Introduction 1

1.1 Definitions

In this manual:

"Act" means *Forest Act*,

"Agreement" means a form of agreement granting rights to harvest crown timber referred to in section 12 of the *Act*, or a pulpwood agreement,

"**Applicable Volume**" means:

a. Except as provided in section 2.2.1(d), and subject to paragraph (b) of this definition, where the harvesting is authorized on a cutting authority area under an agreement other than a BCTS licence, applicable volume means the total net coniferous volume,

b. Where the cutting authority or the agreement under which the cutting authority is issued requires harvesting in deciduous stands and the deciduous timber has not been reserved, applicable volume means the sum of the total net coniferous volume and the total net deciduous volume.

c. Where the harvesting is authorized on a cutting authority area under a BCTS licence, applicable volume means the sum of the total net coniferous volume and the total net deciduous volume.

"**Appraisal Data Submission (ADS)"** means the information required by the person who determines the stumpage rate to determine that rate including the appraisal map, appraisal summary report, cruise compilation and any other information required by the regional manager or district manager, in the form required by the director, signed by a registered professional forester (RPF) or registered forest technologist (RFT), registered with the Association of British Columbia Forest Professionals,

"BCTS" means British Columbia Timber Sales.

"BCTS licence" means:

a. a timber sale licence entered into under Section 20 or 21 of the *Forest Act*, or

b. a forestry licence to cut entered into under Section 47.6(3) of the *Forest Act*,

"Coniferous cruise volume" means that part of the total net cruise volume which is coniferous timber,

"Cutting Authority" means:

1. A cutting permit issued under:

a. a forest licence,

b. a timber sale licence that provides for the issuance of cutting permits,

c. a tree farm licence,

d. a community forest agreement,

e. a woodlot licence,

f. a timber licence,

g. a community salvage licence,

h. a master licence to cut, or

i. a forestry licence to cut.

2. A timber sale licence under which cutting permits have not or will not be issued.

3. All other licences to cut.

4. A road permit.

"Cutting Authority Area" means the area where timber may be harvested under a cutting authority, which has a unique timber mark,

"Deciduous timber" means timber that is not of a coniferous species,

"Director" means director of Revenue Branch Ministry of Forests and Range,

"District Manager" means district manager or district manager's designate,

"Fully Appraised" means stand data (site specific or borrowed) has been used by the general appraisal system to calculate an indicated stumpage rate or an upset stumpage rate,

"Licensee" means the holder of a cutting authority,

"Manual" means *Interior Appraisal Manual*,

"Minister" means Minister of Forests and Range,

"Ministry" means Ministry of Forests and Range,

"Total Net Cruise Volume" means the sum of the species net cruise volumes reported in the appraisal summary report from the cruise compilation for the cutting authority area,

"New Construction" means the following construction phases: subgrade construction, placement of additional stabilizing material and the construction and installation of drainage and other pertinent structures,

"Reconstruction and Replacement" means replacement or structural repair of a major drainage structure (e.g., replacing stringers, cross ties, or cribbing), or major resurfacing, which means resurfacing sections of more than 0.3 km in length that were initially surfaced but have deteriorated due to long term wear and tear, where stabilizing material was not previously used, or major reconstruction, which means restoring at least 0.1 km of road (per occurrence) that requires complete rebuilding of the subgrade,

"Regional Manager" means regional executive director or regional executive director's designate,

"Regulations" means regulations under the *Act*,

"Remedial Fences and Wing Fences" means fencing that is required to remedy, reduce or manage the impact of timber harvesting activities on range management,

"Revenue Branch" means the Revenue Branch of the Ministry,

"Skidder Swing" means situations where two of the different harvest methods as listed in section 4.4.1 are required to move timber to an existing road or landing where it can be loaded onto a haul truck. Where skidder swing is included in an appraisal the harvest method that moves the felled timber first is the method that is indicated in the appraisal data submission,

"Salvage" except as provided in section 6.4, means a cutting authority area where greater than one-third of the net coniferous cruise volume is attacked by mountain pine beetle or other pests,

"Species Net Volume" is the species net volume reported in the appraisal summary report from the cruise compilation for the cutting authority area,

"Stud Log Percent" means the net volume of 5 m logs with top diameters under 20 cm expressed as a percentage of the total net cruise volume. The stud log percent is rounded to the nearest whole percentage point,

"Timber Sales Manager" means the Timber Sales Manager or the Timber Sales Manager's designate,

"Total Net Coniferous Volume" is the total of the species net volumes for all coniferous species on the cutting authority area,

"Total Net Deciduous Volume" is the total of the species net volumes for all deciduous species on the cutting authority area,

"Tributary Cutting Authority Area" means a cutting authority area from which timber must be transported over the road that is developed, or a cutting authority area to which bulk fuels, supplies, equipment and harvesting crews necessary to carry out the day-to-day harvesting activities on that area must be taken on a regular basis over the road that is developed,

1.2 Terms of Reference

1. Pursuant to section 105 of the *Forest Act* the provisions of this manual are policies and procedures to be used in the determination, redetermination and variance of stumpage rates in the Northern Interior Forest Region and in the Southern Interior Forest Region and Manning Park.

1.2.1 Responsibility for Stumpage Determination

1. The following employees of the ministry are authorized to determine, redetermine and vary rates of stumpage:

    a. regional managers, regional timber pricing co-ordinators, and employees of the regional revenue sections, and

    b. director and employees of Revenue Branch.

1.3 Numbering and Calculation Conventions

1. The following exemplifies the numbering system used in this manual:

1.	=	Chapter.
1.1 or 1.1.1.	=	Section.
1.1.1 (2)	=	Section with subsection.
Table 4-2	=	Table 2 within chapter 4.

2. The calculation of the Interior Average Market Price must be performed in accordance with the specifications contained in the documents titled: *"Specifications: Calculation of the Interior Average Market Price*" dated July 1, 2006, and "Interior Market Pricing System Update - 2007".

3. The calculation of the stand value index, mean value index and the base rate must be performed in accordance with the specifications in the document titled: "*Specifications: Calculation of Interior Stumpage Rates"* dated July 1, 2006.

4. Where a value is specified as a limit, for example a constraint or a requirement for an equation,

   a. The value will be treated as an absolute value, and

   b. An actual measurement or record will not be rounded before use unless otherwise specified in this manual.

