

File: 195-30/Sca

March 6, 2003

BY EMAIL

To: Regional Managers

From: Bill Howard
Director
Revenue Branch

Re: *Scaling Manual, Amendment No. 3*

The purpose of this memo is to notify you of the above amendment, provide you with the attached summary of the amendment, and ask that you advise all scaling staff.

For your information, the *Scaling Manual* can be found at:
<http://www.for.gov.bc.ca/revenue/manuals/scaling/Contents.htm>

The manual may also be purchased through Crown Publications, 521 Fort Street, Victoria, British Columbia, V8W 1E7 (telephone 250-386-4636). Crown Publications will advise out of service manual holders of the amendment.

If you have any questions, please contact Jim Crover, Scaling Policy Forester, Revenue Branch at Jim.Crover@gems9.gov.bc.ca (telephone 250-356-1955) or Robert Frear, Technical Scaling Co-ordinator, Revenue Branch at Robert.Frear@gems6.gov.bc.ca (telephone 250-356-7673).

W. Howard

Bill Howard
Director
Revenue Branch

pc: Ministry of Forests Subscribers, *Scaling Manual*





**BRITISH
COLUMBIA**

Ministry of
Forests



MANUAL REVISION TRANSMITTAL

<p>FOR FURTHER INFORMATION OR IF YOU HAVE A CHANGE OF ADDRESS, PLEASE CONTACT:</p> <p>Jim Crover Scaling Policy Forester</p> <p>Revenue Branch Ministry of Forests 6th Floor - 727 Fisgard Street Victoria, BC V8W 1R8 Phone: 356-1955 PROFS userid: Jim.Crover@gems9.gov.bc.ca FAX: 387-5670</p>	MANUAL TITLE	
	Scaling Manual	
	AMENDMENT Amendment No. 3	ISSUE DATE March 1, 2003
	MANUAL CO-ORDINATOR	
	Judy Laton Manuals Co-ordinator	
	AUTHORIZATION (Name, Title)	
	W. Howard Director, Revenue Branch	

Please make the following changes to your copy of the above Ministry manual.

ACTION (Remove/Insert)	(VOL.) CHAPTER-SECTION-SUBJECT TABLE OF CONTENTS	PAGE(S)	COMMENTS
REMOVE	Introduction	I-1 - I-2	After Introduction Tab
INSERT	Introduction	I-1 - I-2	
REMOVE	Table of Contents	i - xxvi	After Table of Contents
INSERT	Table of Contents	i - xxviii	
REMOVE	Chapter 1	3 - 4 7 - 8	After Chapter 1 Tab
INSERT	Chapter 1	3 - 4 7 - 8	
REMOVE	Appendix 1A	1A-1 - 1A-2 1A-5 - 1A-18	After Appendix 1A Tab
INSERT	Appendix 1A	1A-1 - 1A-2 1A-5 - 1A-18	
REMOVE	Appendix 1B	1B-1 - 1B-4	After Appendix 1A
INSERT	Appendix 1B	1B-1 - 1B-4	
REMOVE	Chapter 2	5 - 6 11 - 12 19 - 22	After Chapter 2 Tab
INSERT	Chapter 2	5 - 6 11 - 12 19 - 22	
REMOVE	Chapter 3	5 - 6 23 to 26	After Chapter 3 Tab
INSERT	Chapter 3	5 - 6 23 to 26	

ACTION (Remove/Insert)	(VOL.) CHAPTER-SECTION-SUBJECT	PAGE(S)	COMMENTS
TABLE OF CONTENTS			
REMOVE	Chapter 4	3 to 4 25 to 26 33 to 34	After Chapter 4 Tab
INSERT	Chapter 4	3 to 4 25 to 26 33 to 34	
REMOVE	Chapter 5	3 - 4 35 - 38 41 - 42 63 - 64 71 - 78 87 - 96 99 - 106 109 - 112	After Chapter 5 Tab
INSERT	Chapter 5	3 - 4 35 - 38 41 - 42 63 - 64 71 - 78 87 - 96 99 - 106 109 - 112	
REMOVE	Chapter 6	7 - 10 13 - 28 33 - 34 41 - 42 45 - 46 51 - 52 55 - 74 81 - 84 87 - 90 95 - 100 105 - 106 113 - 116 123 - 128 131 - 132	After Chapter 6 Tab
INSERT	Chapter 6	7 - 10 13 - 28 33 - 34 41 - 42 45 - 46 51 - 52 55 - 74 81 - 84 87 - 90 95 - 100 105 - 106 113 - 116 123 - 128 131 - 132	
REMOVE	Chapter 7	1 - 4 7 - 16	After Chapter 7 Tab
INSERT	Chapter 7	1 - 4 7 - 18	

Introduction

Under British Columbia's *Forest Act*, all timber harvested from both Crown and private land must be scaled. Timber is scaled to determine its volume and quality.

This manual documents how timber is scaled for purposes of the *Forest Act* and the *Scaling Regulation*.

Scale data is the basis for many transactions for both government and industry. To ensure scale results are reliable and mean the same thing to all users, scaling is dependent upon compliance with the standards, conventions, and procedures prescribed in this manual.

If You Need More Information

This manual was written as a reference and a working tool for government, industry, students and anyone else with an interest in scaling. With such a broad target audience, it may not provide sufficient detail to meet all your needs.

If you need clarification on any topic, we encourage you to contact your local Forest Service office.

We Need Your Comments and Suggestions

To ensure this manual is useful for you, it is important that you provide us with your comments and suggestions.

Please send them to:

Scaling Policy Forester
Ministry of Forests
Revenue Branch
PO Box 9511, Stn Prov Govt
Victoria, BC V8W 3E7

Or, use the *Scaling Manual's* feedback form that can be found at the following Internet address:

<http://www.for.gov.bc.ca/revenue/manuals/scaling/feedback.htm>

To Obtain a *Scaling Manual*

The *Scaling Manual* is available electronically on the Internet at:

<http://www.for.gov.bc.ca/revenue/manuals/scaling/>

For those who may still wish to purchase a hard copy of the *Scaling Manual*, it is available for a fee through:

<p>Crown Publications 521 Fort Street Victoria, BC V8W 1E7 (250) 386-4636</p>
--

You can also get *Scaling Manual* information from the Crown Publications, General Publications page:

http://www.crownpub.bc.ca/cat_view.cgi/CP.02.01.40.02

Manual Amendments

Future amendments to this manual can be printed from the Internet or purchased from Crown Publications.

Check out the Ministry of Forests “What’s New” page for upcoming amendments and new publication information at:

http://www.for.gov.bc.ca/pscripts/pab/whatsnew/wn_search.asp

This information can also be found in the *Scaling Manuals* Table of Contents at:

<http://www.for.gov.bc.ca/revenue/manuals/scaling/>

Table of Contents

Introduction

If You Need More Information	I-1
We Need Your Comments and Suggestions	I-1
To Obtain a <i>Scaling</i> Manual	I-2
Manual Amendments	I-2

1 Scaling Overview

1.1 The Role of Scaling and its Importance	1-2
1.2 The Evolution of B.C.'s Scaling Practices	1-3
1.2.1 British Columbia's Official Scales	1-3
1.2.2 Log Grading	1-7
1.2.3 The Roles and Responsibility for Scaling	1-7
1.2.4 Scaling Methods	1-8
1.2.4.1 Piece Scaling	1-8
1.2.4.2 Weight Scaling	1-9
1.2.4.3 Special Forest Products	1-10
1.3 The Legal and Administrative Framework for Scaling	1-11
1.3.1 General	1-11
Appendix 1A Synopsis of Parts 5 and 6 of the <i>Forest Act</i> and the <i>Scaling Regulation</i>	1A-1
1A.1 The Forest Act - Part 5 - Timber Marking	1A-1
1A.1.1 Section 83 - Timber Mark Duration	1A-1
1A.1.2 Section 84 - Timber Marks and Marking Requirements	1A-2
1A.1.3 Section 85 - Timber Mark Applications	1A-2
1A.1.4 Log Brands	1A-2
1A.1.5 Section 90 - Transfers	1A-3
1A.1.6 Section 91 - Evidence	1A-3
1A.1.7 Section 92 - Registers Must be Kept	1A-3
1A.2 The <i>Forest Act</i> - Part 6 - Timber Scaling	1A-8
1A.2.1 Section 93 - Interpretation	1A-8
1A.2.2 Section 94 - Timber to be Scaled	1A-8
1A.2.3 Subsection 94 (3) - Scaling Special Forest Products	1A-10
1A.2.4 Subsection 94 (4) - Set Aside Requirements for Check Scaling ..	1A-10
1A.2.5 Section 94 (5) - Exemptions from Requirements	1A-10
1A.2.6 Section 95 - Scale Site Authorization	1A-11
1A.2.7 Section 96 - The Metric Scale	1A-11
1A.2.8 Section 97 - Scale Return Submission	1A-14
1A.2.9 Section 97 - Scale Return Check Scales	1A-14

1A.2.10 Section 99 - Second Scales and Second Check Scales	1A-15
1A.2.11 Scaling Charges, Costs and Expenses	1A-16
1A.2.12 Scaling Examinations and Appointments	1A-16
1A.2.13 Re-examination	1A-17
1A.2.14 Suspension and Cancellation of a Scaling Licence	1A-17
1A.2.15 Offences and Penalties	1A-17

2 Timber Marking and Branding

2.1 Registered Timber Marks.....	2-2
2.1.1 Purpose of Timber Marks	2-2
2.1.2 Timber Marking Requirements.....	2-3
2.1.3 Requirements of the Scaler	2-5
2.1.4 Timber Mark Formats	2-6
2.1.4.1 Crown Land Tenure Marks	2-6
2.1.4.2 Marks for Privately Owned Land.....	2-9
2.2 Log Brands.....	2-12
2.2.1 Scaled Timber Brands.....	2-12
2.2.1.1 Authority	2-12
2.2.1.2 Purpose.....	2-14
2.2.1.3 Marking Requirements.....	2-14
2.2.1.4 Requirements of Scaler's and Weigh Persons.....	2-15
2.2.1.5 Format of Scaled Timber Brands	2-15
2.2.1.6 Applying for a Scale Timber Brand	2-17
2.2.2 Marine Log Brands	2-19
2.2.2.1 Authority.....	2-19
2.2.2.2 Purpose.....	2-19
2.2.2.3 Marking Requirements.....	2-19
2.2.2.4 Requirements of Scalers	2-20
2.2.2.5 Format of Marine Log Brands.....	2-20
2.2.2.6 Applying for a Marine Log Brand.....	2-20
2.2.3 Boom Chain Brands.....	2-20
2.3 Log Salvage Identification Mark.....	2-21
2.3.1 Authority	2-21
2.3.2 Purpose.....	2-21
2.3.3 Marking Requirements.....	2-21
2.3.4 Requirements of Scalers	2-21
2.3.5 Format of Log Salvage Identification Marks	2-21

3 Species Identification

3.1 Purpose of Classification by Species	3-2
3.2 Coniferous Species.....	3-5
3.2.1 Balsam.....	3-5

3.2.2 Red cedar (Western).....	3-7
3.2.3 Cypress.....	3-8
3.2.4 Douglas-fir	3-9
3.2.5 Hemlock.....	3-10
3.2.6 Larch	3-11
3.2.7 Lodgepole Pine	3-12
3.2.8 Ponderosa (Yellow) Pine	3-13
3.2.9 White Pine.....	3-14
3.2.10 Whitebark Pine.....	3-15
3.2.11 Spruce	3-16
3.2.12 Yew	3-18
3.3 Broadleaf Species.....	3-19
3.3.1 Alder	3-19
3.3.2 Arbutus.....	3-20
3.3.3 Aspen	3-21
3.3.4 Birch.....	3-22
3.3.5 Cottonwood.....	3-23
3.3.6 Maple	3-24
3.4 Tables and Illustrations	3-25
3.4.1 Species Illustrations	3-27

4 Common Defects

4.1 An Overview of Rot Fungi.....	4-2
4.1.1 Common Root and Butt Rots.....	4-3
4.1.2 Common Heart Rots	4-3
4.1.3 Sap Rots and Stains.....	4-4
4.2 Root and Butt Rots.....	4-5
4.2.1 Brown Cubical Butt Rot.....	4-5
4.2.1.1 Species Affected	4-5
4.2.1.2 Rot Description	4-5
4.2.1.3 Indicators of Decay	4-5
4.2.1.4 Extent of Decay.....	4-6
4.2.2 Brown Cubical Trunk and Slash Rot	4-6
4.2.2.1 Species Affected	4-6
4.2.2.2 Rot Description	4-6
4.2.2.3 Indicators of Decay	4-6
4.2.2.4 Extent of Decay.....	4-7
4.2.3 Cedar Pocket Rot	4-7
4.2.3.1 Species Affected	4-7
4.2.3.2 Rot Description	4-7
4.2.3.3 Indicators of Decay	4-7
4.2.3.4 Extent of Decay.....	4-8
4.2.4 Stringy Butt Rot or Feather Rot	4-8

4.2.4.1	Species Affected	4-8
4.2.4.2	Rot Description	4-8
4.2.4.3	Indicators of Decay	4-8
4.2.4.4	Extent of Decay.....	4-9
4.2.5	Annosus Root and Butt Rot	4-9
4.2.5.1	Species Affected	4-9
4.2.5.2	Rot Description	4-9
4.2.5.3	Indicators of Decay	4-9
4.2.5.4	Extent of Decay.....	4-10
4.2.6	Tomentosus Root Rot	4-10
4.2.6.1	Species Affected	4-10
4.2.6.2	Rot Description	4-10
4.2.6.3	Indicators of Decay	4-10
4.2.6.4	Extent of Decay.....	4-10
4.2.7	Armillaria Root Disease.....	4-11
4.2.7.1	Species Affected	4-11
4.2.7.2	Rot Description	4-11
4.2.7.3	Indicators of Decay	4-11
4.2.7.4	Extent of Decay.....	4-11
4.2.8	Yellow Laminated Root Rot	4-12
4.2.8.1	Species Affected	4-12
4.2.8.2	Rot Description	4-12
4.2.8.3	Indicators of Decay	4-12
4.2.8.4	Extent of Decay.....	4-12
4.3	Heart Rots	4-13
4.3.1	Red Fomes Rot.....	4-13
4.3.1.1	Species Affected	4-13
4.3.1.2	Rot Description	4-13
4.3.1.3	Indicators of Decay	4-14
4.3.1.4	Extent of Decay.....	4-14
4.3.2	Brown Trunk Rot	4-14
4.3.2.1	Species Affected	4-14
4.3.2.2	Rot Description	4-14
4.3.2.3	Indicators of Decay	4-15
4.3.2.4	Extent of Decay.....	4-15
4.3.3	Red Rot	4-15
4.3.3.1	Species Affected	4-15
4.3.3.2	Rot Description	4-15
4.3.3.3	Indicators of Decay	4-16
4.3.3.4	Extent of Decay.....	4-16
4.3.4	Redring Rot.....	4-16
4.3.4.1	Species Affected	4-16
4.3.4.2	Rot Description	4-17
4.3.4.3	Indicators of Decay	4-17
4.3.4.4	Extent of Decay.....	4-17

4.3.5 Brown Stringy Trunk Rot	4-18
4.3.5.1 Species Affected	4-18
4.3.5.2 Rot Description	4-18
4.3.5.3 Indicators of Decay	4-19
4.3.5.4 Extent of Decay.....	4-19
4.3.6 White Trunk Rot	4-19
4.3.6.1 Species Affected	4-19
4.3.6.2 Rot Description	4-19
4.3.6.3 Indicators of Decay	4-20
4.3.6.4 Extent of Decay.....	4-20
4.3.7 White Stringy Trunk Rot.....	4-20
4.3.7.1 Species Affected	4-20
4.3.7.2 Rot Description	4-20
4.3.7.3 Indicators of Decay	4-20
4.3.7.4 Extent of Decay.....	4-21
4.3.8 Long Yellow Pitted Trunk Rot.....	4-21
4.3.8.1 Species Affected	4-21
4.3.8.2 Rot Description	4-21
4.3.8.3 Indicators of Decay	4-21
4.3.8.4 Extent of Decay.....	4-21
4.3.9 Red Heart Rot	4-22
4.3.9.1 Species Affected	4-22
4.3.9.2 Rot Description	4-22
4.3.9.3 Indicators of Decay	4-22
4.3.9.4 Extent of Decay.....	4-22
4.3.10 White Mottled Rot	4-23
4.3.10.1 Species Affected	4-23
4.3.10.2 Rot Description	4-23
4.3.10.3 Indicators of Decay	4-23
4.3.10.4 Extent of Decay.....	4-23
4.3.11 Conks, General.....	4-24
4.3.12 Rotten or Hollow Knots.....	4-25
4.3.13 Pipe or Pocket Rot, General.....	4-25
4.3.14 Ring Rot, General	4-26
4.3.15 Goiter	4-26
4.4 Sap Rots and Stains.....	4-27
4.4.1 Blue Stain or Sap Stain (Also Black Stain Root Disease)	4-28
4.4.2 Brown Crumbly Rot.....	4-28
4.4.2.1 Species Affected	4-28
4.4.2.2 Rot Description	4-29
4.4.2.3 Indicators of Decay	4-29
4.4.2.4 Extent of Decay.....	4-29
4.4.3 Brown Cubical Sap Rot	4-29
4.4.3.1 Species Affected	4-29
4.4.3.2 Rot Description	4-30

4.4.3.3 Indicators of Decay	4-30
4.4.3.4 Extent of Decay.....	4-30
4.4.4 Grey-brown Sap Rot	4-30
4.4.4.1 Species Affected	4-30
4.4.4.2 Rot Description	4-30
4.4.4.3 Indicators of Decay	4-31
4.4.4.4 Extent of Decay.....	4-31
4.4.5 Pitted Sap Rot	4-31
4.4.5.1 Species Affected	4-31
4.4.5.2 Rot Description	4-31
4.4.5.3 Indicators of Decay	4-32
4.4.5.4 Extent of Decay.....	4-32
4.5 Other Natural Defects	4-33
4.5.1 Cat Face - Fire Scar.....	4-33
4.5.2 Dead or Missing Side.....	4-33
4.5.3 Lightning Scar.....	4-33
4.5.4 Fire Scar, Burn Saddles.....	4-34
4.5.5 Bark Seam.....	4-34
4.5.6 Worm Holes, Insect Damage	4-34
4.5.7 Burls.....	4-34
4.5.8 Galls	4-34
4.5.9 Cork Bark.....	4-35
4.5.10 Witches Brooms.....	4-35
4.6 Mechanical Defects.....	4-36
4.6.1 Undercut.....	4-36
4.6.2 Barber Chair or Slabbed Logs.....	4-36
4.6.3 Shatter or Broken End.....	4-37
4.6.4 Stump or Sliver Pull.....	4-37
4.7 Multiple Defects.....	4-38
4.8 Illustrations of Common Fungal Organisms.....	4-39

5 Firmwood Scaling Procedures

5.1 Measurements	5-2
5.1.1 Units of Measure.....	5-2
5.1.2 The British Columbia Metric Scale	5-2
5.1.3 Errors in Measurement.....	5-3
5.1.4 Scaling Conventions versus Local Knowledge.....	5-3
5.2 Smalian's Formula.....	5-5
5.2.1 Log Forms and Smalian's Formula	5-6
5.2.2 Smalian's Formula in Detail.....	5-9
5.2.3 Smalian's Formula - Example Calculation.....	5-11
5.2.4 Smalian's Formula - Simplified	5-12
5.2.5 Smalian's Simplified Formula - Example Calculation.....	5-13

5.2.6 The Application of Smalian's Formula	5-13
5.3 Scaling Tools	5-14
5.3.1 Tally sheets	5-14
5.3.2 Hand-held Computers	5-14
5.3.3 Volume Tables	5-14
5.3.4 Measuring Tapes	5-14
5.3.5 The BC Metric Scale Stick	5-15
5.3.5.1 Application of the Scale Stick to Measure Diameters	5-15
5.3.5.2 Application of the Scale Stick to Measure Widths and Thicknesses	5-15
5.3.5.3 The Application of the Scale Stick to Measure Lengths	5-16
5.3.5.4 The Application of the Scale Stick for Unit Volumes	5-16
5.3.5.5 The Application of the Scale Stick for Half Volumes	5-16
5.4 Measuring Log Dimensions	5-25
5.4.1 Measuring Log Diameters	5-25
5.4.1.1 Measuring Round and Out of Round Log Ends	5-25
5.4.1.2 Measuring Shattered and Split-back End Diameters	5-27
5.4.1.3 Measuring Irregular End Diameters	5-28
5.4.1.4 Measuring Forked End Diameters	5-29
5.4.2 Measuring Flared Butt Diameters	5-30
5.4.2.1 Calipering	5-30
5.4.2.2 Projecting the Normal Line of Taper	5-32
5.4.3 Measuring Slab Ends	5-34
5.4.3.1 Measuring Semicircular Slab Ends	5-35
5.4.3.2 Measuring Slab Ends and Sectors With a Hole	5-37
5.4.3.3 Measuring Sectors (pie wedge slab ends) Smaller than a Semicircle	5-41
5.4.3.4 Measuring Slab Sectors and Segments Greater Than a Semicircle	5-44
5.4.3.5 Measuring Four Sided (plank-like, timber-like) Slab Ends	5-45
5.4.3.6 Measuring Triangular (three sided) Slab Ends	5-48
5.4.4 Measuring Lengths	5-51
5.4.4.1 Length Rounding Conventions and Measuring Tools	5-52
5.4.4.2 Finding the Geometric Centre of a Log for Length Measurement	5-52
5.4.4.3 Measuring Lengths of Butt Logs With Undercut	5-54
5.4.4.4 Measuring Lengths of Logs With Portions Under Ten Centimetres	5-55
5.4.4.5 Measuring Lengths of Logs With Shattered Ends	5-56
5.4.4.6 Measuring Lengths of Logs With Sniped Ends	5-57
5.4.4.7 Measuring Lengths of Logs With Missing Chunks	5-58
5.4.4.8 Measuring Lengths of Logs with Forks	5-58
5.4.4.9 Measuring Lengths of Logs With Sweep	5-60
5.4.4.10 Measuring Lengths of Logs with Crook	5-60
5.5 Firmwood Deductions	5-63

