free of any open knot, knot indicator, branch stub, dead or living side branch, bunch knots or forks. Epicormic branches, suckers and candelabras are not classed as knots. Record the number of clear quarters for the first log (0.3 - 5.3 m from the high side of ground) and for the second log (5.3 - 10.3 m) as follows:

Code	Remarks
0	No quarters with knots (four clear quarters)
1	Knots in one quarter (three clear quarters)
2	Knots in two quarters
3	Knots in three quarters
4	Knots in four quarters
5	One to three knots, branches or stubs estimated to be greater than 10 cm dib, irrespective of the number of clear quarters.
6	Four or more knots, branches or stubs greater than 10 cm dib, irrespective of the number of clear quarters.

Epicormic branches are small sprout-type limbs that originate from dormant or adventitious buds. According to current literature, this type of branching is not generally prevalent on conifers except on the true fir species. Since these branches do not originate from the pith and if present, live for only a short period (4-6 years), they have no effect on the quality of the wood.

Positions 52 to 56

These columns are not in use.

Position 59 Selective Cutting

L	leave tree
Blank or C	cut tree

Position 60 Miscellaneous - optional data collection.

Root Rot	Description
J = light	Tree within a disease centre or within 10 m of a tree or stump that is symptomatic or killed by root disease.
K = moderate	Tree with root disease crown symptoms.
L= heavy	Tree with root disease confirmed by stain, decay, fruiting bodies or basal resinous.

Interior Dead Potential White Pine Log Grade Algorithm

Sap rot and weather checks can be collected in the root rot column, column 60.

The sap rot and weather check codes are as follows:

a. record by tree third as per pathological indicator location codes 1 to 7,

b. record codes 1 to 7 for tree thirds that will not be suitable to produce 50 percent lumber,

c. coding is the same as pathological indicator tree positions,

Refer to Appendix 7 for a more detailed description of the algorithm.

The hemlock and dead white pine grade algorithms are used for interior appraisals. The hemlock algorithm is found in Figure A.42 and the white pine algorithm is found in A.43. Sap rot and suncheck codes are required for the dead potential white pine algorithm. The procedure is outlined in A.7.2(3).

Positions 61 to 63 Damage Codes (see Section A.6)

Damage codes are to be used at all times, and shall be recorded as they appear at the time of the cruise with no attempt to predict the future condition of the trees. Where damage is tallied it will be compiled and reported.

The codes are for appraisal reporting purposes and for net volume adjustment purposes in compilation.

All damage types will be compiled for net volume. Where multiple damage is recorded for a single tree, the most severe damage type will be compiled for that tree.

All damage types will be reported in the cruise as a percentage of the cruise net volume.

Position 61 Insect and Disease Codes (see Appendix 6.13)

Position 62 Fire Damage Codes (see Appendix 6.2)

Position 63 Down Trees (see Appendix 6.3)

6.3.3 Card Type 3

Position 36, Columns 37 - 39 Sample Tree Details

Do not estimate heights for card type 3 sample trees. Sample tree details may be entered for count plots.

Refer to Sections 3.5.3.4 and 8.4 for details regarding the use of height/diameter curves.

Refer to Section 3.5.9 for details regarding the collection of tree ages.

Counted Age at DBH

This is the Breast Height Age referenced above.

Horizontal Distance from Plot Centre

This is the measured distance from the plot centre to the face of standing trees at DBH plus half the DBH and on the top side at mid point for down trees.

6.4 Reverse Side of Cruise Tally Sheet (FS 205 HVA 2002/04)

Growth rates, the number of rings in the last 10 cm, and 10 year growth can be noted in the Remarks section.

6.4.1 Miscellaneous

Ecosystem	Record the Biogeoclimatic subzone and variant if known.
Snow Depth	Note average depth of snow in centimetres at the time of cruise for the cruise plot, along with the date on which the cruise plot was completed.
Cruised By	Signature All Cruise Tally Sheets (FS 205 and industry versions) must be signed and dated by the cruiser in charge, and in so doing, accepts responsibility for the information contained on the card.
Checked By	Signature All Cruise Tally Sheets (FS 205 and industry versions) must be signed and dated by the check cruiser, and in so doing, accepts responsibility for the information contained on the card.

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