1.4 Cutblocks within a Cutting Authority Area

1. Cutblocks within a cutting authority area must:

    a. Constitute a logical unit,

    b. Be within the same forest district,

    c. Be tributary to a common point of appraisal,

    d. Must not exceed a maximum distance of ten kilometres between the furthest boundaries of the furthest cutblocks, except when required for bark beetle epidemic blanket salvage.

1.5 Appraisal Data Requirements

1. The cruise and all other pertinent information required for the appraisal must be submitted by the licensee or BC Timber Sales with the appraisal data submission to the district manager.

2. Unless otherwise specified by the Director, cruise data must be gathered and compiled according to the approved interior standard timber merchantability specifications in Table 1-1 below and in accordance with the following Ministry publications:

   a. *Cruising Manual* web site:

      http://www.for.gov.bc.ca/hva/manuals/cruising/

   b. *Cruise Compilation Manual*.

3. When requested by the district manager, a copy of the original field data must be supplied by the licensee.

Table 1-1 Interior Standard Timber Merchantability Specifications

Description	
The following standard timber merchantability specifications must be used for all appraisals.	
Stumps (Measured on the side of the stump adjacent to the highest ground.)	
no higher than	30.0 cm
Diameter (outside bark) at stump height	
lodgepole pine: all timber that meets or exceeds	15.0 cm
all other species: all timber that meets or exceeds	20.0 cm
Top diameter (inside bark or slab thickness)	
for all species and ages, except cedar older than 141 years, all timber that meets or exceeds	10.0 cm
Top diameter (inside bark or slab thickness)	
for cedar older than 141 years, all timber that meets or exceeds	15.0 cm
Minimum length	
log or slab	3.0 m

1.5.1 Comparative Cruise Data

1. Comparative cruise data is cruise data from an existing, cutting authority area that is used in the appraisal of a new cutting authority area.

2. Comparative cruise data will be chosen following procedures set out in section 2.1.2.2 of the *Cruising Manual*.

3. If there is time to perform a full cruise, then the timber will be cruised.

4. If there is insufficient time to perform a full cruise then comparative cruise data may be utilized:

   a. For cutting authorities with volumes greater than 5 000 m^3 if:

      i. the area is in an approved Emergency Bark Beetle Management Area (EBBMA) as designated by the Minister of Forests and within an approved Emergency Management Unit (EMU) as designated by the beetle management coordinator,

      ii. the licensee has previously harvested comparative cutting authority's in a timely manner, and

      iii. the regional manager has determined that the requirement to perform a full operational cruise will delay expeditious harvesting and result in further damage.

   b. When the stumpage rate is determined according to section 6.2(3).

1.5.2 Appraisal Data Submission

The form as required by the director may be found at:

http://www.for.gov.bc.ca/hva/ECAS/index.htm

1.5.3 Appraisal Map

The appraisal map must be completed in accordance with the requirements of Appendix IV.

4.2 Specified Operations

1. Specified operations are those situations listed in Table 4-2 that require special cost estimating that can be included in an appraisal.

2. The cost estimates are determined on the basis of information at hand using the procedures approved by the region.

3. Other phase costs in this manual are combined with the specified operations cost estimates to determine the total operating cost. Where appropriate, specified operations are weighted according to the applicable net cruise volume.

4. A specified operation will only be used in an appraisal when the treatment is required in a Site Plan, or indicated on the appraisal map.

Table 4-2 Specified Operations

Specified Operations	Affected Phase
Root Disease Control	Silviculture (section 4.9).
Skidder Swinging	Tree-to Truck (section 4.4).

4.3 Development

1. A total cost ($) is calculated for each category of section 4.3.1, and 4.3.1.1. These category costs are summed and divided by the applicable volume to provide a total development cost estimate ($/m^3).

2. Subject to section 4.3.1.1.4, the costs for new development occurring under the authority of a road permit or cutting permit may only be used in the appraisal of the licensee's first fully appraised tributary cutting authority area, that is authorized for harvest under the licence under which that road permit or cutting permit has been issued.

3. There are two methods of estimating development as follows:

    a. Tabular cost estimates are made for construction of roads and drainage structures using the applicable equations or tables in section 4.3.2 of this manual. Tabular estimates must be used for an appraisal when physical dimensions and conditions fall within the tabular limitations.

    b. Detailed engineering cost estimates are made when the physical dimensions and conditions of a road section or a drainage structure exceed the tabular limitations of the manual. A detailed engineering estimate is made according to section 4.3.3. Projects eligible for this costing method are listed in section 4.3.3.

4.3.1 Development Cost Categories

1. Development costs are estimated for each of two categories namely:

    a. New construction.

    b. Reconstruction and replacement.

2. Development cost allocation (section 4.3.1.1) applies to all cost estimates made under this section.

3. New construction costs are allocated to the licensee's first fully appraised tributary cutting authority area (subject to section 4.3.1.1.4).

    a. Road Cost Estimates

        i. Tabular cost estimates

        Each road section cost estimate is determined from the appropriate equations and tables (section 4.3.2). These section costs are totalled to give a road cost estimate for each road. The road costs for all roads are then totalled to give a total cost for tabular roads.

ii. Detailed engineering cost estimates

Each project cost is estimated according to section 4.3.3. The total of the estimated costs for each project is summed to give a total cost ($) for engineered roads.

b. Drainage Structure Cost Estimates

i. Each drainage structure cost estimate is determined either from the appropriate table (section 4.3.2.4) or as a detailed engineering cost estimate (section 4.3.3).

ii. Where materials are reused by the original purchaser at a second or subsequent location, the cost estimate will include dismantling, transportation and installation at the new site. The initial materials cost and delivery costs are excluded.

iii. Where used bridge materials are purchased from a legally non-associated party, the cost of purchase and shipping those materials will be included in the cost estimate.