5.5.1	Introduction to the Deductions Section.....	5-63
5.5.2	Firmwood Deduction Principles	5-63
5.5.3	Deduction Methods.....	5-64
5.5.4	Geometric Shapes	5-65
5.5.5	Length Deduction Method	5-66
5.5.6	Diameter Deduction or Radius Reduction Method.....	5-66
5.5.7	Rounding Net Volumes.....	5-67
5.5.8	Average Unit Volumes.....	5-68
5.6	Conventions for Estimating Rot.....	5-70
5.6.1	Standard Conventions	5-70
5.6.2	Butt Rot Conventions.....	5-71
5.6.3	Standard Heart Rot Conventions	5-73
5.6.3.1	Heart Rot Visible at Both Ends.....	5-73
5.6.3.2	Heart Rot Visible at One End Only	5-73
5.6.3.3	Assessing Conk, Indian Paint Fungus and Pin Rot.....	5-74
5.6.3.4	Assessing Goitre	5-77
5.6.4	Ring Rot Conventions.....	5-77
5.6.5	Pocket Rot Conventions.....	5-77
5.6.6	Sap Rot Conventions	5-78
5.7	Measurements Required.....	5-79
5.7.1	Measurements for Gross Volume	5-79
5.7.2	Measurements for Defect Volume	5-79
5.7.2.1	Butt Defect - Partial Length of Log	5-79
5.7.2.2	Butt Defect - Through running.....	5-79
5.7.2.3	Heart Defect - Through Running	5-79
5.7.2.4	Heart Defect - Partial Length of Log	5-80
5.7.2.5	Ring Defect - Through Running	5-80
5.7.2.6	Ring Defect - Partial Length of Log.....	5-80
5.7.2.7	Sapwood Defect.....	5-80
5.7.2.8	Pocket Defect - Through Running	5-80
5.7.2.9	Pocket Defect - Partial Length of Log	5-81
5.7.2.10	Catface Conical.....	5-81
5.7.2.11	Catface Double Conical	5-81
5.7.2.12	Missing Wood and Other Surface Defects.....	5-81
5.7.3	Determining Net Volume.....	5-82
5.7.3.1	Net Volume Using Gross/Net Method.....	5-82
5.7.3.2	Net Volume Using Net Method - Length Deduction	5-82
5.7.3.3	Net Volume Using Net Method - Diameter or Radius Deduction	5-83
5.8	Examples and Calculations.....	5-84
5.8.1	The Relationship of Field Methods to Formulas	5-84
5.8.2	Conical Defects.....	5-84
5.8.2.1	Butt Rot (Conical).....	5-84
5.8.2.2	The Catface (Conical).....	5-89
5.8.2.3	The Catface (Double Conical)	5-91

5.8.3 Cylindrical Defects	5-93
5.8.3.1 Heart Defect - Through running.....	5-93
5.8.3.2 Heart Defect - Partial Length of the Log.....	5-96
5.8.3.3 Ring Defect - Through Running	5-98
5.8.3.4 Ring Defect - Partial Length of Log.....	5-100
5.8.3.5 Sap Rot.....	5-102
5.8.4 Cubical Defects.....	5-106
5.8.4.1 Pocket Defect - Through-running	5-106
5.8.4.2 Pocket Defect - Partial Length of the Log.....	5-109
5.8.5 Other Defects	5-111
5.8.5.1 Missing Segments	5-111
5.8.5.2 Missing Sectors.....	5-114
5.8.5.3 Triangular defects	5-118
Appendix 5A Log Scale Stick Specifications as Approved for Official Scaling in British Columbia.....	5A-1
Appendix 5B Defect Calculations	5B-1
5B.1 Formulas and Their Terms	5B-1
5B.1.1 The Cone Formula (Volume of a Cone).....	5B-3
5B.1.2 The Cone Formula (Volume of a Frustum of a Cone)	5B-3
5B.1.3 The Cylinder Formula (Volume of a cylinder).....	5B-4
5B.1.4 The Four-sided Prism Formula (Volume of a Rectangular Box)	5B-4
5B.1.5 The Three-sided Prism Formula (Volume of a Triangular Shape).....	5B-5
5B.2 The Butt Rot Calculation in Chapter 5, Figure 5.35	5B-6
5B.3 The Butt Rot Calculation in Chapter 5, Figure 5.36	5B-7
5B.4 The Catface Calculation in Chapter 5, Figure 5.37	5B-8
5B.5 The Catface Calculation in Chapter 5, Figure 5.38.....	5B-9
5B.6 The Heart Defect Calculation in Chapter 5, Figure 5.39.....	5B-10
5B.7 The Heart Defect Calculation in Chapter 5, Figure 5.40.....	5B-11
5B.8 The Ring Defect Calculation in Chapter 5, Figure 5.41.....	5B-12
5B.9 The Ring Defect Calculation in Chapter 5, Figure 5.42.....	5B-13
5B.10 The Sap Rot Calculation in Chapter 5, Figure 5.43	5B-14
5B.11 The Cubical Rot Calculation in Chapter 5, Figure 5.44.....	5B-15
5B.12 The Cubical Rot Calculation in Chapter 5, Figure 5.45.....	5B-16
5B.13 The Missing Wood Calculation in Chapter 5, Figure 5.46	5B-17
5B.14 The Pie-shaped Defect Calculation in Chapter 5, Figure 5.47	5B-18
5B.15 The Triangular Prism Shaped Defect Calculation in Chapter 5, Figure 5.48	5B19

6 Timber Grading

6.1 History of Timber Grading in B.C.	6-2
6.1.1 Coast Grading	6-2
6.1.2 Interior Grading.....	6-3

6.2	Timber Grading Requirement.....	6-4
6.3	Principles of Timber Grading	6-5
6.3.1	Log Characteristics Which Reduce Product Recovery (Quantity).....	6-6
6.3.1.1	Fractures and Fibre Separation	6-6
6.3.1.2	Bark Seams	6-7
6.3.1.3	Sweep, Crook and Pistol Grip.....	6-7
6.3.1.4	Rot, Hole, Char, and Missing Wood.....	6-8
6.3.2	Log Characteristics Which Reduce Product Quality.....	6-8
6.3.2.1	Twist (Spiral Grain)	6-8
6.3.2.2	Knots	6-9
6.3.2.3	Grain Density (Ring Count) - Coastal Grading Only.....	6-11
6.4	Applying the Principles of Grading	6-12
6.4.1	Grade Reduction	6-12
6.4.1.1	Field Methods for Determining Grade Reduction	6-13
6.4.2	Assessing Product Recovery	6-14
6.4.2.1	Determining Grade Reduction for Collars (Shells).....	6-15
6.4.2.2	Determining Grade Reduction for Sound Hearts (Residual Cores).....	6-18
6.4.2.3	Determining Grade Reduction for Multiple Defects.....	6-19
6.4.2.4	Slab Thickness and Grading	6-19
6.4.2.5	Determining Trim Allowance	6-21
6.4.2.6	Determining Grade Reduction for Spiral Checks and Shakes	6-44
6.4.2.7	Determining Lengths for Purposes of Grade - Logs and Log Segments	6-46
6.4.3	Assessing Product Quality	6-56
6.4.3.1	Assessing Knots	6-56
6.4.3.2	Twist (Spiral Grain)	6-61
6.4.3.3	Grain Density (Ring Count) - Coastal Grading Only.....	6-63
6.4.3.4	Stain - Coastal Grading Only	6-64
6.4.4	Factors Unique to Interior Grading.....	6-64
6.4.4.1	Dead/Dry Log Status.....	6-65
6.4.4.2	Identifying Undersized Logs in the Interior	6-67
6.5	Interpreting the Schedule of Coast Timber Grades.....	6-69
6.5.1	Grade Applicability.....	6-69
6.5.1.1	Grade Precedence.....	6-69
6.5.2	Physical Characteristics Affecting Log Grades.....	6-69
6.5.2.1	Log Size	6-70
6.5.2.2	Potential for Manufacture of Product Quantity.....	6-70
6.5.2.3	Potential Quality of Manufactured Products.....	6-72
6.5.2.4	Non-Permissible Defects	6-74
6.5.2.5	Slabs.....	6-74
6.5.3	Definition of Descriptive Terms Used in Section 6.5.....	6-75
6.5.3.1	Clear.....	6-75
6.5.3.2	Gross Scale.....	6-75
6.5.3.3	Merchantable.....	6-75

6.5.3.4 Shop grade	6-75
6.5.3.5 Lumber	6-75
6.5.3.6 Side	6-75
6.5.3.7 Shingles.....	6-76
6.5.3.8 Upper.....	6-76
6.5.3.9 List of Permissible Defects	6-76
6.5.3.10 Check (or Heart Check)	6-76
6.5.3.11 Sun Check (or Outside Check)	6-76
6.5.3.12 Otherwise Grade	6-76
6.5.3.13 Ring Shake	6-76
6.5.3.14 Pitch Ring (or Silt Shake)	6-77
6.5.3.15 Peeler Block	6-77
6.5.3.16 Knot Indication	6-77
6.5.3.17 Butt Log (or First Cut Log).....	6-77
6.5.3.18 Second Cut Log.....	6-78
6.5.4 Coast Grade Rules and Requirements.....	6-78
6.5.4.1 Firmwood Reject - all species - Grade Code Z (weight scale species code R).....	6-78
6.5.4.2 Grade Rule	6-78
6.5.4.3 Coniferous Grades	6-79
6.5.4.4 Balsam and Hemlock Grades.....	6-79
6.5.4.5 No 1 Lumber Balsam and Hemlock, Grade Code D.....	6-79
6.5.4.6 No. 2 Lumber Balsam and Hemlock, Grade Code F	6-80
6.5.4.7 No. 2 Sawlog Balsam and Hemlock, Grade Code H	6-81
6.5.4.8 No. 3 Sawlog Balsam and Hemlock, Grade Code I.....	6-81
6.5.4.9 No. 4 Sawlog Balsam and Hemlock, Grade Code J.....	6-82
6.5.4.10 No. 5 Utility Balsam and Hemlock, Grade Code U.....	6-83
6.5.4.11 No. 6 Utility Balsam and Hemlock, Grade Code X.....	6-84
6.5.4.12 No. 7 Chipper Balsam and Hemlock, Grade Code Y	6-84
6.5.5 Cedar Grades.....	6-84
6.5.6 Lumber Grades.....	6-85
6.5.6.1 No. 1 Lumber Cedar, Grade Code D.....	6-85
6.5.6.2 No. 2 Lumber Cedar, Grade Code F	6-86
6.5.7 Sawlog Grades	6-86
6.5.7.1 No. 2 Sawlog Cedar, Grade Code H	6-87
6.5.7.2 No. 3 Sawlog Cedar, Grade Code I.....	6-87
6.5.7.3 No. 4 Sawlog Cedar, Grade Code J	6-88
6.5.7.4 Shingle Grades	6-89
6.5.7.5 Other Considerations	6-89
6.5.7.6 No. 1 Shingle Cedar, Grade Code K.....	6-90
6.5.7.7 No. 2 Shingle Cedar, Grade Code L	6-90
6.5.7.8 No. 3 Shingle Cedar, Grade Code M	6-91
6.5.7.9 No. 5 Utility Cedar, Grade Code U.....	6-92
6.5.7.10 No. 6 Utility Cedar, Grade Code X.....	6-93
6.5.7.11 No. 7 Chipper Cedar, Grade Code Y	6-93

6.5.8 Cypress Grades	6-93
6.5.8.1 No. 1 Lumber Cypress, Grade Code D	6-94
6.5.8.2 No. 2 Lumber Cypress, Grade Code F	6-94
6.5.8.3 No. 2 Sawlog Cypress, Grade Code H	6-95
6.5.8.4 No. 3 Sawlog Cypress, Grade Code I	6-96
6.5.8.5 No. 4 Sawlog Cypress, Grade Code J	6-96
6.5.8.6 No. 5 Utility Cypress, Grade Code U	6-97
6.5.8.7 No. 6 Utility Cypress, Grade Code X	6-98
6.5.8.8 No. 7 Chipper Cypress, Grade Code Y	6-98
6.5.9 Fir and Pine Grades	6-99
6.5.9.1 No. 1 Lumber Fir and Pine, Grade Code D	6-99
6.5.9.2 No. 2 Lumber Fir and Pine, Grade Code F	6-100
6.5.9.3 No. 2 Peeler Fir, Grade Code B	6-101
6.5.9.4 No. 3 Peeler Fir, Grade Code C	6-103
6.5.9.5 No. 2 Sawlog Fir and Pine, Grade Code H	6-104
6.5.9.6 No. 3 Sawlog Fir and Pine, Grade Code I	6-105
6.5.9.7 No. 4 Sawlog Fir and Pine, Grade Code J	6-106
6.5.9.8 No. 5 Utility Fir and Pine, Grade Code U	6-107
6.5.9.9 No. 6 Utility Fir and Pine, Grade Code X	6-108
6.5.9.10 No. 7 Chipper Fir and Pine, Grade Code Y	6-108
6.5.10 Spruce Grades	6-109
6.5.10.1 No. 1 Premium Spruce, Grade Code D	6-109
6.5.10.2 No. 2 Premium Spruce, Grade Code E	6-110
6.5.10.3 No. 1 Lumber Spruce, Grade Code F	6-111
6.5.10.4 No. 2 Lumber Spruce, Grade Code G	6-111
6.5.10.5 No. 2 Sawlog Spruce, Grade Code H	6-113
6.5.10.6 No. 3 Sawlog Spruce, Grade Code I	6-114
6.5.10.7 No. 4 Sawlog Spruce, Grade Code J	6-114
6.5.10.8 No. 5 Utility Spruce, Grade Code U	6-115
6.5.10.9 No. 6 Utility Spruce, Grade Code X	6-116
6.5.10.10 No. 7 Chipper Spruce, Grade Code Y	6-117
6.5.11 Broadleaf Species And Yew	6-117
6.5.11.1 Applicability	6-117
6.5.11.2 Sawlog, Grade Code Blank	6-117
6.5.11.3 Chipper, Grade Code Y	6-118
6.6 Interpreting the Schedule of Interior Timber Grades	6-119
6.6.1 Area of Application	6-119
6.6.2 Rationale for Interior Grades	6-119
6.6.3 Interior Schedule of Grades	6-120
6.6.4 Principles for Applying the Interior Schedule	6-121
6.6.4.1 Assessing Lumber Recovery	6-121
6.6.4.2 Logs Cut from Dead Trees	6-123
6.6.4.3 Logs Cut from Undersized Trees	6-123
6.6.4.4 Knots	6-124
6.6.4.5 Twist (Spiral Grain)	6-125

6.6.5	Definition of Terms in the Schedule of Interior Timber Grades.....	6-125
6.6.6	Interior Grade Rules and Application	6-126
6.6.7	Firmwood Reject - Grade Code Z (weight scale species code R).....	6-127
6.6.7.1	Grade Rule	6-127
6.6.7.2	Application of the Grade Rule	6-127
6.6.8	Sawlog Grade Code () Blank	6-128
6.6.8.1	Grade Rule	6-128
6.6.8.2	Application of the Grade Rule	6-129
6.6.9	Dead and Dry Sawlog - Grade Code 3	6-129
6.6.9.1	Grade Rule	6-129
6.6.9.2	Application of the Grade Rule	6-130
6.6.10	Lumber Reject - Grade Code 4	6-130
6.6.10.1	Grade Rule	6-130
6.6.10.2	Application of the Grade Rule	6-130
6.6.11	Dead and Dry Lumber Reject - Grade Code 5	6-131
6.6.11.1	Grade Rule	6-131
6.6.11.2	Application of the Grade Rule	6-131
6.6.12	Undersized Log Grade - Grade Code 6	6-131
6.6.12.1	Grade Rule	6-131
6.6.12.2	Application of the Grade Rule	6-132
6.6.13	Grade Precedence.....	6-132
Appendix 6A	Field Methods for Grade Reduction.....	6A-1
6A.1	Formula #1	6A-2
6A.2	Formula #2	6A-2
6A.3	Formula #3	6A-3
6A.3.1	For Converting Grade Reduction in Metres to a Percentage	6A-3
6A.3.2	For Estimating Grade Reduction Percentage from Length Losses	6A-3

7 Documenting and Reporting Scale Results

7.1	Scale Documentation	7-2
7.1.1	Introduction.....	7-2
7.1.2	Documentation Conventions.....	7-2
7.1.2.1	Recording Commonly Misinterpreted Characters	7-3
7.1.3	Scale Documentation	7-4
7.1.3.1	Scale Returns	7-5
7.1.3.2	Type of Scale	7-5
7.2	Timing Requirements for Submitting Scale Data.....	7-6
7.2.1	Penalties for Late Submission of Scale Returns	7-7
7.2.2	Electronic Submission of Scale Results.....	7-7
7.3	Scale Data Computation and Documentation Standards and Controls.....	7-8
7.4	Ensuring Compliance with Standards.....	7-10
7.4.1	Approving Applications to Process Scale Data	7-10

7.4.1.1 Piece Scale Computation	7-10
7.4.1.2 Weight Scale Computation	7-10
7.4.1.3 Handheld Data Processing	7-11
7.4.1.4 Electronic Submission of Scale Data	7-11
7.4.1.5 New Releases and Upgrades to Scaling Hardware/Software	7-11
7.4.2 Compliance Checking	7-11
7.5 Correction of Errors	7-13
7.5.1 Key Punch/coding Errors	7-13
7.5.2 Measurement/Grade Errors and Missing Dimensions	7-13
7.6 Data Loss	7-14
7.6.1 Conventions to Minimize Data Loss	7-14
7.6.2 Reconstructing Data Which is Lost	7-15
7.7 Access to Scale Data	7-17
Appendix 7A Scale Documentation	7A-1
7A.1 Piece Scale Documentation	7A-3
7A.1.1 Tally Sheet Scale Returns for Segregated Scale	7A-3
7A.1.2 Tally Sheet Scale Returns for Unsegregated Scale	7A-3
7A.2 Weight Scale Forms	7A-58
7A.3 Stumpage Invoices	7A-94
7A.4 Administrative Documents	7A-120
Appendix 7B Scale Data Computation and Documentation Standards	7B-1
7B.1 Standard for Compiling Log and Segregation Volumes	7B-2
7B.1.1 Calculation Standard	7B-2
7B.1.2 Calculation Conventions	7B-3
7B.2 Standard for Weight Scale Calculations	7B-5
7B.2.1 Calculation Standard	7B-5
7B.2.2 Calculation Conventions	7B-5
7B.3 Source Document Requirements	7B-7
7B.3.1 Harvest Data Base System - Source Document Requirements	7B-7
7B.4 Specific Requirements - Computed - Summary of Scale (FS 72)	7B-8
7B.4.1 Administration and Ownership Identification	7B-8
7B.4.2 Title	7B-9
7B.4.3 Standard Layout	7B-9
7B.4.4 Standard Field Names and Formats - Summary of Scale (FS 72)	7B-11
7B.4.5 Clarify and Legibility	7B-14
7B.4.6 Identification of Summarized Information	7B-15
7B.5 Specific Requirements - Computer Weight Scale Sample CFS531	7B-19
7B.5.1 Administration and Ownership Identification	7B-19
7B.5.2 Title	7B-19
7B.5.3 Standard Layout	7B-19
7B.5.4 Standard Field Names and Formats - Computed Weight Scale Sample (FS 531)	7B-22
7B.5.5 Clarity and Legibility	7B-25
7B.5.6 Identification of Summarized Information	7B-25

Appendix 7C Scale Data Controls and Processing Conventions.....	7C-1
7C.1 Introduction	7C-1
7C.2 How to Use this Appendix	7C-1
7C.3 General and User Control Requirements.....	7C-3
7C.4 Weight Scale	7C-8
7C.5 Piece Scale.....	7C-10
7C.6 Audit and Self Assessment Procedures	7C-12
7C.7 Standards	7C-13

8 Special Forest Products

8.1 Definition of Special Forest Products	8-2
8.1.1 Classification as Special Forest Products	8-2
8.1.2 Exporting Special Forest Products.....	8-3
8.2 Special Forest Product Descriptions	8-4
8.2.1 Building Logs.....	8-4
8.2.2 Car Stakes	8-5
8.2.3 Christmas Trees	8-5
8.2.4 Cribbing	8-6
8.2.5 Cants	8-6
8.2.6 Fence Posts (Round)	8-7
8.2.7 Fence Posts (Split)	8-8
8.2.8 Fence Rails (Round)	8-9
8.2.9 Fence Rails (Split).....	8-9
8.2.10 Firewood and Fuel Logs.....	8-10
8.2.11 Grape Stakes	8-10
8.2.12 Hop Poles	8-11
8.2.13 Lagging (Split)	8-11
8.2.14 Mining Timbers Props and Caps.....	8-12
8.2.15 Orchard Props	8-12
8.2.16 Pickets and Palings	8-13
8.2.17 Poles and Pilings.....	8-13
8.2.18 Shake Bolts, Blocks and Blanks	8-14
8.2.19 Shakes	8-15
8.2.20 Shingle Bolts or Blocks	8-16
8.2.21 Stakes and Stocks (Sticks)	8-16
8.3 Botanical Forest Products	8-17
8.3.1 Medicinal and Pharmaceutical Products	8-18
8.3.2 Wild Edible Mushrooms.....	8-18
8.3.3 Floral and Greenery Products.....	8-19
8.3.4 Wild Berries and Fruit	8-19
8.3.5 Herb and Vegetable Products.....	8-20
8.3.6 Landscaping Products	8-20
8.3.7 Craft Products	8-21