4. Reconstruction and Replacement:

a. The costs approved under this subsection are not road management costs as described in section 4.6.

b. Bridges replaced on forest service roads that are included in the Forest Renewal B.C. five-year "Bridge Replacement Program on Forest Service Roads", or are otherwise funded by the Crown will not be included in any appraisal. Other major forest service road reconstruction or upgrades that are funded by the Crown will not be included in appraisals.

c. Where a Ministry of Transportation (public) road requires reconstruction or upgrade to forest service standards for hauling Crown timber, the project must be approved in advance by the director of Revenue Branch before it can be included in an appraisal of tributary timber. The detailed engineering cost estimate for each project must be based on arms length competitive bids. The approved project costs may be apportioned to multiple users as per section 4.3.1.1.4.

d. Reconstruction and replacement cost estimates are determined as detailed engineering cost estimates (section 4.3.3). The cost estimates may be applied to remaining tributary timber (i.e., applicable volume) provided the project was not known of or planned for at the time of appraisal. If the cost estimate is not applied to the remaining tributary volume, it must be applied to the first tributary cutting authority appraised over the reconstruction or replacement. Section 4.3.1.1.4 may be applicable for main roads. Cost estimates for reconstruction and replacement are not to exceed the tabular costs for new construction under similar conditions.

e. Costs will not be recognized if the licensee has been negligent or has not followed approved plans or standards as defined under legislation.

4.3.1.1 Development Cost Allocation

Where proration is required for section 4.3.1.1.1 and 4.3.1.1.2:

$$\text{Crown Share} = \text{Total Estimated Cost} * \frac{\text{Appraised Timber Volume}}{\text{Total Timber Volume}}$$

Where:

Crown Share ($)	=	Dollar amount to be allocated to stumpage-bearing timber in the cutting authority being appraised.
Total Estimated Cost ($)	=	Dollar amount of the total development cost estimate.
Appraised Timber Volume (m^3)	=	Volume of Crown timber that is tributary to the project and under the control of the licensee or a company legally associated with the licensee, including volume in all areas contributing to the allowable annual cut determination.
Total Timber Volume (m^3)	=	Total volume of Crown and private timber that is tributary to the project and under the control of the licensee or a company legally associated with the licensee.

In all cases volumes are estimated from the latest approved operational or inventory cruise data and maps of the area within the drainage to the height of land.

The Crown share is a dollar amount which is included in the appraisal of a tributary cutting authority, subject to section 4.3.1.1.4.

Development cost estimate is allocated according to the outline below (see also Appendix II).

4.3.1.1.1 Development Cost Estimates on Crown Lands

1. Development providing access to appraised timber only:

   Total estimated costs are included in the appraisal.

2. Development providing access to non-appraised timber only:

   Cost estimates are not included in the appraisal.

3. Development in appraised timber areas providing access to both appraised and non-appraised timber held by the licensee or a company legally associated with the licensee:

   All costs are prorated between appraised and non-appraised timber. The appraised timber portion is then included in the appraisal.

4.3.1.1.2 Development Cost Estimates on Private Land

1. When a new or reconstructed road or structure on private land is required for Crown timber extraction, the estimated cost of the road or structure will be included in the appraisal of a tributary cutting authority according to the procedures of section 4.3.1.1 and the following:

   a. If development provides access to appraised timber only, the total estimated costs are included in the appraisal.

   b. If development provides access to non-appraised timber only, cost estimates are not included in any appraisal.

   c. If development provides access to both non-appraised and appraised timber, all cost estimates are prorated between non-appraised and appraised timber (section 4.3.1.1) and then the Crown portion is included in the appraisal.

4.3.1.1.3 Existing Roads and Structures

The following are defined as existing roads for the cutting authority being appraised and are not eligible for inclusion in development cost estimates:

1. Costs of constructed roads that have been previously considered in appraisals of Crown timber within another cutting authority.

2. Roads previously constructed and used to haul non-appraised timber (excluding right-of-way).

3. Roads previously constructed all or in part for purposes unrelated to logging the cutting authority area being appraised.

4. Roads previously constructed, repaired or reconstructed on private land before August 1, 1996.

5. Winter roads over muskeg or organic soils that use snow and ice for a driving surface are not considered as existing roads.

6. If the existing road requires reconstruction or replacement after August 1, 1996, the cost estimate is made as described in section 4.3.1. If the existing road is on private land, road and land use charges may be recognized as described in section 4.7.

7. A road on private land that has previously been included in an appraisal because it was required for only short term timber extraction (as per previous policy) shall continue to be included upon reappraisal.

4.3.1.1.4 Extended Road Amortization

1. For new appraisals where the development occurring under the authority of a road permit or cutting permit for roads accessing more than one tributary cutting authority exceeds $4.00 per cubic metre, a written agreement may be made between the licensee and the regional manager, which distributes a portion of the development cost estimate to two or more tributary cutting authorities that are issued under the licence that entitled the licensee to apply for the road permit or cutting permit.

2. The agreement is subject to the following conditions:

    a. Future tributary timber included in the extended road amortization agreement must be either within the woodlot licence or an approved cutting permit or cutblocks shown in the licensee's forest development plan, woodlot licence plan or forest stewardship plan in effect on the appraisal effective date.

    b. The road portion that may be included in the agreement ends at the far boundary of the first cutting authority being appraised.

    c. The agreement must indicate the cost estimate that is being distributed to each existing or future cutting authority in the agreement.

    d. The agreement must be signed by the licensee and the regional manager.

    e. The costs apportioned to each cutting authority under the agreement may be adjusted once, in conjunction with this section, at reappraisal using the same ratio for distributing the costs as in the original agreement provided harvesting has not commenced on any of the cutting authority areas included in the agreement.

    f. The apportioned costs are not used to exceed the $4.00/$m^3$ in subsection 1 in order to generate another extended road amortization agreement.

    g. The agreement confers no obligation on the Crown to compensate licensees for any unamortized costs.

4.4.2 Tree-to-Truck Variables

1. a. The variables identified in subsections 2 to 15 of this section will be used in appraisals based on all compiled cruise plots segregated by logging method where applicable (see section 4.4.5).

   b. Where:

      i. The cutting authority area being appraised is authorized for harvest under an agreement other than a BCTS licence,

      ii. The holder of the cutting authority is required to harvest in deciduous stands,

      iii. The deciduous timber has not been reserved from harvest, and

      iv. The calculation of a variable listed in this section requires the use of a volume,

      the volume must include the total net deciduous volume and the total net coniferous volume.

   c. Where the cutting authority area being appraised is authorized for harvest under an agreement other than a BCTS licence, and

      i. the holder of the cutting authority is not required to harvest in deciduous stands, or the deciduous timber has been reserved from harvest, and

      ii. The calculation of a variable listed in this section requires the use of a volume,

      the volume shall only include the total net coniferous volume.

2. Biogeoclimatic Ecosystem Classification (BEC) Zones

   A separate biogeoclimatic zone may be recognized for each harvest method (section 4.4.1) as part of the regional constant.

ICH	-	Interior Cedar Hemlock
SBS	-	Sub Boreal Spruce
ESSF	-	Engelmann Spruce – Subalpine Fir
MS	-	Montane Spruce
IDF	-	Interior Douglas Fir

Where a harvest method area occupies more than one biogeoclimatic zone, the constant for the zone that occupies the greatest net merchantable area in the harvest method area shall be used in the calculation of the cost estimate.

3. Slope (SLOPE%)

   The average side slope percent is derived from an area weighted average of the maximum side slope percentage on all cruise plots, rounded to the nearest whole percentage point.

4. Volume per Hectare (VOLHA)

   The average net cruise volume per hectare (m3/ha), rounded to the nearest cubic metre. For partial cutting, it is based on the actual volume per hectare being harvested.

5. Percent Blowdown (BD%)

   The percentage of the net cruise volume classified as blowdown.

6. Partial Cut Variables (PCUT, DPCUT)

   The term partial cutting includes all forms of harvesting, other than clear cutting.

   Clear cutting is defined as those areas with block opening sizes equal to or greater than 1 hectare and where the volume removal is equal to or greater than 90 percent based on the net volume measured to the Standard Timber Merchantability Specifications (section 1.5).

   Partial cut areas that have less than 90 percent volume removal are not to be averaged with those areas that are equal to or greater than 90 percent. Clear cut areas are to be stratified out before calculating an overall weighted partial cut percent for the cutting authority.

   a. PCUT

      Where a partial cut is comprised of openings of less than 1 hectare in size, the PCUT percent is based on the cumulative volume of these openings divided by the volume of the block area surrounding them.

      The percent partial cut is determined as:

$$PCUT = \frac{\text{Net cruise volume required to be removed using a partial cut system}}{\text{Total net cruise volume on the area where Partial Cutting is required}} * 100\%$$

      (except if partial cut percent > = 90% then PCUT = 0).

b. Partial cut dummy variable (DPCUT)

DPCUT = 1 if partial cut percent is greater than 0 and less than 90, otherwise DPCUT = 0.

7. Distance to Support Centre (DS)

The one-way, road distance from the geographic centre of the cutting authority to the main post office (or other location designated by the regional timber pricing co-ordinator) in a community from the following list. The distance to support centre includes the distance covered by a daily barge or ferry service. Where there is more than one block in the cutting authority, the weighted average distance to support centre must be calculated using the individual distances and the individual block volumes. Where more than one alternative is possible, the least cost alternative is used. The distance is measured to the nearest kilometre. The following is a list of communities by forest region.

Northern Interior Forest Region

Burns Lake	Kitwanga	Smithers	Terrace
Houston	New Hazelton	Stewart	Prince George
Kitimat	Fort St. James	Fraser Lake	Fort St. John
Chetwynd	Fort Nelson	Mackenzie	Dawson Creek
			Vanderhoof

Southern Interior Forest Region

Boston Bar	Kamloops	Merritt	Salmon Arm
Clearwater	Kelowna	Pemberton	Vernon
Hope	Lillooet	Penticton	Nakusp
Canal Flats	Creston	Grand Forks	Nelson
Castlegar	Fernie	Greenwood	Revelstoke
Cranbrook	Golden	Invermere	100 Mile House
McBride	Valemount	Princeton	Quesnel
Williams Lake			

For cutting authorities serviced by a camp (see section 4.8.2), the distance to support centre is the one-way road distance from the geographic centre of the cutting authority to the isolated camp (including that covered by the non-road portions of the route). Where more than one alternative is possible, the least cost alternative is used. The distance is measured to the nearest kilometre.

The following distance variables are included:

- NEWDIST200 = 0 IF DS<= 100 km
  = (DS-100) if DS>100 km and <= 200 km
  = 100 if DS>200 km
- DIST200S150 = 0 if DS<=150 km
  = (DS-150) if DS>150 km and <=200 km
  = 50 if DS>200 km

8. Volume per Tree (VOLTREE)

   The average net cruise volume per tree (m3), rounded to two decimals. For partial cutting, it is based on the trees to be harvested.

9. a. Gross Volume per Tree (GVOL)

   Gross volume per tree (m^3) is computed as: VOLTREE/(1 - defect %/100).

   Where:

   Defect percent is the estimate of decay, waste and breakage (DWB) of the gross merchantable volume from the cruise summary for the trees to be harvested. Defect percent is recorded to the nearest whole percentage point for appraisal calculation purposes.

   b. GVOLSQR = $(GVOL)^2$

10. Small Tree Volume (SMALL TREEVOL)

    SMALLTREEVOL = Average net merchantable volume (m^3) per tree if <0.34 m^3/tree. If >= 0.34 m^3/tree SMALLTREEVOL = 0.

11. Small Tree Dummy Variable (SMALLTREED)

    SMALLTREED = 1 if average net merchantable volume per tree <0.34 m3/tree, otherwise = 0.

12. Heli Yarding Distance (HELIYARD)

    The average loaded horizontal yarding distance (in kilometres) flown by helicopter measured to the nearest 0.1 km.

13. Skyline Yarding Distance (SKYYARD)

The average skyline slope distance measured to the nearest metre (m).

14. Species Percent

The species percent data used in the tree-to-truck and hauling equations is calculated as:

Species volume (m^3) / (Total Net Coniferous Volume (m^3) + Total Net Deciduous Volume (m^3))

HE	- Hemlock	SP	- Spruce
FI	- Fir	LO	- Lodgepole Pine
LA	- Larch	BA	- Balsam
CE	- Cedar		

15. Region Constants [1]

FNP	=	Fort Nelson & Peace Forest Districts
Prince George	=	Fort St. James, Mackenzie, Prince George, and Vanderhoof Forest Districts
Prince Rupert	=	Kalum, Nadina, and Skeena Stikine Forest Districts
Kamloops	=	Cascades, Kamloops, Headwaters and Okanagan Shushwap Forest Districts
Cariboo	=	Chilcotin, 100 Mile House, Central Cariboo and Quesnel Forest Districts
Nelson	=	Arrow Boundary, Columbia, Kootenay Lake and Rocky Mountain Forest Districts

[1] Regions as they were prior to April 1, 2003.