8.3.8 Miscellaneous Botanical Forest Products	8-21
8.4 Other Product Descriptions	8-22
8.4.1 Wood Chips	8-22
8.5 General Requirements	8-25
8.5.1 Timber Marking	8-25
8.5.2 Scaling	8-25
8.5.3 Recording the Scale	8-26
8.5.4 Transport Documentation	8-26
8.5.5 Document Handling for Special Forest Products	8-27
8.6 Special Forest Product Scaling Methods	8-28
8.6.1 Round Piece Sampling Method	8-29
8.6.1.1 Calculation of the Piece Sampling Method	8-30
8.6.2 Stacked Special Forest Products Method	8-35
8.6.3 Christmas Tree Piece Count Method	8-43
8.6.4 Estimating Volumes of Tree Length Piles	8-47
8.6.4.1 Sampling the Pile and Counting Pieces	8-47
8.6.4.2 Measuring the Pile and Applying a Factor	8-49
8.6.5 Finding Piece Sample Requirements	8-55
8.7 Factors and Tables	8-57
8.7.1 Table of Special Forest Products Scaled 1992 - 1994	8-57
8.7.2 Stacked Special Forest Products Factors	8-57
8.7.3 Condensed Table of Half Volumes	8-58
8.7.3.1 Application of the Table	8-58
8.7.4 Table of Full Volumes for Round Fence Posts	8-62

9 The Weight Scale System

9.1 Weight Scaling - Overview of the System	9-3
9.1.1 Background	9-3
9.1.2 Estimating Volumes Under Weight Scaling	9-3
9.1.3 Objectives of the Weight Scale System	9-4
9.1.4 Elements of Weight Scaling	9-5
9.1.4.1 Agreement	9-5
9.1.4.2 The Weight Scale Sample Plan	9-5
9.1.4.3 Sampling Frequency	9-5
9.1.4.4 Weighing Loads and Processing Samples	9-6
9.1.4.5 Compilation and Reporting Requirements	9-6
9.2 Statistics Underlying the Weight Scale System	9-7
9.2.1 Statistical Concepts	9-7
9.2.1.1 An Overview of Estimating Using Statistics	9-7
9.2.1.2 Population, Units and Samples	9-10
9.2.1.3 Parameters and Statistics	9-10
9.2.1.4 The Ratio and the Means	9-11
9.2.1.5 The Standard Deviation and the Normal Distribution	9-13

9.2.1.6 Coefficient of Variation	9-20
9.2.1.7 The Sampling Error.....	9-22
9.2.1.8 Accuracy and Precision.....	9-24
9.2.1.9 Determining the Sample Size.....	9-26
9.2.1.10 Stratified Random Sampling.....	9-27
9.2.1.11 Standard Deviations and Sampling Errors at the Stratum Levels	9-33
9.2.1.12 The Weight Scale Sampling Plan	9-34
9.2.1.13 Chapter Summary	9-34
Appendix 9A Summary of Statistical Formulae in Weight Scaling	9A-1
9A.1 Ratio of a Stratum	9A-1
9A.2 Estimate of Total Volume in a Stratum	9A-1
9A.3 Estimate of Variance of Total Volume in a Stratum.....	9A-1
9A.4 Estimate of Variance of a Stratum	9A-2
9A.5 Precision of the Estimated Volume of a Stratum	9A-3
9A.6 Estimate of Total Volume in a Population.....	9A-3
9A.7 Estimate of Variance of Total Volume in a Population	9A-4
9A.8 Precision of the Estimated Total Volume in a Population	9A-5
9A.9 Sample Size.....	9A-5
9A.9.1 Required for the Population	9A-5
9A.9.2 A Stratum Containing a Pre-specified Precision.....	9A-6
9A.9.3 Sample Size for a Population Containing Some Pre-specified Strata.....	9A-7
9A.10 Sample Size Required for Stratum.....	9A-8
9A.11 Relative Variance of a Stratum	9A-8
9A.12 Relative Variance of a Population.....	9A-9
9A.13 Amalgamation of Strata	9A-9
9A.14 Separation of Strata (also referred to as Splitting of Strata)	9A-10
9A.14.1 Identifying Location of Stratum Splits.....	9A-10
9A.14.2 Deciding to Split a Stratum.....	9A-11
9A.15 Amalgamation of Strata	9A-12
9A.15.1 Some Final Points of Explanation.....	9A-13

10 Weight Scale Sampling

10.1 Setting Up the Sampling Plan	10-2
10.1.1 Defining the Weight Scale Population.....	10-2
10.1.1.1 Production Forecast	10-4
10.1.2 Setting the Sampling Objectives.....	10-5
10.1.2.1 Sampling Objectives	10-5
10.1.2.2 Precision Requirements	10-5
10.1.3 Stratification to Meet the Sampling Objectives.....	10-6
10.1.3.1 Why Do We Stratify.....	10-6
10.1.3.2 How are the Objectives of Stratification Met	10-7

10.1.3.3 Common Stratification Methods.....	10-11
10.1.4 Determining and Allocating the Sample Size.....	10-13
10.1.4.1 Sample Planner Computer Screen	10-16
10.1.5 Selecting and Processing Samples	10-23
10.2 Monitoring Sampling Plan Progress and Weight Scale Results	10-24
10.2.1 Harvest Data Base System Statistical Reports	10-24
10.2.2 Stratification Advisor Programme	10-29
10.2.2.1 Sampling Statistics - Stratum Level.....	10-30
10.2.2.2 Population Precision	10-31
10.2.2.3 Sampling Statistics - Sample Detail.....	10-32
10.2.2.4 Graph of Sample Detail by Strata	10-32
10.2.2.5 Stratification Advisor Report - Chronological Display of Sample Ratios	10-34
10.2.2.6 During the Sampling Year	10-35
10.2.2.7 At Year-end.....	10-35
10.3 Managing the Sampling Plan	10-36
10.3.1 Management Responsibility.....	10-36
10.3.2 Revising the Sampling Plan	10-37
10.3.3 Sample Plan Revisions.....	10-37
10.3.4 Options.....	10-38
10.3.4.1 Stratum 01	10-40
10.3.4.2 Stratum 02.....	10-40
10.3.4.3 Stratum 03.....	10-40
10.3.5 Sampling Plan Amendments.....	10-41
10.3.6 Standard Deviations	10-41
10.4 Operational Procedures to Ensure Sampling Plan Integrity.....	10-43
10.4.1 Inspecting Loads Before Weighing.....	10-43
10.4.2 Processing the Load	10-43
10.4.3 Previously Scaled Timber	10-44
10.4.4 Unscaled Timber.....	10-44
10.4.5 Managing Sample Loads.....	10-45
10.4.6 Loads Not Suitable for the Sample Plan	10-45
10.4.7 Importance of Accurate Stratification.....	10-46
10.4.8 Testing of Weigh Scales for Accuracy.....	10-47
10.4.9 Records Management at a Weigh Scale.....	10-48
10.4.10 Emergency Procedures.....	10-48
Appendix 10A Emergency Procedures in the Event of a Weight Scale Breakdown.....	10A-1
10A.1 Breakdown of the Weighing Device	10A-1
10A.1.1 Conditions	10A-1
10A.1.2 Procedures	10A-1
10A.1.3 Responsibilities	10A-3
10A.2 Breakdown of the Sample Selector	10A-4

11 Scaling Administration

11.1 The Roles and Responsibilities for Scaling	11-2
11.2 Designating the Place of Scale.....	11-3
11.2.1 Applicant's Responsibilities	11-3
11.2.2 Scaler and Scale Site Operator's Responsibilities	11-8
11.3 Scale Site Authorization	11-9
11.3.1 Responsibilities	11-9
11.3.1.1 Applicants Responsibilities.....	11-9
11.3.1.2 Ministry Responsibilities	11-12
11.3.2 Content of a Scale Site Authorization.....	11-15
11.3.4 Site Registration.....	11-16
11.4 The Training, Examination and Licencing of Scalers.....	11-17
11.4.1 Scaler Training.....	11-17
11.4.2 Scaling Examination	11-17
11.4.2.1 Coast and Interior Examinations.....	11-17
11.4.3 Examination Procedures	11-18
11.4.3.1 Conducting the Exam.....	11-18
11.4.4 Requirements to Take the Examination.....	11-20
11.4.4.1 Applications	11-20
11.4.4.2 Payment of Examination Fees.....	11-20
11.4.5 Examination Marking Standards.....	11-20
11.4.5.1 Coast Examination.....	11-20
11.4.5.2 Interior Examination	11-22
11.4.6 The Administration of Scaling Licences.....	11-23
11.4.6.1 Invigilating Scaling Examinations	11-23
11.4.6.2 Marking Requirements.....	11-24
11.4.6.3 Issuance of Scaling Licences.....	11-24
11.4.6.4 Review by Unsuccessful Students	11-24
11.4.7 Other Examination and Endorsements.....	11-24
11.4.7.1 Scaling Endorsements.....	11-24
11.4.7.2 Re-examinations	11-24
11.4.7.3 Other Examinations	11-25
11.4.8 Scalers Oath	11-25
11.5 Authorization and Appointments of Scalers.....	11-26
11.5.1 Legal Requirement for Authorization and Appointments.....	11-26
11.5.2 Administrative Reasons for Authorization and Appointments.....	11-26
11.5.3 Terms of Requirements of Authorization and Appointments.....	11-26
11.5.3.1 Official Scalers.....	11-27
11.5.3.2 Licenced Scalers	11-27
11.5.3.3 Acting Scalers	11-27
11.5.3.4 Forest Service Scalers	11-28
11.5.4 How to Obtain an Authorization and/or Appointment	11-28
11.5.5 Authorization Conditions.....	11-28
11.5.6 Suspensions and Cancellations	11-33

11.6 Assessing Compliance with Scaling Requirements	11-34
11.6.1 Data monitoring is covered in detail in the Scale Data Control Manual	11-34
11.6.2 Check Scaling	11-34
11.6.2.1 Purpose of Check Scaling	11-34
11.6.2.2 Conducting a Check Scale	11-35
11.6.2.3 Check Scale Frequency	11-35
11.6.2.4 Coaching	11-36
11.6.2.5 Division of Responsibilities.....	11-36
11.6.2.6 Checks to be Made.....	11-37
11.6.3 Actions Upon Completion of the Check Scale	11-38
11.6.3.1 Check Scale Advisory.....	11-38
11.6.3.2 Replacement of the Original Scale by a Check Scale	11-39
11.6.3.3 Update Scaler File and Records	11-44
11.6.3.4 Second Check Scale.....	11-44
11.6.3.5 Second Scales.....	11-44
11.6.3.6 Suspension of a Scaling Licence.....	11-45
11.6.4 Scale Site Inspections.....	11-45
11.6.4.1 Purpose of Scale Site Inspections	11-45
11.6.4.2 Conducting a Scale Site Inspection.....	11-46
11.6.4.3 Actions Upon Completion of a Scale Site Inspection.....	11-49
Appendix 11A Guidelines for Scale Site Inspections at Piece Scale Sites.....	11A-1
11A.1 Before Leaving the Office.....	11A-1
11A.2 Upon Arrival at the Scale Site.....	11A-1
11A.3 Routine Yard Inspection	11A-2
11A.4 Previously Scaled Timber Checks	11A-2
11A.5 Scale Data and Forms.....	11A-3
11A.6 Before Leaving Site.....	11A-3

Glossary of Terms

Figures

Figure 1.1 The B.C. Log Rule.....	1-3
Figure 1.2 The Smalian formula.	1-5
Figure 1.3 Scaling in BC - Principal Events.	1-6
Figure 1A.2 Flow diagram outlining scaling requirements under Sections 94 and 100 of the Forest Act.....	1A-9
Figure 2.1 Scaled Timber Brand Certificate.	2-13
Figure 2.2 Application for Scaled Timber Brand.....	2-18
Figure 2.3 Log salvor's permit number within a diamond.	2-21
Figure 3.1 Alder log, view from butt end.	3-27
Figure 3.2 Arbutus logs, view from butt end.	3-27
Figure 3.3 Aspen logs, decked.	3-28
Figure 3.4 Balsam logs, immature and mature (hemlock in background).	3-28
Figure 3.5 Birch logs in a deck.	3-29
Figure 3.6 Western red cedar logs spread for scaling.	3-29
Figure 3.7 Cottonwood log, view from butt end.....	3-30
Figure 3.8 Cypress or yellow-cedar log, butt view	3-30
Figure 3.9 Douglas-fir logs, immature and mature examples.....	3-31
Figure 3.10 Hemlock logs, immature and mature examples.....	3-31
Figure 3.11 Larch logs in a deck, butt cut log and top cut log.....	3-32
Figure 3.12 Lodgepole pine logs spread for scaling.	3-32
Figure 3.13 Maple log, view from butt end.	3-33
Figure 3.14 Ponderosa (yellow) pine log, view from butt end.....	3-33
Figure 3.15 Spruce log waiting for processing.	3-34
Figure 3.16 White pine log in a deck.	3-34
Figure 3.17 Whitebark pine logs ready for scaling.	3-35
Figure 3.18 Yew logs.	3-35
Figure 4.1 Brown cubical butt rot (<i>Phaeolus Schweinitzii</i>) in pine.	4-39
Figure 4.2 Tomentosus root rot (<i>Inonotus tomentosus</i>) in pine.	4-39
Figure 4.3 Cedar pocket rot (<i>Postia sericiomollis</i>).	4-40
Figure 4.4 Brown stringy trunk rot (<i>Echinodontium tinctorium</i>), incipient stage.	4-40
Figure 4.5 Brown stringy trunk rot, advanced stage.	4-41
Figure 4.6 Brown stringy trunk rot, cross section.	4-41
Figure 4.7 The notorious Indian paint fungus.....	4-42
Figure 4.8 Aspen trunk rot (<i>Phellinus tremulae</i>).....	4-42
Figure 5.1 Depictions of three typical log forms.	5-6
Figure 5.2 Graph of the effects of taper on log volume.	5-7
Figure 5.3 Two ways to visualize Smalian's formula.	5-8
Figure 5.4 Measurements for finding the values T, B, and L in Smalian's formula.	5-10
Figure 5.5 Basic parts of the official BC Metric Scale stick.....	5-17
Figure 5.6 Sides and edge of a BC Metric Scale stick.	5-18
Figure 5.7 Locating centimetres from the edge of a BC Metric Scale stick.	5-19
Figure 5.8 Scale stick edges showing the red markings for length measurements.	5-20
Figure 5.9 Using the BC Metric Scale stick to calculate half volumes.....	5-21

Figure 5.10	Use of the side and edge of the stick in calculating 2 m half volumes.....	5-22
Figure 5.11	Obtaining unit volumes (or factors) from the Scale stick.....	5-23
Figure 5.12	Using the side and edge of the stick for lengths in tenths of metres.....	5-24
Figure 5.13	The method used for measuring and averaging diameters.	5-26
Figure 5.14	The method for measuring shattered and split back ends.....	5-27
Figure 5.15	The method for measuring irregular diameters except flared butts.	5-28
Figure 5.16	The method of measuring butt diameter by calipering.	5-31
Figure 5.17	Method of measuring butt diameter by projecting the normal log taper.....	5-33
Figure 5.18	Typical slab shapes.	5-34
Figure 5.19	Measurement of a semicircular slab end.	5-35
Figure 5.20	Measurement of a semicircular slab end with hole.	5-37
Figure 5.21	Measurement of a sector slab end with hole.....	5-39
Figure 5.22	Measurement of sectors (pie wedge slab ends).	5-41
Figure 5.23	Measurement of four-sided (quadrilateral) slab ends.	5-45
Figure 5.24	Measurement of triangular or wedge shaped slab ends.	5-48
Figure 5.25	Length measurement of logs through the geometric centre.....	5-53
Figure 5.26	Length measurement of logs with undercut.....	5-54
Figure 5.27	Length measurement of logs and slab with segment under 10 cm.	5-55
Figure 5.28	Length measurement of logs with shattered ends.....	5-56
Figure 5.29	Length measurement of a partially bucked split-back end.	5-57
Figure 5.30	Length measurement of a log with missing chunk.	5-58
Figure 5.31	Length measurement of forked logs.	5-59
Figure 5.32	Length measurement of logs with sweep.....	5-60
Figure 5.33	Length measurement of logs with crook.....	5-60
Figure 5.34	The geometric shapes used in scaling and firmwood deductions.....	5-65
Figure 5.35	A log with butt rot - one end visible.....	5-84
Figure 5.36	A log with butt rot - through running.	5-86
Figure 5.37	A log with conical catface.	5-89
Figure 5.38	A log with a double conical catface.....	5-91
Figure 5.39	A log with through-running heart rot.....	5-93
Figure 5.40	A log with partial length heart rot.....	5-96
Figure 5.41	A log with through running ring rot.	5-98
Figure 5.42	A log with partial length ring rot.	5-100
Figure 5.43	A log with sap rot.	5-102
Figure 5.44	A log with through pocket rot.....	5-106
Figure 5.45	A log with partial-length pocket rot.....	5-109
Figure 5.46	A log with missing wood.....	5-111
Figure 5.47	A log with sector defect extending to the heart.	5-114
Figure 5.48	A log with partial length triangular defect.....	5-119
Figure 5A.1	British Columbia Metric Log Stick - Specifications Sketch.....	5A-4
Figure 6.1	Examples of collars around internal defects.....	6-17
Figure 6.2	Residual Cores in Sap rot.	6-18
Figure 6.3	Slabs with portions meeting the grade rule.....	6-20
Figure 6.4	The application of trim allowance around heart rot and hole.	6-24

Figure 6.5 The application of trim allowance around butt rot.	6-26
Figure 6.6 The application of trim allowance around ring shake.	6-30
Figure 6.7 Application of trim allowance around ring rot.	6-32
Figure 6.8 The application of trim allowance around multiple and partial rings.....	6-34
Figure 6.9 The application of trim allowance around checks and shake.	6-39
Figure 6.10 The application of trim allowance to off-centre and overlapping defects.	6-41
Figure 6.11 The effect of spiral check and shake on grade.	6-45
Figure 6.12 Short breakage pieces contained in a conventional load.	6-47
Figure 6.13 Rat tail tops delivered with a short segment over the 10 cm utilization policy.....	6-48
Figure 6.14 Assessing grade in logs with sweep, crook and pistol grip.	6-50
Figure 6.15 Assessing grade in log with severe heart rot and residual length is too short to cut lumber.	6-52
Figure 6.16 Examples of short logs left after bucking at the scale site and deemed to be 2.5 m long (interior) and 5.2 m long (coast).	6-54
Figure 6.17 Examples of logs cut to special forest product lengths but not classified as such, and deemed to be 2.5 m long (interior) and 5.2 m long (coast).....	6-55
Figure 6.18 Measuring knot diameters.	6-57
Figure 6.19 Measuring bunch (cluster) knots.	6-58
Figure 6.20 The relationship between log diameters and knot diameters.....	6-59
Figure 6.21 Typical knot distributions and their effect on grade.	6-61
Figure 6.22 Measuring twist - placing the stick.	6-62
Figure 6.23 Measuring twist - reading the deflection.	6-63
Figure 6.24 Measuring diameter for interior undersize grade.....	6-68
Figure 6.25 Schedule of Interior Timber Grades, B.C. Reg 446-94.	6-120
Figure 7.1 Flow chart showing documentation requirements for various scale types.	7-4
Figure 7A.1 FS 244 - Tally sheet scale return – small (Record Type 0, 1 st Header).....	7A-7
Figure 7A.2 FS 244 - Tally sheet scale return – small (Record Type 1, 2 nd Header).....	7A-9
Figure 7A.3 FS 244 - Tally sheet scale return – small (Record Type 2, Segregation Detail).	7A-11
Figure 7A.4 FS 244 - Tally sheet scale return – small (Record Type 3, Log Detail).	7A-14
Figure 7A.5 FS 457 - Interior piece scale return (Record Type P, 1 st Header).	7A-17
Figure 7A.6 FS 457 - Interior piece scale return (Record Type M, 2 nd Header).....	7A-19
Figure 7A.7 FS 457 - Interior piece scale return (Record Type L, Log Detail).	7A-20
Figure 7A.8 FS 416 – Scale Return – Unsegregated Timber.....	7A-23
Figure 7A.9 Computer generated FS 416 or detailed log listing for unsegregated scale.....	7A-24
Figure 7A.10 FS 416 – Scale Return – Unsegregated Timber (Record Type P, Header).....	7A-25