4.4.3 Tree-to-truck Cost Estimates

Tree-to-truck costs estimates are determined for each harvesting method as follows:

1. Helicopter Logging

$\$/m^3 = 54.56 + (6.58 * \text{HELIYARD}) + (3.19\ \text{GVOL})$

2. Horse Logging

No variables are recognized for this method. The cost estimates are applied to the volume of timber to be clear cut or partial cut.

$/m3 = 26.10

3. Ground Skidding

The ground skidding equipment options include, but are not limited to, rubber tired skidder, crawler tractor, soft track skidder, small cat skidding, hoe chucking, long line skidding, clambunk forwarders, low ground pressure skidders, harvester forwarders and cut-to-length processors. A system does not have to skid wood all the way from the stump to the landing to be included. Some wood may be moved part way by longlining or hoe chucking before being skidded by some other system to the landing. Two variations are recognized:

a. Clear Cut,

b. Partial Cut

The tree-to-truck cost estimate for both variations is determined from the equation as follows:

$$\$/m^3 = \text{CONSTANT} + (6.94*SLOPE\%/100) - (4.15*VOLHA/1000) + (1.40*BD\%/100) + (2.04*GVOL) + (1.12*DPCUT) + (6.99*SMALLTREED) - (20.52*SMALLTREEVOL) + (0.64*NEWDIST200/100)$$

Where CONSTANT =

	BEC ZONE				
REGION	**ICH**	**IDF**	**MS**	**ESSF**	**Other**
Cariboo	17.63	18.05	17.00	17.87	16.16
FNP	17.67	18.09	17.04	17.91	16.20
Kamloops	17.19	17.61	16.56	17.43	15.72
Prince George*	16.65	17.07	16.02	16.89	15.18
Prince Rupert	16.85	17.27	16.22	17.09	15.38
Other	19.21	19.63	18.58	19.45	17.74

* Excluding FNP

4. Overhead Cable Logging

The method includes both highlead (spar) mobile (grapple) yarders and skyline yarders, but variations in machine size, spar/boom height, winch line capacity and yarding technique are not recognized.

Variations recognized within the method are:

a. Highlead and Grapple

The tree-to-truck cost estimate for clear cut and partial cut is determined from the equation as follows:

$$\$/m^3 = \text{CONSTANT} + (6.52*\text{SLOPE\%}/100) - (3.16*\text{GVOL}) + (0.64*\text{GVOLSQR}) + (6.67*\text{DPCUT}) + (6.42*\text{DIST200S150}/100) + (7.62*\text{HE\%}/100) + (4.08*\text{LO\%}/100)$$

Where CONSTANT =

	BEC Zone		
REGION	**ICH**	**SBS**	**Other**
Cariboo	31.22	29.76	33.47
FNP	21.15	19.69	23.40
Prince George*	24.94	23.48	27.19
Other	27.72	26.26	29.97

* Excluding FNP.

b. Skyline and Intermediate Support Skyline

Skyline yarding estimates will be recognized for each block where the average yarding distance is greater than 300 m, or intermediate supports are required.

The average yarding distance is determined by:

1. Drawing a series of transects (minimum four) with their origin at the landing, being equi-angle apart and measured to the back-line. This is done for each block; blocks will not be amalgamated for the purpose of average yarding distance calculation. The volume for the system is the sum of the volumes of qualifying blocks.

2. Yarding distance will be measured as slope distance from the centre of the landing to the falling boundary.

3. The sum of transect lengths divided by the number of transects equals the average yarding distance.

4. The exception to the above; where the ministry and the licensee agree that Forest and Land Management is better served by the use of a skyline system in a particular logging chance, then the average yarding distance greater than 300 meters requirement is waived.

   The tree-to-truck cost estimate is determined from the equation as follows:

$$\$/m^3 = \text{CONSTANT} + (16.12*\text{SLOPE\%}/100) - (12.50*\text{GVOL}) + (2.14*\text{GVOLSQR}) + (2.47*\text{SKYYARD}/100)$$

Where CONSTANT =

	BEC Zone
Region	**All**
All	31.50

4.4.4 Tree-to-Truck Additive for Damaged Timber

The following cost estimate additives are recognized for heavy fire damage (HFD), and dead/live useless snags (DUS). The data is collected as specified by the *Cruising Manual*. The additional costs incurred to harvest blowdown timber are recognized in the tree-to-truck ground skidding and overhead cable logging equations (sections 4.4.3(3), 4.4.3(4)).

The following additive is determined for all cable and ground skidding harvesting methods and is added to the tree-to-truck cost estimate.

$$\$/m^3 = 0.04 * (DT - 15)$$

Where: DT is the Damaged Timber percent

$$DT = HFD + DUS$$

If: DT is less than 15 percent, DT = 15

If: DT is more than 100 percent, DT = 100

$$\text{Heavy Fire Damage \%} = \frac{\text{Conifer HFD Volume}(m^3) * 100}{\text{Total Net Conifer Volume}(m^3)}$$

4.4.5 Prorating Tree-to-Truck Cost Estimates

Where more than one harvesting method is required, a proration of costs is necessary.

The variables for each required harvesting method must be based on a cruise compilation of only those plots located within the area to be harvested by the method and include the deciduous volume if the licence requires harvesting in deciduous stands.

The additive for damaged timber is also determined for each applicable method.

The final prorated tree-to-truck cost estimate is determined according to the following equation where each component is rounded to the nearest cent before totalling:

4. Notwithstanding any other subsections of this section, the stumpage rate must not be lower than the prescribed minimum stumpage rate.

6.1.1 Incidental Conifer in Deciduous Leading Stands

1. Except as provided in section 7.5.1(5), this section applies to coniferous timber in a cutting authority area where the total volume of all deciduous species to be harvested is greater than 70 percent of the total net cruise volume to be harvested.

2. The stumpage rate for each species of coniferous timber must be determined by using the stumpage rate prescribed in Table 6-1 for the forest zone in which the cutting authority area is located.

3. A stumpage rate determined under subsection 2 shall be redetermined on August 1, of each year in accordance with this section.

6.2 Cutting Authorities With 5 000 m^3 or Less Volume

1. Where the total coniferous volume to be harvested in a cutting authority area is 2 000 m^3 or less, and where the agreement under which the cutting authority authorizing harvesting on the cutting authority area has been issued has a coniferous allowable annual cut of not more than 3 000 cubic metres, or no coniferous annual allowable cut:

    a. The stumpage rate for each species of timber in the cutting authority area must be determined using the stumpage rate in Table 6-1 for the forest zone in which the cutting authority area is located, except that,

    b. Where the agreement holder is not required to establish a free growing crop of trees on the cutting authority area, the stumpage rate for each species of timber shall be

        i. the sum of the rate determined under paragraph (a) of this subsection and the basic silviculture cost for the species in the forest region, or

        ii. where the Crown has the responsibility for silviculture, the silviculture levy determined under section 5.6.4(1).

2. Except as provided in subsection 3 of this section, where the total coniferous volume to be harvested on a cutting authority area is 5 000 m^3 or less, and the cutting authority authorizing harvesting on the cutting authority area is a competitively awarded forestry licence to cut, other than a BCTS licence:

    a. Subject to section 5.6.2 and paragraph (d) of this subsection, the upset stumpage rate for each species of timber in the cutting authority area will be 70 % of the stumpage rate for that species in Table 6-1 for the forest zone in which the cutting authority area is located, except that,

    b. Where applications for a forestry licence to cut have been invited with upset stumpage rates determined under this subsection and no applications have been received, the upset stumpage rate for each species shall be the rate requested by the district manager and approved by the regional manager.

    c. Where the regional manager does not anticipate that applications for a forestry licence to cut will be received due to market conditions or timber profile, the upset stumpage rate for each species of timber shall be the rate requested by the district manager and approved by the regional manager.

    d. Where the Crown is responsible for basic silviculture on the cutting authority area, the upset stumpage rate for each species of timber in the cutting authority area will be the sum of the stumpage rate determined under paragraphs (a), (b) or (c) of this subsection and the basic silviculture levy determined under section 5.6.4(1).

3. Each upset stumpage rate determined under subsection (2) of this section shall not be less than the district's variable cost per cubic meter to prepare the timber for sale calculated by the district manager.

4. Except as provided in section 2.2.1(1)(d) or 2.2.2, where the upset stumpage rate is determined under subsections 1 and 2 of this section, the total stumpage rate is fixed for the term of the cutting authority and all extensions.

5. a. Notwithstanding subsections (1) or (2) of this section, where the total coniferous volume to be harvested on a cutting authority area is 5 000 m^3 or less, the stumpage rate may be determined:

   i. for a cutting authority other than a BCTS licence by an appraisal in accordance with chapters 2, 3, 4, 5, and.

   ii. for a BCTS licence by an appraisal in accordance with chapter 7.

   b. Where the stumpage rate is determined in accordance with this subsection:

      i. the cruise data that is used in the appraisal may be from the cruise of the cutting authority area or from the cruise of a comparable cutting authority that has similar stand and terrain characteristics,

      ii. the district manager may require the selection of a comparable cutting authority to be in accordance with procedures set out in section 2.1.2.2 of the *Cruising Manual*, and

      iii. except as provided in sections 2.3(5) and 7.2.1(2) the total stumpage rate is adjustable for the term of the cutting authority and all extensions.

6.3 Road Permits

1. In this section the area of a forest district or the area of a timber supply area does not include the area of a park located within that district or timber supply area.

2. Except as provided in subsections 3 and 6 of this section, the stumpage rate for a road permit shall be the weighted average sawlog stumpage rate for:

   a. all cutting authorities, other than road permits, that authorize the harvesting of timber in the same forest district in which the road permit cutting authority area is located, and that are issued under the licence that entitles the licensee to apply for the road permit, or

   b. if the licence permitting the granting of the road permit has an allowable annual cut of 3 000 m^3 or more per year, and there are no records from which the weighted average sawlog stumpage rate may be determined under:

      i. paragraph (a), then all the cutting authorities, other than road permits, that authorize the harvesting of timber on land located in the smaller of the area of the same forest district or the area of the same timber supply area in which the road permit cutting authority area is located, or

      ii. paragraph (a) or (b)(i), then all the cutting authorities, other than road permits, that authorize the harvesting of timber on land located in the larger of the area of the same forest district or the area of the same timber supply area in which the road permit cutting authority area is located, or

   c. if the licence permitting the granting of the road permit has an allowable annual cut of less than 3 000 m^3 per year, and there are no records from which the weighted average sawlog stumpage rate may be determined under:

      i. paragraph (a), then all of the cutting authorities, other than road permits, that are for licences that have an allowable annual cut of less than 3 000 m^3 in the smaller of the area of the same forest district or the area of the same timber supply area in which the road permit cutting authority area is located, or

      ii. paragraphs (a) or (c)(i), then all of the cutting authorities, other than road permits, that are for licences that have an allowable annual cut of less than 3 000 m^3 in the larger of the area of the same forest district or the area of the same timber supply area in which the road permit cutting authority area is located, or

      iii. paragraphs (a), (c)(i) or (c)(ii) then all the cutting authorities, other than road permits, that authorize the harvesting of timber on land located in the smaller of the area of the same forest district or the area of the same timber supply area in which the road permit cutting authority area is located, or

      iv. paragraphs (a), (c)(i), (c)(ii), or (c)(iii) then all of the cutting authorities, other than road permits, that authorize the harvesting of timber on land

7.4 Market Price Calculation

The market price must be calculated in accordance with this section

7.4.1 Market Price Variables

The calculation of each market price variable must include the total net deciduous volume unless otherwise indicated in the description of that variable below.