Figure 7A.11 FS 416 – Scale Return – Unsegregated Timber (Record Type C, Header).....	7A-27
Figure 7A.12 FS 416 – Scale Return – Unsegregated Timber (Record Type U, Header).....	7A-28
Figure 7A.13 FS 416 – Scale Return – Unsegregated Timber (Record Type M, Detail Line).....	7A-30
Figure 7A.14 FS 416 – Scale Return – Unsegregated Timber (Record Type L, Detail Line).....	7A-31
Figure 7A.15 FS 72 cover page for batch of FS 416s.....	7A-35
Figure 7A.16 FS 72 – Summary of Scale (Record Type 0, Sequence Number: 00).....	7A-37
Figure 7A.17 FS 72 - Summary of Scale (Record Type 4).....	7A-38
Figure 7A.18 FS 72 – Summary of Scale (Remarks).....	7A-40
Figure 7.19 Computer-generated FS 72 Summary of Scale.....	7A-41
Figure 7A.20 FS 287 – Monthly Scale Return (Record Type 0).	7A-43
Figure 7A.21 FS 287 – Monthly Scale Return (Record Type 1).	7A-44
Figure 7A.22 FS 287 – Monthly Scale Return (Record Type 4).	7A-44
Figure 7A.23 FS 287 – Monthly Scale Return (Remarks).....	7A-46
Figure 7A.24 FS 287 - Monthly scale return for special forest products.....	7A-48
Figure 7A.25 FS 222 – Record of Scale of Special Forest Products & Transportation Document.....	7A-51
Figure 7A.26 FS 200 - Christmas tree return.....	7A-55
Figure 7A.27 FS 488 - Weight scale load slip.	7A-61
Figure 7A.28 Example of a computer-generated weight scale load slip.....	7A-62
Figure 7A.29 FS 482 - Weight scale daily load inventory.....	7A-65
Figure 7A.30 Computer-generated weight scale daily load inventory.....	7A-67
Figure 7A.31 FS 484 - Weight Scale Station, Daily Report for Stratum.....	7A-69
Figure 7A.32 Computer generated daily report by stratum.....	7A-71
Figure 7A.33 FS 239 - Weight scale sample tally (Record Type 0, Header).....	7A-74
Figure 7A.34 FS 239 - Weigh Scale Sample Tally (Record Type 2, Detail Record).	7A-76
Figure 7A.35 FS 239 - Weigh Scale Sample Tally (Record Type 3, Continuation Records).....	7A-78
Figure 7A.36 FS 531 - Computer generated weight scale sample tally.	7A-82
Figure 7A.37 FS 531 – Computer-generated weight scale sample tally.	7A-84
Figure 7.38 FS 493 – Weigh Scale Monthly Return.....	7A-88
Figure 7A.39 Weight Scale Monthly Return (FS 493).	7A-91
Figure 7A.40 FS 433 - Weight Scale Stumpage Invoice and Scale Summary.	7A-97
Figure 7A.41 Example of Initial Invoice.	7A-105
Figure 7A.42 Later Invoice.	7A-108
Figure 7A.43 Piece Scale – Stumpage Invoice and Scale Summary (page 1 of 2)..	7A-114
Figure 7A.44 Piece Scale – Stumpage Invoice and Scale Summary (page 2 of 2)..	7A-115
Figure 7A.45 FS 649 – Load Description Slip.....	7A-124
Figure 7A.46 FS 1146 - Load Destination Notice.	7A-127
Figure 7A.47 Example of a water transport record.....	7A-129

Figure 7A.48 Example of a bundle addendum to accompany a water transportation record.....	7A-130
Figure 7A.49 FS 308 – Scaler’s Raft tag.	7A-133
Figure 7A.50 Example of a scaler diary.....	7A-135
Figure 7A.51 Example of an incoming site ledger.	7A-137
Figure 7A.52 Example of an outgoing site ledger.	7A-138
Figure 7A.53 Example of a scale site activity report.	7A-139
Figure 7A.54 Example of a load listing report.....	7A-141
Figure 7A.55 Example of a load summary report.....	7A-142
Figure 7B.1 FS 72 - Header Record (Record Type 0).....	7B-11
Figure 7B.2 FS 72 - Place of Scale Record (Record Type 1).	7B-12
Figure 7B.3 FS 72 - Totals Record (Record Type 'T') (Insert one blank line after last type '4' record and the 'T' record).....	7B-13
Figure 7B.4 Identification of Summarized Information (Attachment #1).	7B-16
Figure 7B.5 Identification of Summarized Information (Attachment #2).	7B-17
Figure 7B.6 Identification of Summarized Information (Attachment #3).	7B-18
Figure 7B.7 FS 531 - Header Record (Record Type 0) (Pages 1 to 3).	7B-22
Figure 7B.8 Identification of Summarized Information (Attachment #4).	7B-26
Figure 7B.9 Identification of Summarized Information (Attachment #5).	7B-27
Figure 7B.10 Identification of Summarized Information (Attachment #6).	7B-28
Figure 7C.1 Self Assessment Questionnaire/Report (cover sheet and pages 1 to 17).	7C-17
Figure 8.1 Flow diagram outlining selection of scaling methods and forms.	8-27
Figure 8.2 A pile of posts sorted to size classes and ready for sampling.....	8-30
Figure 8.3 Completed FS 222 for 100 round fence posts.	8-32
Figure 8.4 Completed FS 287 - Monthly scale return summarizing the FS 222 in Figure 8.3.	8-34
Figure 8.5 Table of number of pile heights taken for various lengths.	8-36
Figure 8.6 Table of solid wood conversion factors by product.....	8-38
Figure 8.7 A completed FS 222 - with split product.....	8-40
Figure 8.8 A completed FS 72 - summary of information from the FS 222 in Figure 8.7.	8-42
Figure 8.9 A completed FS 200 - Christmas tree return.	8-44
Figure 8.10 A completed FS 287 - Monthly scale return which summarizes the information on the FS 200 in Figure 8.9.....	8-46
Figure 8.11 Selecting a sample section from a log deck.....	8-48
Figure 8.12 Two methods of measuring the length and heights of a pile.	8-50
Figure 8.13 Finding the average width of a pile by averaging five representative tree lengths.	8-52
Figure 8.14 Squaring up a pile by taking length measurements at exactly one-half the height of the pile.	8-54
Figure 9.1 A loaded logging truck on a platform scale.....	9-2
Figure 9.2 Conceptual formula for estimating volumes.	9-4
Figure 9.3 Conceptual overview of weight scale sampling.	9-9
Figure 9.4 Graph of ratios for populations A and B.	9-14

Figure 9.5	Shows a normal distribution curve.	9-16
Figure 9.6	Relationship between the standard deviation and the intervals defined by the mean plus and minus 1, 2, and 3 standard deviations.....	9-18
Figure 9.7	Three normal curves with difference variances but the same mean.	9-19
Figure 9.8	Populations B and C in graph form.	9-20
Figure 9.9	In this dartboard example, the 3 dates (x) are precise but inaccurate and biased.....	9-26
Figure 9.10	Graphs to show the impact of stratification.	9-30
Figure 9.11	Sample size requirements of populations by relative variance for accuracy of $\pm 1\%$ 19/20.	9-32
Figure 10.1	An example of a basic production estimate form to be submitted by the weight scale licensee.	10-4
Figure 10.2	The initial sample planner screen from the Stratification Advisor Program.	10-15
Figure 10.3	Sample planner computer screen.	10-18
Figure 10.4	A final sample plan.	10-21
Figure 10.5	The FS 530 code sheet for entering the finalized Sample Plan on the HBS.	10-22
Figure 10.6	Sampling Intensity Report from the Harvest Billing System.	10-26
Figure 10.7	Stratum Monitor - Precision view screen.	10-31
Figure 10.8	Stratum Monitor - Sample statistics - sample detail.	10-32
Figure 10.9	Stratum Monitor: Graphical display of sample ratios.	10-33
Figure 10.10	Stratum Monitor - Chronological Display of Sample Ratios.	10-34
Figure 10A.1	Load averaging ledger for weigh scale breakdown.	10A-5
Figure 10A.2	Summary of scale - Weight scale emergency procedures.	10A-6
Figure 11.1	Example of an application for a mark site designation.	11-4
Figure 11.2	Example of a mark site designation - pages 1 and 2.	11-6
Figure 11.3	An example of an application for a scale site authorization.	11-11
Figure 11.4	An example of a scale site authorization - pages 1 and 2.	11-13
Figure 11.5	FS 87 - The application to scale.	11-19
Figure 11.6	An example of an authorization to scale - page 1, 2, and 3.	11-30
Figure 11.7	Example of a check scale comparison report prepared at the scale site - parts 1, 2, and 3.	11-41
Figure 11.8	Scaling site inspection report - page 1 and 2.	11-47

Tables

Table 1A.1 Summary of Standard Requirements - Timber Marking and Transportation Regulation	1-6
Table 2.1 Current Timber Mark and Log Brand Formats	2-10
Table 2.2 Forest District Codes	2-16
Table 3.1 Species Identification Quick Reference	3-3
Table 3.2 Relative Hardness Table of Heartwoods	3-4
Table 3.3 Alphabetic Species Listing	3-25
Table 5A.1 Half Volume of Cylinders in Cubic Decimetres	5A-5
Table 5A.2 Volumes of One Metre Cylinders in Cubic Decimetres	5A-10
Table 5B.1 Chart of Terms Used in Scaling Formulas	5B-2
Table 8.1 Table of Half Volumes of Cylinders in dm ³	8-59
Table 8.2 Table of Full Volume (m ³) for Top Measured Round Fence Posts	8-63
Table 10.1 HBS - Sampling Intensity Reports (FVLPWSIR)	10-27

This page is intentionally left blank.

1.2 The Evolution of B.C.'s Scaling Practices

Scaling in British Columbia is rich in history. An understanding of this history provides an insight into today's scaling practices and their roles and relationships in forest administration.

1.2.1 British Columbia's Official Scales

The earliest scaling in British Columbia comprised the licensee or lessee keeping a written account of the number of trees felled on a tract of land. Each month, the operator submitted a sworn statement of trees felled and accepted responsibility to pay dues based on this count. The term "stumpage" arose from this crude procedure. While the approach enabled a fast and accurate check on the statement of trees felled and dues payable by simply counting stumps, it failed in providing meaningful information for buyers and sellers about value, volumes and quality. The need for a more accurate and versatile scale was soon identified.

In 1895, the British Columbia Board Foot Log Scale was established as the official scale. It was used to determine scale in foot board measure (BCFBM). The Scribner Decimal C and Doyle Log rules were used along side the B.C. Log Rule until 1915 at which time they were no longer accepted for government measurement purposes. The B.C. Log Rule was derived mathematically and was tempered with certain arbitrary assumptions (Figure 1.1).



$$V_{\text{FBM}} = .0476(D - 1.5)^2 L$$

where:

V_{FBM}	=	volume in foot board measure (board feet),
D	=	small end diameter in inches, and
L	=	length in feet.

Figure 1.1 The B.C. Log Rule.

The resulting formula yielded the number of board feet of lumber (rough, green) that could be cut from logs of a given length and small end diameter. The formula was later modified to better account for longer logs.

While the B.C. Log Scale provided satisfactory results of the timber profile harvested when the rule was first introduced, later forest exploration in the 1930s saw the harvest of smaller timber and production of longer logs. Scale results quickly came under criticism from buyers and sellers, and scaler's were accused of manipulating scale results to the benefit of their employer. This problem is inherent of scale rules just as much today as it was then. Consistent and accurate results can only be expected when the timber profile and processing practices are within the often narrow confines of that assumed in the log rule. By the 1940s, over 50% of the provincial cut was converted into products other than lumber, and as such, users of scale data often had little interest in a scale premised on lumber recovery.

In 1946, an amendment to the *Forest Act* introduced the British Columbia Cubic Scale. The amendment followed the 1945 Sloan Royal Commission Report, which set out a blueprint for the introduction of sustained yield forestry to the province. The cubic scale was introduced as a means of developing information that would be more useful for the Forest Service in reconciling forest depletion with its inventory.

In contrast to the British Columbia Log Scale, which attempted to estimate the amount of lumber that could be produced from a log, the cubic scale made no allowance for wood wasted in slabs and kerfs, and only attempted to estimate the volume of the log suitable for the manufacture of lumber. The Cubic Scale was not expressed in foot board measure (FBM), but rather cubic feet (or 'cunits', representing 100 cubic feet).

Initially, the cubic scale was known as the B.C. Lumber Cubic Scale because the scale made allowances for log defects such as twist, crook, knots, shake, and split. It also allowed for collars of sound wood around holes and rot to recognize that defects must be 'squared out' in the manufacture of lumber.

During the mid-1960s, with the introduction of Close Utilization Standards, the references to lumber manufacture were dropped from scaling and the scale only represented the net firmwood content of each log. The only permissible deductions for scaling purposes were rot, missing and charred wood, and catface. This scale became known as the B.C. Firmwood Cubic Scale.

When first introduced in 1946, the use of the cubic scale was optional and licensees could use either an FBM or cubic scale. In 1952, all new sales made provision for cubic scale, and in 1972, both FBM and lumber cubic scales were no longer authorized for use. Metrication in 1978 saw the B.C. Metric Cubic Scale proclaimed as the only official scale for British Columbia, and it remains so today.

From the inception of cubic scaling, the Smalian formula (Figure 2), which calculates logs on the basis of a parabolic frustrum, was adopted as the cubic scale rule. This scale requires measurement of the two inside bark diameters and the length.

1.2.2 Log Grading

Log grading dates back to 1902 on the B.C. coast. Timber is graded to provide information about potential end use and log quality and, as such, makes scale data more meaningful for various transactions and administering the cut. Grading is regulated by schedules of timber grades specific to the coast and the interior under the *Scaling Regulation*.

While the early very basic schedule of timber grades evolved and expanded greatly in response to changing demands and needs to make scale data more relevant for its many users, the principles of grading have changed very little over the years.

Grading played a much lesser role in the interior until 1988, at which time a formal schedule of grades was introduced to better differentiate timber quality and to accommodate revisions to the utilization and timber pricing policies.

1.2.3 The Roles and Responsibility for Scaling

The appointment and licensing of scalers has remained a responsibility of government since 1894 with the proclamation of the Official Scaler's Act. While the Pacific Northwest States moved towards the concept of a third party scale under log scaling bureaus jointly funded by buyers and sellers, the provincial government policy until 1985 saw provincial employees conducting almost all scaling for revenue purposes. Non-government licenced scalers were authorized for scaling only where government scalers were not available, or where timber values were considered low.

Government scalers were not commonplace in the interior until the early 1960s because the less significant interior harvest was largely processed through many small bush mills. Rapid expansion of the interior forest industry occurred during the 1960s with the introduction of pulp mills and the consolidation and centralization of the industry.

British Columbia's policy on scaling is rooted in the province owning over 90% of the forest land base. During the 1960s and 1970s, this arrangement saw some 450 to 500 government scalers trained and supervised by the province. While various funding arrangements were in place, the industry traditionally absorbed the costs of scaling.

In 1985, the responsibility for all revenue scaling was transferred to the private sector. Several factors contributed to this policy change:

- it reduced the direct costs of government,
- it removed any potential union interface problems between government scalers and industry workers, and
- it reduced government interference with industrial operations and allowed industry more flexibility in staffing and operating scaling stations.

Government's role in scaling is now comprised of the following activities:

- Examining and licencing scalers,
- Authorizing and appointing scaler's and setting all revenue scaling policies and procedures,
- Authorizing scale sites and setting scale site conditions,
- Designating where timber must be scaled,
- Setting scale data computation and data control procedures and standards, and
- Assessing compliance with scaling requirements and standards.

1.2.4 Scaling Methods

Scaling accounts for some 86% of the provincial harvest. About 14% of the harvest is accounted for through a cruise-based measurement procedure. The cruise-based procedure is confined to the interior's uniform stands and has a minimal presence on the coast. In B. C., two principal scaling methods are in place:

- Piece Scaling, and
- Weight Scaling.

1.2.4.1 Piece Scaling

Piece scaling or stick scaling accounts for some 85% of coastal production and about 3% of interior production. This procedure involves measuring and grading each log, usually while they are spread out in a log yard or in a log boom floating in the water.

Before the introduction of weight scaling in the early 1960s and dryland sorts in the 1970s, almost all coastal production was piece-scaled in the water in the form of booms. Today, piece scaling through dryland sorts accounts for about 95% of the coastal piece scale production. Less than 5% is still scaled on the water. Dryland sorts are flat areas, usually paved, where loads are lifted out of the water or offloaded from logging trucks and spread onto the ground for scaling, grading and subsequent sorting. For scaling, the identity of each load is retained for control purposes. A listing of scale details is also maintained for all logs scaled. Accurate scaling is greatly facilitated through dryland sorts as the scaler can view almost the entire log with boom scaling, only a small surface was available for inspection.

Appendix 1A Synopsis of Parts 5 and 6 of the *Forest Act* and the *Scaling Regulation*

The objective of the following discussion is to acquaint users of this manual with a basic understanding of the various provisions of the *Forest Act*, *Scaling Regulation* and the *Timber Marking and Transportation Regulation*. It is not intended to provide a comprehensive discussion.

Ensure you have a current copy of the *Forest Act*, the *Timber Marking and Transportation Regulation*, and the *Scaling Regulation*. If in doubt contact Crown Publications to purchase new copies. You may also get access to the *Forest Act* and its regulations through the Ministry of Forests Website on the Internet at: <http://www.for.gov.bc.ca/tasb/legsregs/comptoc.htm>.

1A.1 The Forest Act - Part 5 - Timber Marking

While timber marking does not generally fall under their responsibilities, scalers are required to record timber marks as a part of recording scale results. As such, scalers must have a working knowledge of timber marks, scaled timber brands, and marine log brands as well as the requirements for timber marking and branding.

The authority for timber marks, scaled timber brands and marine log brands and the responsibility for their use is set under Part 5 of the *Forest Act*. The *Timber Marking and Transportation Regulation* prescribes how marks and brands are to be applied to timber. The *Timber Marking and Transportation Regulation* requires all unscaled timber to be transported only to scale sites designated by a forest officer and prescribes documentation requirements which must accompany all timber in transport.

1A.1.1 Section 83 - Timber Mark Duration

Under Section 83 all timber marks for the agreements listed in Section 12 of the *Forest Act* have expiry dates and the maximum duration of any given mark is five years.

Timber marks are a one to six character code that are painted on the side or stamped on the ends of logs to identify the authority under which the timber was harvested as well as other information about the timber.

1A.1.2 Section 84 - Timber Marks and Marking Requirements

Under Section 84, timber mark holders and persons working with their consent must ensure timber is conspicuously marked in the prescribed manner prior to transport off the area of harvesting. The prescribed manner of marking is set under the *Timber Marking and Transportation Regulation*.

Under Section 84 (5) the Forest Service may issue exemptions from the prescribed method of marking and set another method and/or level of marking where it is warranted.

In addition, under policy, harvesting agreements and cutting authorities may include a standard clause requiring the licensee to erect signs at the exit point of each cut block clearly showing the timber mark applicable to that cut block.

1A.1.3 Section 85 - Timber Mark Applications

This section requires that timber marks must be applied for. In addition, this section authorizes timber marks to be cancelled if the mark holder contravenes a provision of Part 5 or 6 of the *Forest Act* or for other sufficient cause. When this action is contemplated, the timber mark holder must be given an opportunity to be heard before the mark is cancelled.

1A.1.4 Log Brands

Log Brands are applied to logs to indicate that timber has been scaled. Section 86 and 88 authorize two types of brands.

1A.1.4.1 Section 86 - Scaled Timber Brands

Under Section 86, timber that has been scaled must be marked with a scaled timber brand before being removed from the scale site. The method of marking is prescribed by the *Timber Marking and Transportation Regulation* and exemptions may be issued with conditions attached.

1A.1.4.2 Section 87 - Applications for Scaled Timber Brands

This section provides that a certificate describing a scaled timber brand and the scale site to which it applies be issued upon application. Scaled timber brands may be cancelled under subsection 87 (2).

1A.1.4.3 Section 88 - Marine Log Brands

Section 88 provides for issuance upon application of a marine log brand by the Registrar of Timber Marks. Where approved, a certificate containing a facsimile of the marine log brand is issued. Under this section, marine log brands must be unique and not resemble any other marine log brand.

Collectively, these objectives help to ensure the Ministry of Forests meets its primary mandate of ensuring all timber is scaled and any revenues due to harvested timber are accurately and completely accounted for. Where the standards set under the regulation are inadequate in view of a high revenue risk (e.g., risk of theft, mismarking, log loss, mixing marks, etc.) the *Forest Act* and this regulation give the Ministry of Forests the authority to impose higher standards and/or methods.

Similarly, under some circumstances, the ministry may exempt mark holders from the standard requirements and impose lesser standards and/or other methods. These circumstances may include instances where timber is too small for conventional timber marking, standard requirements are unsafe, or standard requirements are not practical given a low level of risk or operational constraints.

Table 1A.1 Summary of Standard Requirements - Timber Marking and Transportation Regulation



Summary of Standard Requirements Timber Marking and Transportation Regulation Effective January 1, 1998			
UNSCALED TIMBER			
Section	Heading	Standard Requirement	Additional Notes
2	Scale Site Designation	All unsealed timber must be sent only to scale sites where the timber mark has been designated for scaling.	1. The place of scaling for each timber mark must be designated by the Forest Service before any transport – see your local Forest Service Office.
3	Timber Marking – stored timber	For timber stored in decks or piles or cutblock or right of way: <ul style="list-style-type: none"> ◊ 10% of logs must be hammer indented on 1 end. 	1. Under policy – the standard requirement applies where: <ul style="list-style-type: none"> ◊ accumulations are greater than 35m³ in volume, and ◊ accumulations are accessible to a truck, and ◊ there is no logging activity and equipment has been removed from the cutblock or right-of-way. 2. The Forest Service may also require deck marking where the risk of mismarking and theft warrants it. 3. The Forest Service may also exempt from deck marking and set another method of marking where warranted (usually for safety, operational constraints or size of logs).
4	Timber Marking – land transport	For all unsealed timber transported on the land: <ul style="list-style-type: none"> ◊ hammer indent 2 logs at the front and 2 at the back of each load, and ◊ paint the mark on each side of each load. 	1. Ministry may exempt markholders from standard requirement – see local Forest Service office for direction. 2. Timber marks may be marked on the sides with crayon or paint if not feasible to mark the ends – see local Forest Service office for direction. 3. The Forest Service may, under some circumstances, require a higher level of marking than the standard.
5	Timber Marking – water transport i. if timber will be dumped into the water ii. if timber is on a ferry or barge and will not be dumped into water	For unsealed timber transported in rafts, bundles or a barge where timber will be dumped into the water: <ul style="list-style-type: none"> ◊ hammer indent 1 end of each piece. For unsealed timber (on a truck or railcar or bundles on a barge) and will not be dumped into the water: <ul style="list-style-type: none"> ◊ hammer indent 2 logs at the front and 2 logs at the back of each load or bundle, and ◊ paint the mark on each side of each load. 	1. Ministry may exempt markholders from standard requirement – see local Forest Service office for direction. 2. Timber marks may be marked on the sides with crayon or paint if not feasible to mark the ends – see local Forest Service office for direction. 3. The Forest Service may, under some circumstances, require a higher level of marking than the standard.