MP	=	Market Price for the cutting authority in ($/m^3).
RSP	=	Real Stand Selling Price for coniferous species ($/m^3). See section 7.3.
VPH	=	Total net coniferous volume divided by net merchantable area (m^3/ha).
PC	=	Fraction of harvest method volume that is appraised as partial cut. PC = (100 – CAPCUT %)/100. See section 4.9 for definition of CAPCUT %. The 80% limit in section 4.9 does not apply.
FIR	=	Fraction of total net coniferous volume that is Douglas fir.
VOL	=	Total net coniferous volume (m^3).
CY	=	Fraction of total harvest method volume that is appraised as overhead cable yarding.
HP	=	Fraction of total harvest method volume that is appraised as helicopter yarding.
HORSE	=	Fraction of total harvest method volume that is appraised as horse yarding.
FIRE	=	Fraction of total net coniferous volume that is fire damaged.
CYCLE	=	Hauling round trip cycle time from the landing to the point of appraisal or water dumpsite and return (hrs.). See section 4.5.1.
HB	=	Fraction of total net coniferous volume that is hemlock and balsam.
CEDAR	=	Fraction of total net coniferous volume that is cedar.
SAL	=	Where greater than one-third of the total net coniferous volume is attacked by mountain pine beetle or other pests. SAL = 1, otherwise 0.

VPT	=	Cutting permit average volume per tree from cruise (m^3).
DECID	=	Total net deciduous volume (m^3) / (total net deciduous volume (m^3) + total net coniferous volume (m^3)).
SLOPE	=	Cutting permit average slope from cruise (%).
DANB	=	Average number of bidders by district from the auction dataset (see Table 7-2).
DECAY	=	Prorated coniferous species decay (%) from cruise/100.
Z9	=	Fort Nelson - Peace selling price zone variable. Z9 = 1 if cutting authority is appraised with selling price zone 9, otherwise Z9 = 0.
AUC2006	=	2006 Auctions variable. AUC2006 = 1.
DECK	=	DECK_VOL / VOL
DECK_VOL	=	The total net coniferous volume that has been felled and decked in the timber sale (m^3).
ER	=	Exchange Rate ($US/$C). Bank of Canada three-month average rate beginning five months prior to the stumpage rate effective date, as published by Revenue Branch.
CPI	=	Monthly B.C. Consumer Price Index (CANSIM 326-0020, 2002 = 100) x 1.1787.
CPIF	=	Consumer Price Index Factor calculated as CPI/109.3.

Table 7-2 District Average Number of Bidders (DANB)

Forest District	DANB	Forest District	DANB
100 Mile House	5.1	Kootenay Lake	4.0
Arrow Boundary	3.7	Mackenzie	2.3
Cascades	5.2	Nadina	4.9
Central Cariboo	4.6	Okanagan Shuswap	4.8
Chilcotin	2.0	Peace	3.6
Columbia	3.7	Prince George	3.5
Fort Nelson	2.8	Quesnel	5.0
Fort St. James	2.6	Rocky Mountain	4.4
Headwaters	5.6	Skeena Stikine	2.8
Kalum	3.0	Vanderhoof	2.9
Kamloops	5.9		

7.4.2 Market Price Equation

Using the variables defined in section 7.4.1, the selling price calculated in section 7.3.2 and the equation below, calculate the market price (MP).

MP = [41.22 + 0.214 * RSP + 5.92 * (VPH/1000) – 2.91 * PC + 7.98 * FIR + 2.67 * ln ((VOL – DECK_VOL)/1000) – 9.51 * CY – 40.90 * HP – 10.11 * HORSE - 17.78 * FIRE – 2.11 * CYCLE – 15.83 * HB + 28.35 * CEDAR – 3.41 * SAL -1.41 * (1/VPT * (1- HB)) – 12.83 * DECID – 0.0241 * SLOPE + 0.768 * DANB – 36.21 * DECAY – 3.31 * Z9 – 4.07 * AUC2006 + 6.05 * ln(VPT) + 159.64 * DECK -17.48 * ER] * CPIF

If MP less than $0.25 then MP = $0.25

7.4.3 Specified Operations

The following only are identified as specified operations. Cost estimates from the current *Interior Appraisal Manual* are used for 1, 2 and 3 below.

1. Rail Haul

   Rail haul including truck to rail transfer and rail transport.

2. Barge/Ferry

   Barge/ferry used for truck haul (private).

   Barge/ferry not used for truck haul (private).

3. Dump, Boom, Tow, Dewater, Reload

   Dump, boom

   Tow

   Dewater and reload.

4. Camp Costs

   Cost estimate is $\$2.43/m^3$.

5. Skyline Yarding

   Cost estimate is $\$8.07/m^3$ for the volume appraised as skyline.

6. High Development Cost

   Where the development cost estimate (DC) determined under chapter 4, is greater than $\$4.02/m^3$ the high development cost specified operations estimate (HDC) is calculated as follows:

   HDC $/m^3 = DC – 1.42

   If DC < = 4.02 HDC = 0

7.5 MPS Stumpage Rate

7.5.1 MPS Upset Stumpage Rate

1. Except as provided in subsections (2), (3), (4), (5), (6) and (7), the MPS upset stumpage rates for a timber sale licence advertised on or after December 2, 2005, shall be determined in accordance with section 7.5.2.

2. Where applications for a timber sale licence with an MPS upset stumpage rate determined in accordance with section 7.5.1(1) have been invited but no applications have been received, the MPS upset stumpage rate shall be the rate requested by the timber sales manager and approved by the Director of Operations, BC Timber Sales.

3. Where the Director of Operations, BC Timber Sales does not anticipate that applications for a timber sale licence with an MPS upset stumpage rate determined under section 7.5.1(1) will be received due to market conditions or timber profile the MPS upset stumpage rate shall be the rate requested by the timber sales manager and approved by the Director of Operations, BC timber sales.

4. The MPS upset stumpage rate determined under subsections 2 or 3 of this section shall not be less than the variable cost per cubic meter to prepare the timber for sale calculated by the Timber Sales Manager.