SCALED TIMBER			
Section	Heading	Standard Requirement	Additional Notes
7	Scaled Timber Brands – land transport	For all scaled timber transported on land: <ul style="list-style-type: none"> ◇ hammer indent the scaled timber brand on 2 log ends at the front and 2 log ends at the back of every load, and ◇ paint the scaled timber brand on each side of each load. 	1. Requirements under 7, 7.1(1) and 7.1(2) may be exempted in whole or in part – see Forest Service for details.
7.1	Scaled Timber Brands – water transport	For all scaled timber where bundles will be in the water: <ul style="list-style-type: none"> ◇ 4 waterproof tags at the front and 4 waterproof tags at the back of each bundle. For all scaled timber where timber is in rafts or in loose logs on a barge dumped into the water: <ul style="list-style-type: none"> ◇ hammer indent one end of each log with the scaled timber brand. 	
9	Marine Log Brands	For all scaled timber to be marked with a marine log brand: <ul style="list-style-type: none"> ◇ hammer indent 1 end of each log. 	There are no exemptions from the standard requirement.
ALL TIMBER IN TRANSPORT			
10	Load Documentation	For all timber being transported anywhere in B.C., regardless of origin or destination: <ul style="list-style-type: none"> ◇ each transport must be accompanied by a written record of the timber being transported ◇ transporters must produce the written record if requested to do so by a forest officer ◇ the written record must be remitted and retained at the direction of the ministry. 	1. This requirement applies to all timber in transport. 2. See Section 10(2) of the regulation for information which must be included on the written record. 3. Under some circumstances this requirement may be waived.
11 & Forest Act	Offences	Contravention of requirements for: Scale Site Designation Timber Marking (scaled and unscaled), and Load Documentation are subject to ticketing and/or summary conviction.	1. See the Forest Service for details.

1A.2 The *Forest Act* - Part 6 - Timber Scaling

1A.2.1 Section 93 - Interpretation

The term "to Scale" under the *Forest Act* means:

- to determine the volume or quantity of timber, and
- to classify the quality or grade of that timber.

Timber under the *Forest Act* (Section 1) is defined to include trees, whether standing, fallen, living, dead, limned, bucked, or peeled and for purposes of the *Scaling Regulation* includes special forest products.

1A.2.2 Section 94 - Timber to be Scaled

Section 94 sets the requirement that all timber harvested under jurisdiction of the province (both private and Crown land) must be scaled prior to manufacture or sale, or transported to a place, other than where it is required to be sent for scaling. Under this section and Section 2 of the *Timber Marking and Transportation Regulation*, the place of scaling for all timber must be designated to one or more authorized scale sites prior to transport off the area of harvesting. Scale site designation is administered on a timber mark basis and, as such, is referred to by the Ministry of Forests as Mark Site Designation (MSD).

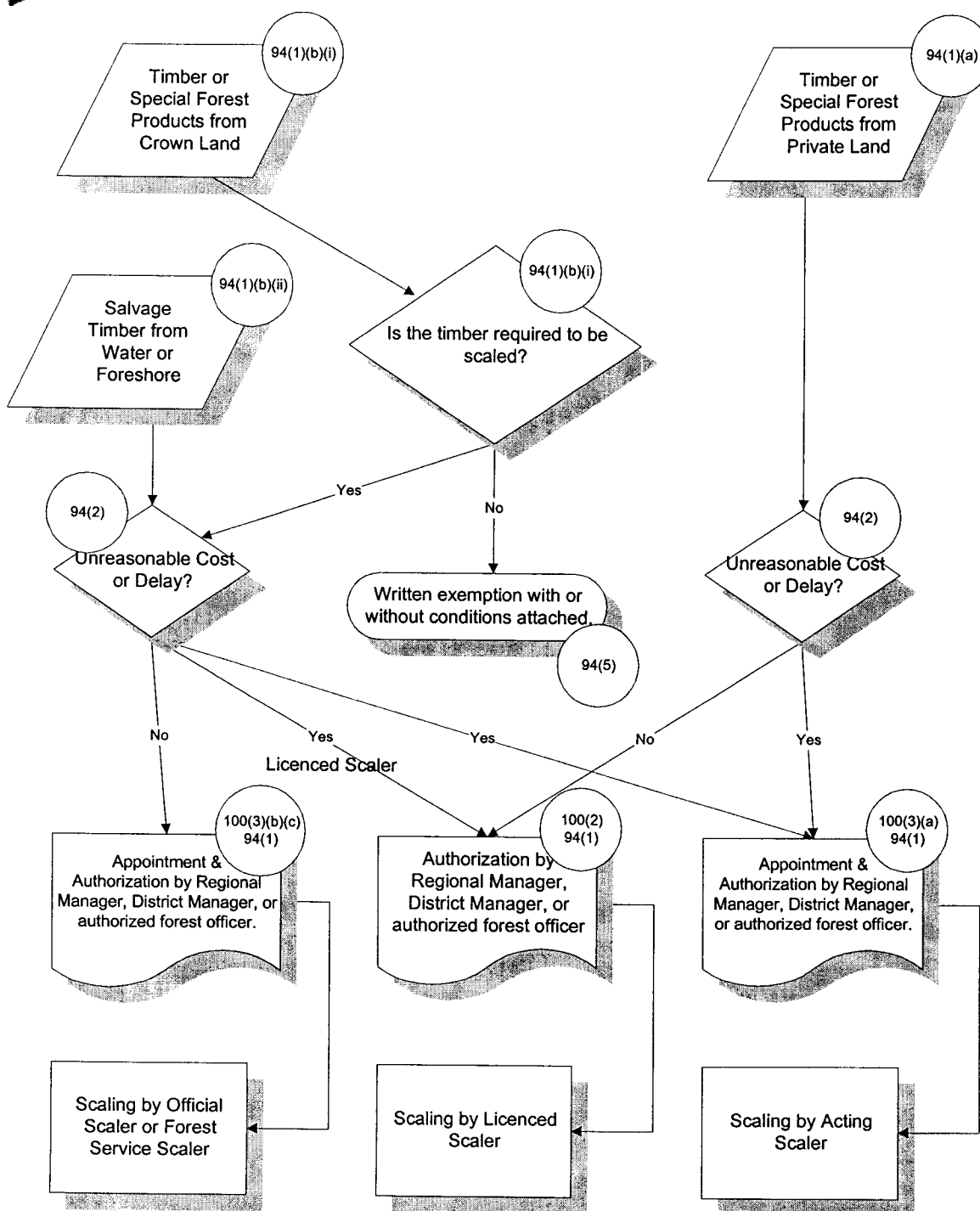


Figure 1A.1 Flow diagram outlining scaling requirements under Sections 94 and 100 of the Forest Act.

This further defines who may be authorized to scale under various circumstances. Figure 1A.1 is a schematic summarizing subsections 94 (1) and 94 (2) as they relate to timber harvested on private and Crown lands.

The intent underlying subsection 94 (1) and 94 (2) is to ensure that Crown timber is scaled by the most competent and qualified scalers available. Less demanding requirements are in place for timber cut on private lands as private timber is not subject to stumpage, and is not generally regulated for cut control purposes.

1A.2.3 Subsection 94 (3) - Scaling Special Forest Products

This subsection provides the authority to scale special forest products in product form instead of in timber form where the special forest products are manufactured on the same site where the timber was felled. Chapter 8 of this manual details special forest product descriptions and defines when special forest products may be scaled instead of timber in log form.

1A.2.4 Subsection 94 (4) - Set Aside Requirements for Check Scaling

Provided under this subsection is the requirement that the most recently scaled parcel or load of logs for each scaler at the scale site be set aside or retained at the scale site and be accessible for check scaling. The responsibility for this requirement applies to the owner of a scale site, the operator of a scale site, and the person whose timber is scaled.

1A.2.5 Section 94 (5) - Exemptions from Requirements

Section 94 (5) provides the authority to the designated persons to exempt the requirements of Section 94 and attach conditions to the exemptions.

Criteria for scaling exemptions are defined under ministry scaling policy. Exemptions from the other requirements of Section 94 may be considered where ministry objectives are not compromised by the exemption.

1A.2.6 Section 95 - Scale Site Authorization

This section requires timber to be scaled only at scale sites that have been authorized by the named ministry officials. Scale site authorizations must be applied for and applications may be denied on the grounds outlined in subsection 95 (3). Subsection 95 (4) enables the ministry to attach conditions to a scale site authorization which ensure a complete and accurate scale at that site. Similarly, authority is given to attach additional conditions, remove or alter conditions at any time.

Subsection 95 (5) enables the ministry to add, remove or alter conditions at specific sites, a type of scale site (e.g., piece, weight scale or special forest products) or at all scale sites at the same time. For example, this authority would enable the ministry to issue a letter to all scale sites requiring compliance to a new condition (e.g., a new rounding convention, etc.).

Under Subsection 95 (6) authority is given to suspend or cancel scale site authorizations where the ministry is satisfied there has been non-compliance with subsections 95 (6) (I) (ii) (iii) to 95 (6) (a) (b), and only after the holder of the authorization has been given an opportunity to be heard.

Under subsection 95 (7), the responsibility for complying with the scale site authorization rests with the owner of the scale site, the operator of the scale site, and the holder of the scale site authorization.

The intent of Scale Site Authorization is to ensure all timber is scaled in controlled conditions that support a complete and accurate scale.

1A.2.7 Section 96 - The Metric Scale

This section carries the legislative authority for British Columbia's official scale as the British Columbia metric scale. It further requires that all persons scaling for purposes of the *Forest Act* must scale in accordance with the prescribed procedures, and must express the scale in terms of cubic metres or another unit of metric measure required by the Chief Forester in recording special forest products. The prescribed procedures for scaling are set under the *Scaling Regulation* and are further described in this manual.

Subsection 96 (3) places the responsibility for a complete and accurate scale upon the person whose timber is scaled, which in most instances is the mark holder.

As per Section 96 (1) of the *Forest Act* all scaling must be carried out in accordance with the procedures prescribed under the *Scaling Regulation*. These procedures are set out in several sections of this regulation.

1A.2.7.1 Time of Scaling

Section 2 of the *Scaling Regulation* requires that timber be scaled as soon as possible after it is cut. Specific standards are not prescribed so that the factors such as the method of harvesting, climatic conditions, log handling and transportation practices which impact the timing between harvesting and scaling can be recognized.

1A.2.7.2 Late Scale Requirement

Where it is determined that timber has not been scaled as soon as possible after it is cut, subsection 3 (1) authorizes the ministry to scale the timber using an estimate. This field estimate is deemed to be an approved method of scaling under subsection 5 (1) (c) of the regulation. Being a scale under the *Forest Act*, the date of scaling for all purposes of the *Forest Act* is deemed to be the date of the field estimate.

Subsection 3 (2) enables a replacement scale to be ordered where the ministry is not satisfied with the reliability of the field estimate.

Where the ministry concludes the delay in scaling caused the volume to change or the quality to deteriorate, Section 3 (3) provides the authority that timber be scaled at the time of the field estimate, or replacement scale to reflect the volume and grade which would have applied when the timber should have been scaled (i.e., as per Section 2).

1A.2.7.3 Bucking at the Scale Site

Section 4 of the *Scaling Regulation* provides the necessary authority to control the bucking of logs prior to scaling. The intent of this section is not to forbid the bucking of logs prior to scaling, but rather to ensure logs are cut to improve the resultant scale. Under the section, timber must not be bucked at the scale site unless bucking has been permitted or ordered. This is often covered under conditions included in the scale site authorization.

Where timber has been bucked at the scale site prior to scaling into lengths of less than the prescribed minimums, subsection 9 (2) deems the log lengths for the purposes of grading to be 5.2 m for the Coast Schedule of Grades and 2.5 m for the Interior Schedule of Grades.

1A.2.7.4 Type of Scale

Section 5 sets out the different types of scale:

- a. by scaling each piece (piece scaling),
- b. by scaling samples, or
- c. other methods, including an estimate approved by the persons named under Section 5.

Where timber is scaled using an approved sampling method, subsection 5 (1.1) (b) of the *Scaling Regulation* sets out the legislative requirements that must be satisfied (i.e., must be scaled in accordance with an approved sampling plan. The approved sampling plan must carry a sampling error objective of ± 1 percent (19 times out of 20) for the population volume covered under the plan. Weight scaling, the main sampling procedure used in scaling, is covered under Chapters 9 and 10 of this manual.

This section also requires that special forest products other than poles, pilings, building logs, and Christmas trees must be scaled by a method approved by the regional manager, district manager, or a forest officer authorized by either of them. Poles, pilings, and building logs must be scaled either by piece or weight scaling. Christmas trees must be scaled by classifying each tree according to species and length class, and counting the number of trees in each classification. Chapter 8 of this manual documents scaling of special forest products in detail.

1A.2.7.5 Scaling Procedures

Section 6 of the *Scaling Regulation* prescribes how a scaler is to scale timber and record scale data. This manual details these requirements.

1A.2.7.6 Timber Grading

Sections 7, 8, and 9 of the *Scaling Regulation* set out the requirements for classifying the grade of timber as required under subsection 6 (k).

Section 7 prescribes that timber cut from an area in which timber is appraised using a log based appraisal must be graded in accordance with the Schedule of Coast Grades. Timber cut from all other areas must be graded using the Schedule of Interior Grades.

Section 8 outlines the placement of grades in the schedule where the grade criteria match more than one grade.

Section 9 (1) defines what rounding conventions are to be applied in using the schedules of timber grades.

Section 9 (2) prescribes the disposition of grades where timber has been bucked at the scale site into lengths less than prescribed minimums (see Bucking at the Scale Site, Section 1A.2.7.3). Under Section 9 (3), where logs lengths exceed 12.8 meters on the coast, the diameter used for applying the Coast Schedule of Grades is the diameter measured at the point 12.8 meters from the large end of the log.

Timber Grading is discussed in detail under Chapter 6.

1A.2.7.7 Calculation of Log Volumes

Section 10 of the *Scaling Regulation* prescribes the method and standards for calculating scaled log volumes under the British Columbia metric scale.

The basis for the BC Metric Scale is detailed in Chapter 5 of this manual and the standard for calculating volumes are contained in Appendix 7B.

1A.2.8 Section 97 - Scale Return Submission

Subsection 97 (1) of the *Forest Act* requires the owner of the scale site, the operator of the scale site, the person whose timber is being scaled, and the person who performed the scale to complete a scale return in a form approved by the minister. The section further requires a copy of the scale return to be delivered within a prescribed time to the person whose timber is scaled and to the regional or district manager and also retain a copy at the scale site.

Subsection 11 (1) of the *Scaling Regulation* prescribes the required timing for submission of the scale return to be seven days after the end of the period stated under the scale site authorization. Subsection 11 (2) further prescribes penalties where these timing requirements are not met. These penalties may be waived under Subsection 11 (3) where the Regional Manager is satisfied the course of the late submission was beyond the control of the person required to submit the scale return.

Section 12 of the *Scaling Regulation* further authorizes the regional manager to order the electronic submission of scale returns where the annual volume from the scale site exceeds 50 000 m³.

1A.2.9 Section 97 - Scale Return Check Scales

Subsection 97 (4) of the *Forest Act* provides that where a check scale conducted under Section 94 (4) of the *Forest Act* varies from the original scale by a prescribed percentage in terms of volume or value, the check scale governs for purposes of the *Forest Act*. Section 14 of the *Scaling Regulation* sets the prescribed percentage at 3 percent.

Subsection 97 (5) of the *Forest Act* authorizes the named persons to exempt replacement of the original scale by the check scale where it is considered the original scale was

performed in accordance with good scaling practices and the differences in the original scale and the check scale are attributable to the condition of the timber.

Subsection 97 (6) of the *Forest Act* makes various persons responsible for ensuring the original scale details are replaced by the check scale details where a replacement is required.

In addition, Section 13 of the *Scaling Regulation* enables the costs in attempting to conduct a check scale to be assessed against the scale site owner or operator where a check scale cannot be performed because the set aside requirement under Section 94 (4) of the *Forest Act* has not been complied with.

1A.2.10 Section 99 - Second Scales and Second Check Scales

Section 99 of the *Forest Act* sets out the conditions under which timber may be scaled a second time to check the accuracy of the original scale.

Subsection 99 (1) provides a recourse for any person with an interest in the original scale to contest the accuracy of the scale. This person may serve notice on a regional or district manager and request a second scale. The Ministry is obligated to conduct a second scale if it is feasible.

In addition, a second scale may be required at the discretion of a regional or district manager.

Subsection 99 (2) lays out the outcome of a second scale. Where the second scale varies from the original scale by more than the prescribed percentage in terms of volume or value, the second scale governs for all purposes of the *Forest Act*.

Where the second scale does not vary from the original scale in volume or value by more than the prescribed percentage, the original scale stands and the person who objected to the original scale and requested a second scale must pay for the costs and expenses incurred by the ministry in performing the second scale.

The prescribed percentage is set under Section 16 of the *Scaling Regulation* at 3% of the volume or value.

Subsection 99 (3) provides a formal recourse for scalers to have a second binding opinion if they do not agree with a check scale that replaced their original scale. Subsection 99 (4) requires the ministry to have a second check scale performed where it is feasible. Where a second check scale is performed, it replaces the first check scale as the basis of comparison with the original scale.

Under subsection 99 (5), if the second check scale varies in volume or value from the original scale by more than the prescribed percent (± 3 percent), the second check scale

must replace the original scale. The scaler requesting the second check scale must pay the costs and expenses incurred by the ministry in conducting the second check scale.

Where the volume or value of the second check scale is between 0 and 3 percent of the original scale, the original scale is confirmed and the scaler who requested the second check scale is free of any expenses incurred by the ministry in conducting the second check scale.

The prescribed percentage of ± 3 percent is set under Section 16 of the *Scaling Regulation*.

1A.2.11 Scaling Charges, Costs and Expenses

Various fees, costs, and expenses are prescribed under Section 98 of the *Forest Act*. The only charges levied by the Crown under this section are where the Crown incurs expenses and costs in doing the scaling, preparing, and submitting the scale return. These charges are contained in a schedule as specified by the Chief Forester.

Section 98 (3) enables amounts under subsection 98 (1) and (2) to be waived if the amount is less than a prescribed amount. This minimum amount is prescribed under subsection 12.1 of the *Scaling Regulation* at \$25.00.

1A.2.12 Scaling Examinations and Appointments

Section 100 (1) of the *Forest Act* requires that a person who applies for a scaling licence to be examined by one or more scaling examiners appointed by the chief forester. Section 100 (2) requires that the scaling examination be approved by the chief forester and persons who pass the examination may be issued a scaling licence.

Section 100 (3) authorizes the appointment of acting scalers, forest service scalers, and official scalers.

Under the *Scaling Regulation*, Section 17 sets the fee for a scaling licence examination at \$50.00 and Section 18 sets the fee for appointment as an acting scaler at \$100.00 per year. Under the scaling policy the scaling licence examination does not apply to an applicant under the following conditions:

- is a Forest Service employee, or
- holds an acting scaler appointment and has paid the \$100.00 appointment fee, or
- holds a scaling licence and is taking an upgrading exam or is being re-examined under Section 101 of the *Forest Act*.

Similarly, under subsection 18, the acting scaler appointment fee may be waived if the volume scaled under the appointment will not exceed 300 m³ in a 12-month period.

Chapter 11 of this manual documents licencing standards, procedures, and related administration.

1A.2.13 Re-examination

Section 101 of the *Forest Act* provides the chief forester with the authority to require a licenced scaler to be re-examined within a specified time. Failure to pass the examination within the specified time will render the scaling licence cancelled.

1A.2.14 Suspension and Cancellation of a Scaling Licence

Section 102 (1) of the *Forest Act* provides the regional manager, or the district manager with the authority to suspend the licences of scaler's who fail to properly perform their duties. Suspensions must be for a set period of time and a notice must be served on the offending scaler advising of the suspension.

Section 102 (2) of the *Forest Act* provides the chief forester with the authority to cancel a scaling licence where the scaler fails to properly perform scaling duties. The cancellation must be in the form of a notice served on the offending scaler and the scaler must be given an opportunity to be heard before the scaling licence is cancelled.

1A.2.15 Offences and Penalties

Offences under the *Forest Act* are set out in Section 163. Offences applicable to Parts 5 and 6 of the *Forest Act* include and may be subject to summary conviction under the *Offences Act*:

84 (1)	90 (1)
84 (2)	90 (2)
84 (3)	94 (1)
84 (4)	94 (4)
84 (6)	95 (1)
86 (1)	95 (7)
86 (2)	96 (1)
86 (3.1)	97 (1)
86 (4)	97 (6)

In addition, under Section 163 of the *Forest Act*, it is an offence to:

- 163 (b) to mark timber with a marine log brand or scaled timber brand unless it is first marked with a timber mark under Part 5 and scaled under Part 6,

- 163 (c) for persons to represent that they are authorized to perform a scale under Part 6 when they are not so authorized, and
- 163 (f) to hinder, obstruct, or impede a regional manager, district manager, or forest officer or a person acting under the direction of any of them in the discharge or performance of a duty or the exercise of a power or authority under the *Forest Act*.

Contravention of several sections of the *Scaling Regulation* also constitute an offence under the *Forest Act*. These include:

- Section 2, and
- Section 4 (1) and 4 (4).

Contraventions of Section 10 (Documentation of Requirements) the *Timber Marking and Transportation Regulation* also constitute an offence under the *Forest Act*. Ticketable offences include contraventions of subsections 10 (1), 10 (3) and 10 (4).

Most offences under the *Forest Act* and *Scaling Regulation* are subject to violation tickets being issued by the ministry. These offences and applicable fines are set out in the *Violation Ticket Fines Regulation Administration* and under the *Offence Act*. These offences may also be subject to summary conviction under the *Offence Act*.

Penalties are also prescribed in the *Scaling Regulation* under Section 11 for late submission of scale data and Section 13 for not retaining timber for check scaling purposes.

Appendix 1B Scaling Requirements in British Columbia

1B.1 Introduction

If you are going to apply for a timber sale licence, cutting permit or some other licence to harvest Crown timber or harvest timber on private land, it is important that you understand some of the basic scaling requirements in advance.

Responsibilities for Scaling:

If you have a licence or permit to harvest Crown timber or you want to harvest timber on your own private land, you have the responsibility to ensure your timber is properly scaled.

More specifically, subject to approval of your plans by the ministry, you are responsible for:

- ensuring the timber is scaled as soon as possible after harvesting at the designated place for scaling,
- ensuring the scale is complete and accurate, and
- Ensuring scale returns are submitted as required by the Forest Service.

1B.2 Scaling - An Overview

Scaling is the measurement of timber to determine its volume and quality or grade. Scale data is reported by species and grade, and volumes are expressed in cubic metres (m³). One cubic metre of timber can be viewed as a cubic metre of solid wood, free of any rot, hole or char.

Scaling is performed by scalers who are licenced and authorized to scale by the Ministry of Forests. The law on scaling is contained in the *Forest Act* and the *Scaling Regulation*. The *Scaling Manual* describes scaling procedures in detail.

In British Columbia, all timber (including private timber) that is harvested must be scaled. The scale provides the data used by the Ministry of Forests to assess and invoice stumpage and account for harvested volumes. The data is also used by individuals and firms who buy and sell logs.

1B.3 Scaling Methods

In order for you to meet your scaling responsibilities, you must choose one of the approved methods of scaling, and receive approval by the ministry.

1B.3.1 Piece Scale:

With this method, each and every log or piece is measured and the volume and grade is determined for each piece. A piece scale is the most accurate method of scaling, but can be expensive if the logs are small and truckloads contain many pieces.

1B.3.2 Weight Scale:

With this method, every truck load is weighed and some of the loads (the samples) are piece scaled. The sample data is then used to determine the volume and grade of all the timber that was weighed. The total of the loads weighed over the scale in a one year period is known as the weight scale population. Volumes are determined by multiplying the total weight of the loads by the volume to weight ratio derived from the samples which are both weighed and piece scaled.

i.e., $\text{volume} = \text{weight} \times \text{the ratio}$

Weight scaling is usually done at a lower cost than piece scaling. While the estimate of the total population volume can be as reliable as piece scaling, estimates for smaller volumes may be less accurate.

If your timber is to be scaled by weight scaling, you should be aware of the potential limitations of this method. You should also be aware of options which will best help you meet your responsibility for an accurate scale. These are discussed later.

1B.3.3 Other Methods:

Other methods of scaling may be approved by the ministry. Approval of other methods is largely confined to scaling minor volumes and scaling special forest products where the ministry approves the manufacture of special forest products on the area of harvest. In the case of Crown timber, the specific special forest products must be named in the licence document in order for special forest products to be manufactured on site and scaled as such.

1B.4 Things to Consider Under Weight Scaling

If weight scale is your method of scaling, it is important that you find out how your timber will be scaled under the population. You should be aware of a couple of things:

- In weight scaling, the samples used to determine the ratio are selected at random. It is possible that none of your timber will be selected as a sample. If this is the case, your volumes will be based entirely on timber, which may not reflect your own timber in terms of quality, species or grade.
- Also, unless you request a final billing in advance of having your timber scaled, timber from non-replaceable tenures such as timber sale licences under the SBFEP, licences to cut, and cutting on private land, it is invoiced at ratios which exist at the time timber is weighed. This means the scale data for your timber will be based on the ratio in effect on the date your timber was weighed. For replaceable tenures such as cutting permits, under forest licence, timber is invoiced on the month-end ratio, but is also subject to a year-end adjustment (final billing) which reflects all the samples taken over the entire year.

You should discuss these with the weight scale operator and the ministry to assess their significance.

If you believe the weight scaling arrangements will not provide an accurate scale for your timber, you may have a couple of other options.

- Set up separate strata for your timber, if your harvest is big enough and the weight scale operator agrees; or
- Set up your own population, if your harvest is big enough and the weight scale operator agrees.

If none of these are feasible, your only option may be to elect piece scaling.

1B.5 Approvals and Advice

Once you have decided where and how your timber is to be scaled, you must contact your local Ministry of Forests office for approval. Be sure to contact your local office for details on how to submit your plan and for any assistance in understanding your responsibilities for scaling.

To ensure use of the correct timber mark for each harvesting area the Forest Service may, under harvesting agreements and cutting authorities, require licensees to post signs at the exit point of each cut block, clearly showing the timber mark applicable to that cut block.

Under the *Forest Act*, it is an offence to remove, obliterate or alter a mark that has been applied to timber before the timber has been used in manufacturing.

2.1.3 Requirements of the Scaler

The scaler's principle responsibility is to ensure the timber marks found on the timber are accurately recorded. Where a scaler believes that timber has been incorrectly marked, he or she should contact the local forest district as soon as possible.

The scaler must:

- legibly record the mark appearing on the timber according to the documentation conventions outlined in Chapter 7.1.2,
- know what marks are approved for scaling at that scale site (i.e., scale site designation letter), and
- know what to do if timber arrives at the scale site bearing marks which are illegible, inadequate, invalid or not approved for scaling at that site. (Procedures are usually specified in the scale site authorization. If not, the scaler should contact the local forest district as soon as possible)

The scaler must be familiar with the scale site authorization as well as the scaler's authorization to scale.

2.1.4 Timber Mark Formats

Over the history of registering timber marks, the format of the marks has been used to serve many needs. Until recently, timber mark certificates over private land had no expiry. As such, many mark formats are still in place.

Timber marks are generally comprised of numbers and letters, and may include other distinguishing features, such as crescents and bars. There are some twenty two classes of timber marks in use and within these classes, there are numerous mark styles.

Please refer to Section 7.1.2.1 - Recording of Commonly Misinterpreted Characters.

Many different timber mark configurations may be encountered. Contact the local Forest Service office if there is any confusion concerning the validity of a mark or to receive instructions on how to record it.

There are two major groups of marks:

- those from Provincial Crown land tenures and Federal Crown reserves.
- those from private lands.

2.1.4.1 Crown Land Tenure Marks

For mark and brand formats, see Table 2.1.

2.1.4.1.1 Forest Licences and Timber Sale Harvesting Licences

Where more than 26 cutting permits will be issued, a "mark designate" is assigned, otherwise the mark follows the format of timber sale licences. These designates consist of two letters and a number followed by five numbers. For example for forest licence A15429, the mark designate is always EK1 followed by three numbers denoting the applicable cutting permit, and is recorded as EK1123, EK1321, and so on. Similarly, Forest Licence A18665 would have marks like UG7123 or UG7321.

2.1.4.1.2 Tree Farm Licence

Tree farm licence marks will appear in a broken circle or broken triangle where the top numeral designates the licence number and the bottom number designates the cutting permit.

File type	Tenure type	Licence or certificate	Timber marking	Recording on tally
B09	Crown grant - non exportable	NE RTG	NE RTG	NERTG
B08	Crown grant - exportable	EA CGU	EA CGU	EACGU
B14	Indian reserves	IR123	IR 123	IR123
B15	Letter of marking authority - exportable	LEA UXM	LEA UXM	LEAUXM
B16	Letter of marking authority - non exportable	LNB ACP	LNB ACP	LNBACP
A10	Watershed agreement	WS1, CP6	WS1 006	WS1006
B01	Road permits	R01234	R01 234	R01234
B02	Christmas tree permit	C00155	C00 155	C00155
S01	Free use permit	FUP1234	FUP 1234	FUP1234
B11	Scaled timber brands	DCR 102	DCR 102	not recorded
B11	Marine log brands	RC		RC
B11	Log salvage marks	1234		Recorded in camp boom #

Recording on Tally: legibly record the mark according to the documentation conventions outlined in Chapter 7.1.2.

2.2 Log Brands

2.2.1 Scaled Timber Brands

2.2.1.1 Authority

Part 5 of the *Forest Act* provides that:

- timber that has been scaled and will be transported from its place of scaling must first be conspicuously marked with the scaled timber brand, which pertains to that scale site,
- the ministry may exempt scaled timber from this requirement where warranted,
- no person shall remove, obliterate, or alter a brand that has been applied to timber,
- the ministry upon application may issue a certificate describing a scaled timber brand upon application of the scale site operator, and may attach conditions concerning use of the brand, and
- the ministry may cancel a scaled timber brand.

It is an offence under the *Forest Act* to fail to apply a scaled timber brand as required or to remove, alter or obliterate a brand that has been applied to timber.

Figure 2.1 is an example of a Certificate describing a Scaling Timber Brand.

2.2.2 Marine Log Brands

2.2.2.1 Authority

Part 5 of the *Forest Act* provides for issuing marine log brands upon application. The Forest Service issues a certificate which describes the marine log brand. Marine log brands are registered by the Registrar of Timber Marks and any given marine log brand will not resemble any other registered log brand.

Marine log brands differ from scaled timber brands in several ways:

- they are meant for timber which will be transported in the ocean,
- their use is optional (unless their use is conditional upon an exemption to using a scaled timber brand),
- they do not indicate where they were scaled,
- there are relatively few marine log brands (less than 50 and generally only one per licensee),
- they are registered, unlike scaling timber brands, and
- marine log brands denote ownership.

2.2.2.2 Purpose

Like scaled timber brands, marine log brands are taken as proof that timber has been scaled.

The main purpose of a brand is to allow the owner to identify and recover timber lost and subsequently salvaged in the coastal waters.

2.2.2.3 Marking Requirements

Marine log brands may be applied to timber only after it has been marked with a registered timber mark and scaled. The brand must be hammer indented on the ends of every log so that the brand is readily discernible when the timber is in the water.

2.2.2.4 Requirements of Scalers

Where beachcombed logs are scaled, a marine log brand takes precedence over any other marks or brands on a log. The scaler must record the marine log brand as the timber mark.

2.2.2.5 Format of Marine Log Brands

Marine log brands are from one to four letters, often stylized, such as A, AB, ABC, or ABCD. See Table 2.1 for an example of a marine log brand.

2.2.2.6 Applying for a Marine Log Brand

Persons applying for a marine log brand must complete an application in the form required by the Minister. The application must include a prescribed fee as well as a facsimile of the marine log brand applied for.

Upon confirming the proposed marine log brand does not resemble any other registered log brands, the Regulation of Timber Marks may issue a certificate which describes the marine log brand.

For the approved application form, see the local Forest Service district or regional office.

2.2.3 Boom Chain Brands

Under the Boom Chain Act, there is provision for a boom chain brand.

Boom chains are chains with toggles attached for use in the booming of logs. A brand is made up of characters or marks that are impressed on a boom chain for purposes of identification. The Forest Service keeps a register of these brands in the timber mark register, but they are not used for marking timber.

2.3 Log Salvage Identification Mark

2.3.1 Authority

Part 11 of the *Forest Act* provides for establishing log salvage districts. Within the log salvage district, a licence may be granted to operate a receiving station. Permits may also be granted to persons wishing to salvage logs (i.e., log salvors).

In a log salvage district, all logs recovered by log salvors (permit holders) must be returned to the log salvage receiving station.

2.3.2 Purpose

Log salvage identification marks are issued to log salvage permit holders. This mark denotes that the log on which it appears was, at one time, in the possession of the permittee (log salvor).

2.3.3 Marking Requirements

Salvors must hammer indent the mark on the ends of logs as soon as they take possession of the log.

2.3.4 Requirements of Scalars

Log salvage identification marks are only used to identify the parcel and are not recorded in lieu of a timber mark.

2.3.5 Format of Log Salvage Identification Marks

Log salvage marks are always one to four numbers enclosed in a diamond and are read starting from the top going counterclockwise.



Figure 2.3 Log salvor's permit number within a diamond.

This page is intentionally left blank.

3.2 Coniferous Species

3.2.1 Balsam

Balsam includes three species of true firs: subalpine fir (*Abies lasiocarpa*), amabilis fir, or Pacific silver fir (*Abies amabilis*), and grand fir (*Abies grandis*).

These species are recorded as BA.

Logs	Normally cylindrical in form, with branches in whorls.
Inner bark	<p>Soft and mushy and thicker than the outer bark. The outer bark takes three main forms:</p> <p>On young trees and the top logs of older trees, it is a light-to-dark ash grey with greyish white flecks. The bark is smooth and shows pitch blisters, or scars of pitch blisters.</p> <p>The bark of the lower stem on older trees is also light-to-dark ash grey with greyish flecks. However, as the tree ages, the smooth bark of the lower stem begins to break into longitudinal and some transverse cracks. The cracks are dark, even black in colour. Bark at the edges of the cracks tends to peel. Scars of pitch blisters may be visible.</p> <p>The bark of still older trees breaks into dark grey flat ridges and develops a scaly appearance.</p>
Wood	Light, soft, and of relatively low strength. It has little odour and is white to a pale, yellowish brown colour. There is no contrast between heartwood and sapwood. Cut ends usually pitch, especially in the interior ranges.
Needles	<p>Vary between species</p> <p>Subalpine fir (balsam) – greyish green to pale bluish green on both upper and lower needle surfaces. Both surfaces show numerous markings. Needles are 2.5 to 4.5 cm long and rounded or notched at the tip.</p> <p>Amabilis fir (balsam) – needles are a shiny dark green on upper surface and white banded underneath. There are no markings. Needles grow 2 to 3 cm long.</p> <p>Grand fir (balsam) – needles are very similar to amabilis ones, but may show a few scattered markings. Length is 2.5 to 5 cm.</p>

Common defects and identifiers	Butt rot, pocket rot, ring rot, heart rot, pin rot, sap rot, ambrosia, butt (water) shake, frost checks, checks.
Common uses	For the manufacture of veneer, structural and fine quality export lumber. Poor quality balsam is usually used for pulp.

3.3.5 Cottonwood

The only species of this cottonwood that grows in British Columbia is black cottonwood (*Populus trichocarpa*).

The species is recorded as CO.

Logs	Have irregular branching, are usually quite round, and can be as large as 160 cm in diameter.
Bark	On young trees is smooth and yellowish grey, turning dark greyish-brown and becoming furrowed with flat topped ridges separated by v-shaped crevices, similar in appearance to balsam poplar.
Wood	Light, soft, low in strength, and rather fuzzy in texture, with a slightly offensive odour. The sapwood is whitish in colour and blends gradually into the greyish white to light brown heartwood.
Leaves	Broad and egg-shaped and taper from below the middle to a drawn out tip. They are 7.5 to 12 cm long, with fine-toothed edges. Colour is dark green above and silver green below, often stained with brownish resin blotches.
Common defects and identifiers	Butt rot, crook, and adventitious knots.
Common uses	For the manufacture of veneer, pulp, and specialty lumber.

3.3.6 Maple

Three species of maple grow in British Columbia: vine maple (*Acer circinatum*), Douglas, or Rocky Mountain maple (*Acer glabrum*), and bigleaf, or broadleaf maple (*Acer macrophyllum*). However, only the latter achieves a size that makes it potentially commercial.

The species is recorded as MA.

Logs	Have irregular branching and frequently display burls or swellings, especially on the butt. Diameters range up to and may exceed 60 cm.
Bark	Light brown to milk chocolate brown and has a pattern similar to cottonwood with scaly ridges separated by v-shaped crevices.
Wood	Moderately hard and whitish yellow to light brown in colour. Cut ends will stain to many different shades.
Leaves	Broadleaf maple are quite large and may be 15 to 30 cm across and almost as long. They are five-lobed, shiny, and dark green above and paler on the underside. The leaf stalk exudes a milky sap when broken.
Common defects and identifiers	Rotten knots, burls, and crooks.
Common uses	Limited to the manufacture of furniture.

3.4 Tables and Illustrations

Table 3.3 Alphabetic Species Listing

Common Name	Reference Slide	Scaling Code	Latin Name
Alder (red)	#11	AL	<i>Alnus rubra</i>
Alder (Sitka)	#11	AL	<i>Alnus sinuata</i>
Alder (speckled)	#11	AL	<i>Alnus rugosa</i>
Arbutus (Pacific madrone)	#1	AR	<i>Arbutus menziesii</i>
Aspen (balsam poplar)	#26	AS	<i>Populus balsamifera</i>
Aspen (trembling)	#26	AS	<i>Populus tremuloides</i>
Balsam (alpine fir)	#29	BA	<i>Abies lasiocarpa</i>
Balsam (grand fir)	#29	BA	<i>Abies grandis</i>
Balsam (noble fir)	#29	BA	<i>Abies procera</i>
Balsam (Pacific silver fir)	#29	BA	<i>Abies amabilis</i>
Birch (Alaska)	#24	BI	<i>Betula neoalaskana</i>
Birch (water)	#24	BI	<i>Betula occidentalis</i>
Birch (white)	#24	BI	<i>Betula papyrifera</i>
Cedar (western red)	#10	CE	<i>Thuja plicata</i>
Cottonwood (black)	#36	CO	<i>Populus trichocarpa</i>
Cypress (yellow-cedar, yellow cypress)	#5	CY	<i>Chamaecyparis nootkatensis</i>
Douglas-fir (coastal, interior)	#5B	FI	<i>Pseudotsuga menziesii</i>
Hemlock (western)	#9	HE	<i>Tsuga heterophylla</i>

Common Name	Reference Slide	Scaling Code	Latin Name
Hemlock (mountain)	#9	HE	<i>Tsuga mertensiana</i>
Larch (alpine)	#23	LA	<i>Larix lyalli</i>
Larch (tamarack)	#23	LA	<i>Larix laricina</i>
Larch (western)	#23	LA	<i>Larix occidentalis</i>
Lodgepole pine	#22	LO	<i>Pinus contorta</i>
Maple (broadleaf)	#13	MA	<i>Acer macrophyllum</i>
Maple (Douglas)	#13	MA	<i>Acer glabrum</i>
Maple (vine)	#13	MA	<i>Acer circinatum</i>
Ponderosa pine (yellow)	#25	YE	<i>Pinus ponderosa</i>
Spruce (black)	#32	SP	<i>Picea mariana</i>
Spruce (Englemann)	#32	SP	<i>Picea englemannii</i>
Spruce (Sitka)	#32	SP	<i>Picea sitchensis</i>
Spruce (white)	#32	SP	<i>Picea glauca</i>
White pine (western white)	#14	WH	<i>Pinus monticola</i>
Whitebark pine	PRINT ONLY	WB	<i>Pinus albicaulus</i>
Limber pine	N/A	WB	<i>Pinus flexilis</i>
Yew (western Pacific)	#15	UU	<i>Taxus brevifolia</i>

Rot fungi are sub-classified into root, and butt rots, heart or trunk rots and sap rots and stains according to their characteristic spread. The following list illustrates the typical areas of infection of many fungi common to British Columbia.

4.1.1 Common Root and Butt Rots

- Brown cubical butt rot (*Phaeolus schweinitzii*) or velvet top fungus,
- brown cubical trunk and slash rot (*Laetiporus sulphureus*) or sulfur fungus,
- cedar pocket rot (*Postia sericiomollis*) formerly *Poria sericiomollis* or *Polyporus asiatica*,
- stringy butt rot or Feather rot (*Perenniporia subicida*),
- annosus root and butt rot (*Heterobasidion annosum*) formerly *Fomes annosus*,
- tomentosus root rot or Red root and butt rot (*Inonotus tomentosus*) formerly *Polyporus tomentosus*,
- armillaria root disease or shoestring root rot (*Armillaria ostoyae*), and
- laminated root rot or yellow laminated rot (*Phellinus weirii*).

4.1.2 Common Heart Rots

- Red Fomes rot or Brown top rot (*Fomitopsis cajanderi*) or rose conk formerly *Fomes subroseus*,
- brown trunk rot (*Fomitopsis officinalis*) or elephant foot (quinine) fungus,
- red rot or red ray rot (*Polyporus anceps*),
- red ring rot or white pocket rot (*Phellinus pini*) formerly *Fomes pini*,

- brown stringy trunk rot (*Echinodontium tinctorium*) or Indian paint fungus,
- hardwood white trunk rot (*Phellinus igniarius*) formerly *Fomes igniarius*,
- aspen trunk rot (*Phellinus tremulae*) formerly thought to be *Fomes igniarius*,
- white stringy trunk rot or White spongy trunk rot (*Fomes fomentarius*),
- long yellow pitted rot (*Hericiium abietis*),
- red heart rot (*Stereum sanguinolentum*) or bleeding fungus (conk) formerly *Haematostereum sanguinolentum*,
- white mottled rot (*Ganoderma applanatum*) or Artist's conk,
- conks, general,
- rotten knots (Conk knots), and
- pipe or pocket rots, general.

4.1.3 Sap Rots and Stains

- Black stain root disease or Blue stain (*Leptographium wageneri*, *Ceratocystis* and *Graphium*),
- brown crumbly rot (*Fomitopsis pinicola*) or red belt fungus,
- brown cubical sap rot (*Gleophyllum saepiarium*) formerly *Lenzites saepiaria* (or *Trametes americana*, and *Trametes serialis*),
- grey-brown sap rot (*Cryptoporus volvatus*) formerly *Polyporus volvatus*, and
- pitted sap rot (*Trichaptum abietinum*) formerly *Herschioporus abietinus* and *Polyporus abietinus*.

Unfortunately, for those who are interested in the identification (morphology) of conks, logs delivered to a mill yard seldom maintain their conks because equipment handling removes them. The indicator then becomes a "conk knot" which is simply a rotten knot often showing fungus parts.