5. a. Except as provided in paragraphs (b) and (c) of this subsection, the MPS upset stumpage rate for a timber sale licence where the volume of deciduous timber to be harvested on the cutting authority area is equal to or greater than sixty percent of the total net cruise volume, will be:

$$0.70 \times \left[\frac{(TNDV\ (m^3) \times 0.50\ (\$/m^3)) + (TNCV\ (m^3) \times 18.77\ (\$/m^3))}{TNDV\ (m^3) + TNCV\ (m^3)} \right]$$

where: TNDV = total net deciduous volume

TNCV = total net coniferous volume

b. Subject to paragraph (c) of this subsection, where an MPS upset stumpage rate for a timber sale licence has been calculated under paragraph (a) of this subsection and

i. Applications for the licence have been invited but no applications have been received, or

ii. The Director of Operations, BC Timber Sales does not anticipate that application for the licence will be received due to market conditions or timber profile,

then the MPS upset stumpage rate shall be the rate requested by the timber sales manager and approved by the Director of Operations, BC Timber Sales.

c. i. if the upset stumpage rate calculated under paragraph (a) of this subsection is less than the variable cost to prepare the timber for sale calculated by the Timber Sales Manager, the upset stumpage rate shall be the variable cost to prepare the timber for sale calculated by the Timber Sales Manager,

ii. the rate requested under paragraph (b) of this subsection shall not be less than the variable cost to prepare the timber for sale calculated by the Timber Sales Manager.

6. The MPS upset stumpage rate for timber that has been decked for over three years and is administered by the Timber Sales Manager, shall be the prescribed minimum stumpage rate when that is requested by the Timber Sales Manager.

7. Not withstanding anything else in this section the MPS upset stumpage rate must not be lower than the prescribed minimum stumpage rate.

7.5.2 Upset Stumpage Rate Calculation

The upset stumpage rate (USR) is calculated as follows:

USR = (MP – SO) x (1-DF)

Where:

USR	=	Upset stumpage rate
MP	=	Market Price as defined in section 7.4.2
SO	=	Specified operations as defined in section 7.4.3.
DF	=	0.00 if the cutting authority being appraised was entered into under section 47.6(3) of the *Forest Act*, otherwise DF = 0.30

7.5.3 Prescribed Minimum Stumpage Rate

The minimum stumpage rate is prescribed by the minimum stumpage rate regulation (BC Regulation 354/87). The current minimum stumpage rate is $0.25 per cubic metre.

7.5.4 Total MPS Stumpage Rate

1. The total MPS stumpage rate is the sum of the MPS upset stumpage rate and the bonus bid.

2. Where the MPS upset stumpage rate is determined under subsections (1), (2), (3), and (4) of section 7.5.1, or section 7.5.2, the total MPS stumpage rate applies to Grade Code 1 and 2 coniferous sawlogs.

3. Where the MPS upset stumpage rate is determined under section 7.5.1(5), the total MPS stumpage rate applies to Grade Code 1 and 2 coniferous and deciduous sawlogs.

Appendices

Appendix I Equipment and Labour Rates

(Cost Base July 1, 2004)

MACHINE DESCRIPTION	TYPICAL MODEL	$/HOUR
Crawler Tractor	Cat D9R, Komatsu D275	269.10
Crawler Tractor	Cat D9N (years: 1996 thru 2000)	258.00
Crawler Tractor	Cat D8R, Komatsu D155AX-5	205.00
Crawler Tractor	Cat D7R, Komatsu D65/85	175.35
Crawler Tractor	Cat D6, Dresser TD15, Komatsu D61	139.15
Crawler Tractor	Cat D5, Case 850, Komatsu D39	116.65
Rock Drill (includes labour)	Compressor: 750 cfm on tank chassis	212.68
Grader	Cat 140H, Komatsu GD750	127.20
Front End Loader (Gravel)	Cat 966G, Komatsu WA450-3, Case 921C	145.45
Front End Loader (Logs)	Cat 972G, Kawasaki 90ZV, Volvo L180D	168.80
Hydraulic Excavator incl. Brush Guard & Thumb	Hitachi EX450LC, Komatsu PC400HD	247.12
Hydraulic Excavator incl. Brush Guard & Thumb	Komatsu PC~~300/~~400 LC-6	203.23
Hydraulic Excavator incl. Brush Guard & Thumb	Hitachi EX330LC, Komatsu PC300	179.08
Hydraulic Excavator incl. Brush Guard & Thumb	Cat 325BL, Hitachi EX270LC, Deere 270LC	164.07
Hydraulic Excavator incl. Brush Guard & Thumb	Cat 322CL, Komatsu PC220LC, JD 230LC	151.53
Hydraulic Excavator incl. Brush Guard & Thumb	Cat 320CL, Hitachi EX200LC-5, JD 200CLC	141.46
Gradall	Volvo EW 180	163.95
Logging Truck (Highway)	All Triaxle (6axle unit)r	98.40
Self Loading Log Truck	Highway log truck + 5 tonne deck crane	110.35
Gravel Truck	10.7 m^3 (14 cu. yd.)	81.29
Gravel Truck Articulated (labour included)	25 - 30 tonne: Cat 730, Deere 300C	143.75
Gravel Truck Articulated (labour included)	20 - 25 tonne: Cat 725, Terex TA25	127.75
Lowbed	5 axle unit: tandem tractor and lowbed	88.45
Concrete Mix Truck	6.1 m^3	90.40
Concrete Vibrator (labour not included)	5 m^3	4.64
Concrete Mixer (labour not included)	0.17 m^3	7.03
Crane - Truck Mounted	18 tonne	96.70
Soft Track Skidder	KMC/FMC 2100/2400 (out-of-date model)	138.50
Rubber Tired Skidder	Cat 515, Clark H-66-G (out-of-date model)	95.35
Vibrator Compactor	Cat 515 plus 2.7 t to 3.6 t roller	108.45
Tractor and Grid Roller	Cat 515 plus grid roller	109.25
Labourer	Group I: Includes 40% payroll loading	31.38
Roadman	Group II: Includes 40% payroll loading	31.64
Crib/Culvert Maker, Powderman	Group VII: Includes 40% payroll loading	33.22
Landingman	Group VIII: Includes 40% payroll loading	33.65
Rockdriller & Powderman (for load & blast only)	Group VII & XI: Includes 40% payroll loading	72.34
Bridgeman	Tradesman: Includes 40% payroll loading	39.98
Powersaw (labour not included)	All: one man, 20 inches + bar	3.35
Faller, including powersaw cost	Includes 40% payroll loading	56.06

Sources:

Cost surveys, B.C. Road Builders & Heavy Construction Association, Equipment Rental Rate Guide (rates based on a 3 year old machine), and IWA agreement rates including payroll loading.