Because of the variability of the effects of conk, not only by fungus species but by the tree species and location around the province, it is very difficult to establish with conviction any conventions that apply across the province. Local conditions and experience will therefore determine which conventions or "rules of thumb" may be applied with conviction. The local Forest Service scaling representative will assist new scalers in making these judgements. Where there are conk knots and no sign of rot at the ends of a log, the scaler should, if possible, observe the processing of the log in order to get a better idea of the internal effects of conks.

4.3.12 Rotten or Hollow Knots

Rotten or hollow knots (limbs), other than indicators of *Phellinus pini* or *Echinodontium tinctorium* (punk knots) and *Fomitopsis officinalis*, are encountered frequently in yellow pine, and occasionally in other species. Their reliability as indicators of either the presence or extent of decay is extremely variable between timber stands. Such knots have a rotten core within the heartwood of the limb, which may be associated with a pocket of rot within the heartwood of a log or, in some instances, be confined to the limb. The appearance of log ends that have been bucked through, or adjacent to such knots serve as good evidence of the probable effect of similar knots on the same log. Observations of a number of such log ends will aid the scaler in establishing a pattern of general characteristics for the particular timber stand and species being scaled. The normal course of log presentation restricts the number of meaningful observations that can be made and, where opportunity is afforded, logs should be intentionally bucked through such knots or observed while being milled for additional evidence of a general rot pattern. Generally, the pie-cut or sector method of deduction or, depending on the observed characteristics, another appropriate method may be used as described in Chapter Five, Firmwood Deductions.

4.3.13 Pipe or Pocket Rot, General

Pipe or pocket rot is often caused by fungus such as *Phellinus pini*. It infects most conifers in North America, with balsam, hemlocks, yellow pine, cypress and western red cedar commonly affected. Decay is usually in one column or several discrete columns that extend from branch stubs, where the disease starts. Wood in early stages of decay will have small pockets which slowly expand and merge into pipes or columns.

Pipe or pocket rot is defined as interior decay, other than butt rot, ring rot, or cylindrical heart rot, that frequently occurs at several locations of the same cross section of a log. Because this type of rot does not necessarily conform to the circular shape of the other rots described (e.g., butt rot, heart rot, sap rot), the scaler can use the "rectangular box" deduction method for these and many other kinds of defects that have a cubical or rectangular shape.

Each segment of decay is scaled either as a rectangular solid (i.e., cubical) or as a cylinder.

Where multiple pockets of rot are present, add the rot volumes together to calculate the total rot volume.

When the shape of the pocket is circular, refer to the heart rot section for the deduction methods.

4.3.14 Ring Rot, General

Ring rot is actually a form of heart rot where decay follows the growth rings but leaves a core of firm wood. The cylinder formula is used to calculate the volume enclosed by the outside diameter of the ring and to calculate the volume enclosed by the inside diameter of the ring. The inside volume is subtracted from the outside volume to find the volume of the rotten ring.

4.3.15 Goiter

Goiter is a swelling or abnormal growth on the bole of a tree; rot may be associated with this defect. Internal rot seldom travels more than 1 m above and below the goiter. Firm wood loss is based on scaler experience and judgement.

4.5 Other Natural Defects

Surface defects take a variety of forms, showing up as either rotten and charred wood or missing wood such as catface, deadside, and miscellaneous scars.

Due to the nature of these defects, it is necessary to use judgment in determining the best deduction method to use. In some cases, a diameter reduction is made, as with sap rot. In others, the shape of the defect, cylindrical, conical, or cubical determines the best method to use. Often, very little volume is involved and no deduction can be made because the smallest volume deduction increment possible is 0.1 m.

With experience, it will become clear that many forms of defect will suit a shape for which a calculation method has already been described in the Measurements and Deduction sections of this scaling manual.

If the defect extends to the pith, scale as a sector of an arc or pie shape.

If the defect does not extend to the pith, scale as a portion of a cylinder, portion of a cone, or by "squaring up" the defect.

Portions of defects outside the scaling cylinder are not measured (i.e., flared portion of a log).

The following list illustrates many typical natural defects that involve missing wood.

4.5.1 Cat Face - Fire Scar

A depression in the outer surface of a log where the tree failed to renew following an injury, such as an abrasion or fire scar.

4.5.2 Dead or Missing Side

Dead side is decay extending from the surface to the pith of a log, resembling a pie shape in cross section of the log.

4.5.3 Lightning Scar

Lightning can damage a tree enough to provide entrance of fungal spores or cause other structural defects.

4.5.4 Fire Scar, Burn Saddles

Fire scars take several shapes, usually affecting the outer surface of the tree. Burn saddles are saddle shaped pockets burned into a stem where two trees lay diagonally across each other in a fire.

4.5.5 Bark Seam

Seams are longitudinal separations of fibre in a living tree. They are often caused by lightning, wind, frost (check), other injuries, or simply growth characteristics (fluted cedar, forks, etc.). A patch of bark will be partially or wholly enclosed by the wood, and rot may be associated with it.

4.5.6 Worm Holes, Insect Damage

Insect burrows that are sufficient to result in a significant loss of firmwood are not common in healthy trees. However, storage for long periods in salt water allows teredo borers to do extensive damage and storage in land decks can allow boring insects to infest the sapwood. Lumber loss can be significant if the damage is extensive enough to affect merchantability.

4.5.7 Burls

Burls are abnormal swellings of the main stem or branches and are among the most conspicuous of the stem diseases. They vary considerably in size, reaching 1 m or more in diameter in some cases but rarely occur in sufficient abundance to warrant concern. Burls result from the abnormal development in number or size of wood cells following disturbance to the cambial layer, the cause of which in most cases remains unknown. Dwarf mistletoes cause burls in several coniferous species. Because of their size, burls will add volume to a log but are unsuitable for manufacturing lumber. Although they can affect the quality of underlying wood, it is not significant enough to warrant a grade deduction. In fact, burl wood and surrounding wood can demand premium market prices depending on species because of the very appealing grain structure revealed in specialty products manufactured from it, such as automotive trim veneers and furniture.

4.5.8 Galls

Galls are localized trunk or branch swellings in which bark tissues are mainly affected with little or no damage to the underlying wood. Small galls, approximately 1 to 3 cm in diameter are relatively frequent on Douglas-fir and western hemlock, those on Douglas-fir have been attributed to a bacterial agent but in western hemlock the cause is still unknown. Because of their minimal effect on volume or wood quality, galls are ignored in scaling.

5.1.3 Errors in Measurement

No measurement is exact. It instead represents a range within which the true value lies. The graduations used in scaling, such as the “radius class unit” or rad, allows any measurement falling within a range of 2 cm to qualify as a single unit. Similarly, length measurements allow any measurement falling within a range of plus or minus 0.1 m to be recorded as a single unit. These divisions are established to allow rapid measurement and to reduce errors. Standardised units, methods and conventions, combined with good training and reliable tools also contribute to acceptable error levels.

Errors can be classified into four kinds:

Mistakes	Mistakes can include incorrect use of an instrument, recording errors, and calculation errors. Large mistakes are detected by systematic checking of all work and may be corrected by redoing part or all of a job. Small mistakes can be very difficult to detect, because they merge with other types of errors. Good practice is needed to minimize mistakes.
Compensating (accidental) Errors	These errors are due to the nature of the object being measured, variable environmental conditions, limitations in instruments, and dependence on assumptions. Positive errors will, on average, be balanced by negative error.
Systematic Errors (bias)	These errors are recurring, relatively constant, and are not compensating. Bias may be caused by faulty equipment, technique, subjectivity, and dependence on erroneous assumptions.
Sampling Errors	These errors are due to faulty sample design including poor estimates. The magnitude of error can be estimated from the variance of the population and the sample size, and can be reduced, or rendered largely self-compensating, by adhering to an objective sampling approach.

5.1.4 Scaling Conventions versus Local Knowledge

The ultimate objective of scaling is to accurately determine the net firmwood volume and grade of each log scaled. To achieve consistent results and facilitate timely scaling, most scaling is conducted with some reliance on the use of conventions. Conventions are based on experienced relationships between external log characteristics and their impacts on firmwood content and product recovery. Numerous scaling conventions are documented in this manual.

While scaling conventions help the pace of scaling and help scalers achieve consistency, strict adherence to conventions fails to recognize that the trees from which logs are cut

are often variable because of their inherit genetic blue print, their physical growing conditions and their history. Because of this diversity, logs often do not conform to established conventions.

Under these circumstances strict adherence to some conventions will not always yield the most accurate scale.

An accurate scale will best be achieved when scalers temper the use of conventions with local knowledge and sound judgement. Local knowledge is gained through observing log breakdown in the mill, participating in out-turn studies, bucking logs in the millyard and in the case of Interior log grades, studying standing timber to assist in the dead/green classification at the scale site.

Notwithstanding the inherent variability of timber and the need to temper the use of conventions to achieve a better scale, scalers must always be able to clearly demonstrate the basis for their scale. Significant departures from established conventions should be discussed and agreed to by the local district scaling supervisor or check scaler before they are employed. It must always be remembered that the Ministry of Forests scaling staff have the ultimate authority in the interpretation and application of scaling procedures.

As stated Section 5.2, Smalian's formula uses an average of the two end areas projected over the length of the piece to determine the volume. It follows that the challenge to the scaler measuring a slab is to record the two radius class units which fairly represent the areas of both slab ends and which, when inserted into Smalian's formula, will yield the firmwood volume. This derived or "effective" radius can be determined either by enclosing the end area with one of a "semicircle", a "pie wedge", a quadrilateral (four sided) or a triangle (three sided) shape, depending upon which most nearly matches the slab end. Regardless of the shape, measurements are always taken at right angles (90 degrees) to one another. Internal slab shapes which are quite irregular may require more than one measurement on an axis to arrive at an average width or average thickness.

5.4.3.1 Measuring Semicircular Slab Ends

The most frequently encountered external slab shape has a "semicircular" end profile. A true semicircle is exactly one half the original circle. Normally logs are not perfect circles and rarely do they fracture exactly in the middle. Therefore, what we are calling a semicircle is more properly termed a segment, or the area transcribed by the intersection of a circle and a chord.

Although not usually perfect semicircles, these shapes may be viewed, for scaling purposes, as being half of a whole or "parent" log of round, oval or elliptical shape, as shown in Figure 5.19.

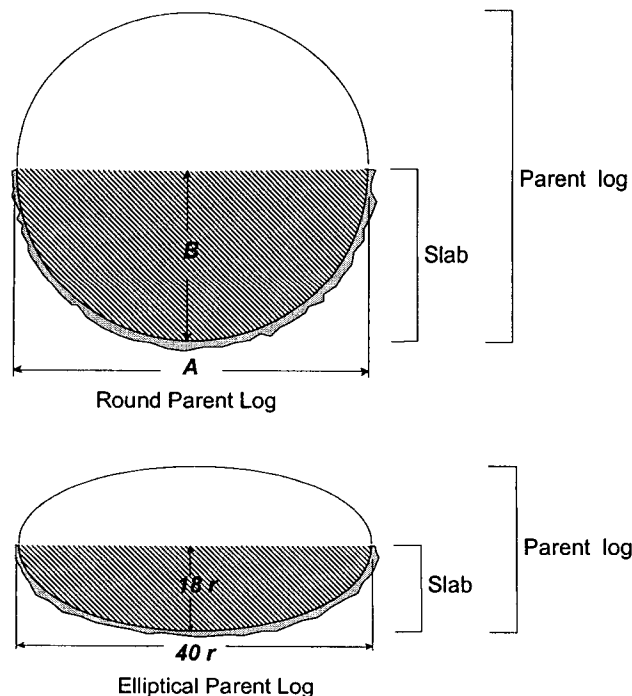


Figure 5.19 Measurement of a semicircular slab end.

To find the volume of a semicircular slab it is necessary to:

- first derive the average diameter of an end of the parent log, from two measurements of the end of its segment,
- find the unit volume of the end of the parent log,
- divide the unit volume in two to find the unit volume of the end of the segment,
- record the radius class unit which is closest to the segment's unit volume,
- repeat the above process for the other end of the slab, and
- record the length of the slab so that a volume may be calculated.

The scaling method to find a radius class representing the unit volume of the slab in Figure 5.19 is:

The measurements are taken across the width and thickness of the semicircular slab. The long-standing convention is to term the dimension "A" which falls across what is, more or less, the parent log's diameter as the width. The other dimension "B", perpendicular to "A", and which is, more or less, the parent log's radius is termed the thickness. The width is measured at the point of maximum width and the thickness is measured at the point of maximum depth at right angles to the width, ignoring any minor irregularities.

Then, the average diameter of one end of the parent log is derived from the measurements taken of its slab. The formula for determining the average diameter of one end of the parent log from the measurements of its semicircular slab is:

$$\text{Parent log diameter} = \frac{A + 2B}{2}$$

For example, if $A = 40$ rads and $B = 18$ rads,

$$\text{Parent log diameter} = \frac{40 + 2 \times 18}{2}$$

$$\text{Parent log diameter} = \frac{76}{2}$$

$$\text{Parent log diameter} = 38 \text{ rads}$$

Next, the unit volume for 38 is located on the scale stick (454) and divided by 2. Finally, the unit volume nearest to that resulting unit volume (227) is located on the scale stick, and the corresponding radius class unit is recorded. In this case, the closest unit volume is 229, which corresponds to 27 rads. The process is repeated at the other end of the slab.

5.4.3.2 Measuring Slab Ends and Sectors With a Hole

5.4.3.2.1 Measuring a Semicircular Slab End with hole

Logs with advanced heart rot or hole may split into slab sectors or segments. To scale a semicircular slab with a hole, the dimensions for the parent log and the hole are derived, and the unit volume of the hole is subtracted from the unit volume of the parent log before division by 2.

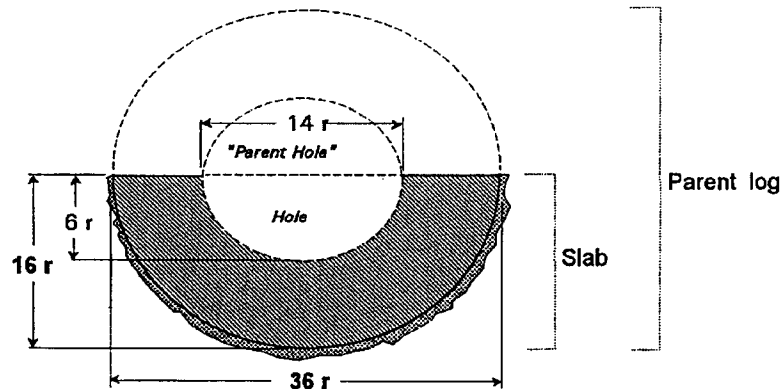


Figure 5.20 *Measurement of a semicircular slab end with hole.*

To find the volume of a semicircular slab with a hole, it is necessary to:

- first derive the average diameter of an end of the parent log, from two measurements of the end of its segment,
- find the unit volume of the end of the parent log,
- derive the average diameter of an end of the "parent hole", from two measurements of the end of its segment,
- find the unit volume of the end of the parent hole,
- subtract the unit volume of the parent hole from the unit volume of the parent log,
- divide the result in two to find the unit volume of the end of the slab,
- locate and record the radius class unit which is closest to the segment's unit volume,

- repeat the above process for the other end of the slab, and
- record the length of the slab so that a net volume may be calculated.

The scaling method to find a radius class representing the unit volume of the slab in Figure 5.20 is: The measurements are taken across the width and thickness of the semicircular slab as described in the example in Section 5.4.3.1. Then, the average diameter of one end of the parent log is derived from the formula:

$$\text{Parent log diameter} = \frac{A + 2B}{2}$$

$$\text{Parent log diameter} = \frac{36 + (2 \times 16)}{2}$$

$$\text{Parent log diameter} = \frac{68}{2}$$

$$\text{Parent log diameter} = 34 \text{ rads}$$

The unit volume for 34 rads is located on the scale stick (363).

Next, the average diameter of one end of the parent hole is derived in the same manner:

$$\text{Parent hole diameter} = \frac{14 + (2 \times 06)}{2}$$

The unit volume for 13 rads is located on the scale stick (53) and is subtracted from the unit volume of the parent log and divided by 2 to arrive at the unit volume of the slab.

$$\text{Slab unit volume} = \frac{\text{parent log unit volume} - \text{parent hole unit volume}}{2}$$

$$\text{Slab unit volume} = \frac{363 - 53}{2}$$

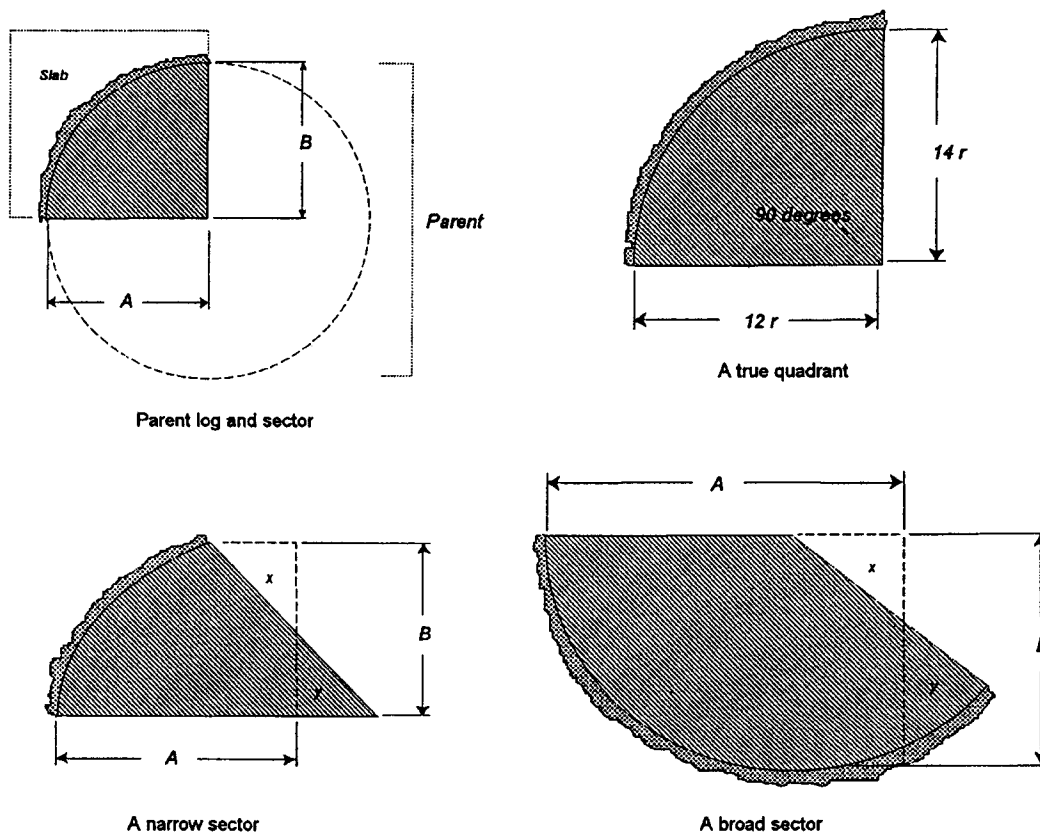
$$\text{Slab unit volume} = \frac{310}{2}$$

$$\text{Slab unit volume} = 155$$

Finally, the unit volume nearest to the slab unit volume is located on the scale stick, and the corresponding radius class unit is recorded. In this case, the closest unit volume is 152, which corresponds to 22 rads. The process is repeated at the other end of the slab.

5.4.3.3 Measuring Sectors (pie wedge slab ends) Smaller than a Semicircle

Sometimes logs will conveniently split into quarters or thirds of their original end profile. Other times a less convenient fraction will result. This slab type may be categorized as being a sector less than a semicircle, roughly a pie wedge in shape, and external, or having a portion of the original circumference of the log remaining, as illustrated in Figure 5.18. Examples for scaling with different methods follow.



$$\text{Average Diameter} = \frac{A + B}{2} \text{ where area } x = \text{area } y$$

Figure 5.22 Measurement of sectors (pie wedge slab ends).

5.4.3.3.1 Measuring Small Sectors by Averaging the Dimensions

Figure 5.22 illustrates various sectors smaller than a semicircle. These shapes may be scaled by direct measurement without using a factor relating to a "parent" log as described next. This method, called the "*quarter-round*" method, is preferred for slabs which do not break into convenient fractions. Illustrated are quadrants, narrow sectors and broad sectors. As with the factored method, the measurements are taken at *A* and *B* and averaged to arrive at an effective radius class unit for recording.

The average diameter in rads of the end of a sector slab is derived from the measurement of its two faces. The measurement of a quadrant allows both measurements to be taken directly off each face because they are at 90 degrees to each other. Broad and narrow sectors must be measured with *A* being "drawn in" to the point where the void *x* is about equal to the projection *y* as shown on the examples so that *the two measurements are taken at 90 degrees to each other*. Overstatement of volume will result if this is not done.

To find the volume of a sector slab by averaging it is necessary to:

- first average the two measurements of an end of the slab,
- record the average,
- repeat the above process for the other end of the slab, and
- record the length of the slab so that a volume may be calculated.

The scaling method to find a radius class representing the unit volume of end of the sectors in Figure 5.22 is as follows.

The formula for determining the average diameter of a slab sector is:

$$\text{Averagediameter} = \frac{A+B}{2}$$

Replace the variables *A* and *B* with the measurements given. (*A* = 12 and *B* = 14).

$$\text{Averagediameter} = \frac{12+14}{2}$$

$$\text{Averagediameter} = 13\text{rads}$$

The radius class unit is recorded, and the process is repeated for the other end of the slab.

5.5 Firmwood Deductions

5.5.1 Introduction to the Deductions Section

The following sections of Chapter 5 discuss the concepts of firmwood deduction and outline methods for determining the net firmwood content of logs containing defects. For each defect shape, there is a *formal calculation* and one or more examples of *field methods*.

The formal calculation can be thought of as the method a computer would use when presented with the required measurements and shapes. Apart from their inclusion in handheld scaling computer software, these formal calculations are most frequently used when analysing theoretical logs in a classroom setting, when dealing with particularly challenging or borderline logs or when arithmetic skills are strong and time is not a factor. Scalers with well developed arithmetic skills may wish to use some of them exclusively. They are expressed in full detail in Appendix 5B.

The field methods are based upon proven field experience and are provided for practicality and ease of use. Although the results often approximate those of the formal calculations, experience has shown that differences are rarely significant enough to be of concern because they tend to be "compensating errors". Compensating, or "self-cancelling" errors are discussed in Section 5.1.3. The field methods typically rely on reducing one or more of the gross dimensions of a log so that the recorded net dimensions closely reflect the net firmwood volume.

5.5.2 Firmwood Deduction Principles

Where the measurement sections of this chapter dealt with the more objective concepts of scaling, this section introduces many subjective concepts. Objective results are based on fact. That is, it is possible to perform most measurements and record the gross dimensions of a typical log by following standard procedures which do not vary, and are quite objective. Firmwood defects, on the other hand, can be subjective, or based on ideas and opinions gathered through experience. A reasonable estimation of the effects of internal rots where there are few indications of its presence, and no possibility of measurement is quite subjective. Through study, training, observation, and support from the scaling community in both industry and government, new scalers will gain enough experience to make judgements which are unbiased and within tolerances.

It is not the purpose of this manual to attempt to displace, and beyond the scope of this chapter to catalogue, the great amount of work which has been done in this area by generations of professional scalers.

5.5.3 Deduction Methods

The firmwood volume of timber excludes all rot, hole, missing wood, and charred wood. Although the current *Scaling Regulation* does not refer to missing wood as a separate entity from hole, missing wood has been added to scaling terminology to further define a hole. In scaling, a hole is a cavity or opening, such as a knot hole, an advanced heart rot, or an advanced butt rot. Missing wood refers to areas where wood is absent from a log that otherwise would be regarded as complete, such as sniped ends, equipment damage, and burn saddles. Deductions are made from the gross volume of a log for these defects as they occur. A deduction is made by subtracting the volume of the defect(s) from the gross volume of the log.

Two *field methods* of recording the outcome of a scale may be used, depending on the tools available to the scaler:

- the *net dimensions method* is normally used when recording the scale on a paper form and consists of reducing the measured dimensions of the log so that the recorded net dimensions will calculate the correct firmwood volume, and
- the *gross/net method* requires the use of a hand held computer or an approved non-standard data capture form. Here the gross measurements of the log are recorded, as are the dimensions and form of the defect(s). The gross volume of the log and the volume of the defect are calculated and the latter is subtracted from the former to yield the net volume. Where this method is employed, the computer will produce a detailed log listing showing the gross volumes, defect types, defect volumes, and net firmwood volumes as well as facsimiles of the standard data submission forms such as the FS 531 and FS 72. For more detailed information on these forms see Chapter 7.

Where a formal calculation using formulas is rigid and structured, the field methods are more dynamic, allowing the scaler to use one or more proven methods to come up with an accurate result. Production scalers will soon adopt ways of bypassing excessive calculation if tools, such as computers or calculators, are not available to automate the process. Although the use of hand held computers is becoming common, all scalers must have the ability to scale without the use of them. It is a requirement of their certification to acquire and maintain competence in the traditional field methods.

No firmwood deduction is made for twist, sweep, crook, checks, stain, large knots or other quality considerations, even though these may indicate a grade *reduction*. A condition which may be considered a defect in a grade reduction is not necessarily considered to be a firmwood defect in a volume *deduction*. Firmwood scaling is concerned with determining the volume of sound or firm wood fibre in a log. Grading, on the other hand, is concerned with the potential quantity *and* quality of end product available from that log.

For the purposes of grading, the same formulae and methods described in this chapter may be used to calculate the portion of a log that can be manufactured into an end product. A "trim allowance" is added to certain defects before determining the grade reduction. Grading is detailed in Chapter 6.

5.6.2 Butt Rot Conventions

Butt logs are usually identified by observing the large end for flare, fluting, and/or faller's signs such as an undercut or hinge in hand fell trees, or the characteristic face left by a harvesting machine. It is important not to confuse heart rot and butt rot. Although heart rot may show in a butt cut log, and butt rot may show in a second cut log, the rot can usually be identified by its nature. For example, brown cubical butt rot is recognizable by the way the wood fibres are affected. As its name implies, the rot is brown, crumbly, and breaks easily into cubes. The "conk" rots, recognizable by the white, yellow, orange, or brown "fleck", are indicators of heart rots and are discussed in the following section on heart rot. Advanced scalers not only know the difference between, and the effects of, different species of rot, but also the variations in the effects by locale. The following basic conventions apply to butt rot:

1. Where rot appears only in the butt end of a butt log, treat it as butt rot unless other indicators are present, such as conk knots or conk rot.
2. Butt rot visible at the butt end only will be assumed to be conical in shape, with the same basal diameter as the average diameter of the visible end section of the rot.
3. Conical butt rot that extends the full length of a log may be treated as though it is through running heart rot. However, if the rot diameter at the butt is greater than 1.5 times the rot diameter at the top, the cylinder (Smalian's) formula will tend to over deduct the volume of rot, and averaging the diameters will understate the volume of rot. If bucking is impossible, adjustments are required. There are two ways to do this; if using the cylinder formula, the rot diameter at the butt may be reduced to the difference between the calipered butt diameter and twice the average collar thickness. If averaging the diameters, the result will be closer to true defect volume of the neiloid or "golf tee" shape typical of logs with a high degree of flare. By adding 1 rad to the average, the result will be closer when the defect is a frustrum of a cone. The cylinder formula is suitable for rot shapes which are parabaloid (bullet shape). Section 5.8.2 provides example calculations to demonstrate the two concepts.

4. The diameter of butt rot used for deduction calculations must not exceed that of the recorded butt measurement where the actual measurement of butt rot exceeds the line of normal taper. This is a common occurrence in decadent logs with a great deal of butt flare.

There are many factors which affect the distance butt rot runs up from the stump; species, flare, taper, size, and age all contribute. Without indicators to establish rot penetration, it becomes necessary to estimate the length of the rot. Through decay studies, mill studies, and experience, the following conventions have been found to be reliable in most cases:

1. In the British Columbia interior, the average distance which butt rot travels in most logs is approximately 15 times the radius of the rot in centimetres, if there are no indicators to the contrary. For example, if the radius is 25 cm, (same as the diameter in rads), $25 \times 15 = 375$ centimetres, or 3.75 m. The penetration is therefore 3.8 m (rounded).
2. In coastal areas of British Columbia, butt rot, butt shake and related butt defects have the length of defect estimate based on the relation between the defect diameter and the recorded butt diameter of the log.

Where rot measures	It often penetrates
1/4 of the recorded butt dia.	1.8 - 2.4 m
1/2 of the recorded butt dia.	3.6 - 4.2 m
3/4 of the recorded butt dia.	5.4 - 6.0 m
4/4 of the recorded butt dia.	7.2 - 7.8 m

These figures may be adjusted slightly up or down depending on the species and visible butt flare. Douglas -fir and spruce, having pronounced butt flare may use the lower figure mentioned as butt rot in these species usually does not run far past the flare. In hemlock, balsam, and sometimes red cedar, where butt flare is minimal, rot may run further into the log and a larger estimate is required. These are general guidelines only.

The Forest Service may endorse other conventions, which are applicable to regional conditions.

5.6.3 Standard Heart Rot Conventions

Where Chapter 4 provides a general view of rot fungi, the following sections describe the treatment of rots in making firmwood deductions. Chapter 6 details the treatment of these rots for grading purposes.

1. Decayed heart wood may be visible at one or both ends of a log and will usually be circular or semicircular in shape. Its presence may only be indicated by rotten knots, or "conk".
2. If heart rot appearing at the end of a log is scattered or sporadic in nature, the cylinder of rot must be reduced in diameter to accommodate the firm wood scattered within the rot.

5.6.3.1 Heart Rot Visible at Both Ends

1. If rot is visible at both ends of the log, scale out the cylinder of rot as if it were a log inside the first log. The volume of the inner cylinder is the volume of the rot.
2. If rot is visible at both ends of the log, they are presumed to be connected unless there are indications to the contrary. For example, if different species of rot show at the ends, they may not be connected.

5.6.3.2 Heart Rot Visible at One End Only

1. Heart rot, pocket rot, ring rot, and similar defects when showing in only one end of the log are presumed to run half the length of the log to a maximum of 6 metres, unless there is evidence to the contrary. In all cases, good judgement must be used. Where local experience indicates otherwise, the Forest Service may order that this maximum be reduced, and in the interior regions of British Columbia where timber types are different, the *maximum is set to 4 metres*. Local experience is gained by observation of the bucking and manufacturing process.
2. In heart defects with only one end visible, the diameter of the defect at the unseen end is assumed to be the same as at the measured end where the defect penetrates 1/2 way or less. However, in logs where the rot penetrates more than 1/2 way, this assumption is less reasonable, and the Forest Service may order that logs be bucked prior to scaling to improve accuracy. If bucking is impossible, the ratio of the area of the rot to the area of the end which the rot occurs must be maintained at the unseen end, or an overdeduction will result. A shortcut method to calculate a length deduction where the defect is estimated to penetrate more than 1/2 way is:

$$\frac{\text{Unit Volume rot}}{\text{Unit Volume log end}} \times \text{length of rot} = \text{length deduction}.$$

5.6.3.3 Assessing Conk, Indian Paint Fungus and Pin Rot

While "conk" is the name used for the mushroom-like fruiting body often seen on standing timber which indicates a fungal invasion of a tree, for scaling purposes conk refers to the types of rot which attack lignin (the glue) and leaves cellulose fibre more-or-less intact. In the early stages the wood is only stained purple or light red and requires no firmwood deduction. In later stages, the wood breaks down to form a honeycomb appearance, identifiable at the end of a log by the white, yellow, orange or brown "fleck" (sometimes called "peck" and "white pocket") that distinguishes all conk rots.

During logging operations the external conk indicators are usually knocked off, leaving brown, yellowish brown, and/or orange powdery residues at the entry points. These residues are what a scaler looks for in assessing a log, because their presence indicates a very high probability of extensive conk rot. Conk knots should not be confused with rotten branch stubs, which may not indicate the presence of heart rot. Observation of the ends of logs, where they have been bucked through rotten knots, will indicate the differences in appearance.

Generally, the point of deepest penetration of conk rot is where a fruiting body enters the log. It commonly takes the shape of a crescent, and continues to spread through the cross-section of the tree. It can form into one or more full rings, which tend to follow the growth rings. Eventually it effects the entire heart. In the various configurations, firmwood deductions are taken according to the basic shape which is most suitable.

If rot does not show at either end of the log but its presence is indicated by conk knots, the challenge is to make a reasonable determination of its range, based only on its indicators. The indicators and the assessment of them are described in the following Section on conk rots.

5.6.3.3.1 Basic Conk Assessments

Because of the variability of the effects of conk, not only by species but by the tree species and location around the province, it is very difficult to establish with conviction any conventions which will have universal application. Mill visits and experience are essential for a scaler to learn to interpret the meaning of conk indicators. In general:

1. Conk can appear in several ways on logs and the estimates for making firmwood deductions and grading are affected by the indicators present. The location of conk knots and the diameter of rot on log ends may be used to estimate the distance that rot travels. That is, the observation of these relationships will help indicate whether the rot is getting worse down the log or "running out".
2. When conk stain or conk rot shows in log end(s) carefully look for conks on the log. Use the tine of the scale stick or a spud to dig into swollen spots, punk knots, and black knots. Size of conks is sometimes helpful in determining the extent of rot in some species.
3. Where there are two or more indications of conk, they are normally presumed to be connected.
4. If, among the enclosed rot, there is a substantial amount of firm wood that can be recovered in chips, then the defect diameter should be reduced proportionately for the firmwood volume determination.
5. In logs where conk shows in one or more knots and only a small amount of rot is present in the log end, and the scaler is positive that the rot showing in the end is not representative of the severity of the defect, then the firmwood deduction may be increased to one half the length that the conk is estimated to extend.
6. Where very large and/or numerous conks are present, an additional length deduction may be required to compensate for the "funnel" effect of the path of rot from the outside of the tree into the central cylinder of rot. In no case will this deduction exceed 0.1 m for every two knots.

5.6.3.3.2 Assessing Conk Rot; Visible Conk Knot(s), No Rot Visible

If the scaler observes conk knots but no rot shows at the ends of a log, the following conventions are commonly used:

1. Conk rot generally extends further down from a conk knot than up. Experience has shown that, in coastal regions of British Columbia, given no other indicators to the contrary, it may be presumed that the conk rot extends 2.4 m above the highest conk knot and 3.6 m below the lowest conk knot. In the interior regions of British Columbia, with different timber types, conk rot extends, on the average, 1 m above the highest conk knot and 2 m below the lowest conk knot. Where a conk knot is located closer to the top end or closer to the butt end than the above conventions, presume that the defect will travel one half the distance between the last knot and the log end.
2. When a conk knot is the only indication of conk and the severity of the rot is unknown, the firmwood deduction is calculated as one half the estimated length of the defect in coastal regions, and in interior regions, the diameter of the rot is assumed to be one-half the average diameter of the log for the full length of the defect.
3. Where there are conk knots and no sign of rot at the ends of a log, the scaler should, if possible, have the log bucked and/or observe the processing of the log to get a better idea of the internal effects of conks in their area.

5.6.3.3.3 Assessing Conk Rot; Visible Conk Knot(s), Rot Visible at One End

If a scaler observes one or more conk knots and conk rot showing in one end of a log, the following guides will serve in the assessment of the log:

1. Where conk shows in the top end of a log and there are conk knots, the rot should be run the greater distance of half the log length to a maximum of (6 m coast/ 4 m interior), or (3.6 m coast/ 2 m interior) below the last conk knot. If the last conk knot is closer to the butt end than (3.6 m coast/ 2 m interior), it may then be presumed to travel one-half the distance between the knot and the butt end.
2. Where conk shows in the butt end of a log and there are conk knots, the rot should be run the greater distance of half the log length to a maximum of (6 m coast/ 4 m interior), or (2.4 m coast/ 1 m interior) above the last conk knot. If the last conk knot is closer to the top end than (2.4 m coast/ 1 m interior), it may then be presumed to travel one-half the distance between the knot and the top end.
3. Where conk rot is visible in the butt end of a butt cut log, and there are conk knots present, the rot is treated as conk rot, not butt rot. Therefore, it is scaled as a cylinder extending from the butt end, rather than as a cone.

5.6.3.3.4 Assessing Conk Rot; No Visible Conk Knot(s), Rot Visible at One End

1. Where conk rot is visible in one end of a log and there are no conk knots present, the rot is presumed to travel half the length of the log to a maximum of 6 m in coastal regions and 4 m in interior regions.

5.6.3.4 Assessing Goitre

Goitre is a swelling or abnormal growth on the bole of a tree and rot may be associated with this defect. Internal rot seldom travels more than 1 m above and below the goitre. The volume of the rot may be assumed to be one-half of the volume of the log in the same length. For example, if the rot is estimated to travel two metres, the volume deduction will be 1 m of length. A deduction is made only when rot is present.

5.6.4 Ring Rot Conventions

1. Ring rot often does not form a complete circle. The volume should be calculated as if it were a full circle, then a factor of the circumference of the ring divided by the full circle is applied to obtain the true volume. That is, if the ring travels approximately two thirds of the way around its circumference, the "unit volume" or factor of the ring area is also two thirds of what a full circle of rot would be.
2. If there is more than one ring of rot, the firmwood deduction is taken progressively, from the outside rings to the inside rings.
3. When estimating the distance that ring rot travels down a log, use the same conventions as used in the heart rots, or conk rot, if there is evidence of conk.

5.6.5 Pocket Rot Conventions

1. Pocket rot, unlike heart rot, is not confined to growth rings and is therefore not often circular in profile. Each segment of decay may be enclosed in an area which most resembles the shape, four-sided, triangular or circular. Sections 5.1 through 5.4 define ways to enclose log segments and sectors for finding their volumes, and these same methods apply equally to irregular rot shapes. When calculating a deduction, the scaler then uses a method appropriate to the chosen shape.
2. Where multiple pockets of rot are present, and are less than 5 rads apart, experienced scalers group the individual rot volumes together visually rather than carrying out a number of discrete calculations. An example of enclosing pockets is provided in Section 5.8 (triangular defect).
3. When estimating the distance that pocket rot travels down a log, use the same conventions as used in the heart rots, including conk rot, if there is evidence of conk.

5.6.6 Sap Rot Conventions

In some scale settings, logs having sap rot for the full diameter and length of a log are scaled with the rot included in the gross scale, and the rot is deducted. This is the "gross-net" scale method. In others, the rotten sapwood, like the bark, is disregarded. This is the "net" scale method:

1. To obtain a net scale, simply measure the diameter of the sound core inside the rotten sapwood.
2. To obtain a gross-net scale, scale the outside diameter of the log, (the gross scale), scale the sound core of wood inside the rotten sapwood (the net scale). The difference between the gross scale of the outer scaling diameter and the net scale of the inner scaling diameter will be the deduction volume if no other defects are present.
3. If sap rot travels one half the length of a log, a diameter deduction (radius reduction) may be taken at one end. If it travels the full length, a diameter deduction (radius reduction) may be taken at both ends.

5.8.2.1.5 Formal Calculation - Butt Rot Visible at Both Ends of Log

Using the cone deduction formula (frustum) described in Appendix 5B, the net volume of the log is calculated to be 1.457 m³.

It is the general rule to treat butt defect as conical, and in many geographical areas, no other treatment is used. However, intimate experience with certain species and growth conditions may indicate that a neiloid (golf tee) shape or a parabaloid (bullet) shape is valid (see Figure 5.1). In these cases, different field approaches may be used for through running defects with extreme taper (the ability to use these parameters is governed by local conditions).

1. If the shape is assumed to be neiloid, average the diameters.
2. If the shape is assumed to be parabaloid, use the average of the end areas.
3. If the shape is assumed to be conoid, use one of the two following field methods.

5.8.2.1.6 Field Calculation - Length Deduction

The gross length of the log is reduced by an amount equal to the defect volume. The result is a log with a net length equal to the net volume. When conical butt rot projects through to the top end of a log it becomes a frustum of a cone. There are two field methods to arrive at the defect volume without resorting to excessive calculation:

Method 1. Determine the difference between the calipered butt diameter and twice the average collar thickness to obtain a reduced rot diameter at the butt (collar measurements are required at the butt to determine average collar thickness).

Calipered butt diameter	=	38 rads
(Measured rot diameter	=	30 rads)
Average collar thicknesses	=	$\frac{5+6}{2} = 5.5$ rads
Twice av. collar thickness	=	5.5 x 2 = 11 rads
Reduced butt rot diameter	=	38 – 11 = 27 rads

Defect volume:

Half volume of 5.0/06	=	28 dm ³
Half volume of 5.0/27	=	+ <u>573 dm³</u>
Full volume of 5.0/06/27	=	601 dm ³

Method 2. Average the top and butt defect diameters. But because the rot is conoid and taper is extreme, add 2 rads to the average. For example, where the defect diameter at the butt exceeds the defect diameter at the top by:

< = 1.5 times, use the average

> 1.5 times and < = 2 times, use the average plus 1 rad

< 2 times, use the average plus 2 rads.

$$\text{Average defect diameter} = \frac{6+30}{2} = 18 \text{ rads}$$

$$\text{Adjusted defect diameter} = 18 + 2 = 20 \text{ rads}$$

Defect volume:

$$\text{Half volume of } 5.0/20 = 314 \text{ dm}^3$$

$$\text{Half volume of } 5.0/20 = + \underline{314 \text{ dm}^3}$$

$$\text{Full volume of } 5.0/20/20 = 628 \text{ dm}^3$$

Calculate the average unit volume (AUV) of the log by adding the ten metre half volumes of the end measurements of the log and dividing by ten.

$$\text{Half volume of } 10.0/34 = 1816 \text{ dm}^3$$

$$\text{Half volume of } 10.0/38 = + \underline{2268 \text{ dm}^3}$$

$$\text{Full volume of } 10.0/34/38 = 4084 \text{ dm}^3$$

$$\text{Full volume of } 1.0/34/38 = 408 \text{ dm}^3 \text{ (AUV)}$$

Calculate the length deduction by dividing the defect volume by the average unit volume of the log:

$$\text{From method 1: } \frac{601}{408} = 1.47 \text{ m}$$

$$\text{From method 2: } \frac{628}{408} = 1.53 \text{ m}$$

The length deduction is rounded to 1.5 m and negates the difference between the two concepts in this case. It is prudent to compare the two methods from time to time; the standard for comparison is the formula for the frustum of a cone in Appendix 5B.

Calculate the net length by subtracting the length deduction from the gross length of the log.

$$5.0 - 1.5 = 3.5 \text{ m}$$

$$\text{Volume} = 1.429 \text{ m}^3 \text{ or } 1429 \text{ dm}^3$$

Record the net dimensions as 035 34 38

5.8.2.2 The Catface (Conical)

5.8.2.2.1 Example and Illustration - Single Catface

In the example illustrated on the next page (Figure 5.38), a portion of the tree's circumference has been scarred. As a result, it does not form a cylinder for part of its length. Where the catface tapers out as illustrated, the defect approximates the shape of a segment of a cone.

This log is 7 m long with a 20 rad top and a 24 rad butt. The conical catface is 4.8 m long and is 18 rads wide by 10 rads deep at the butt face.

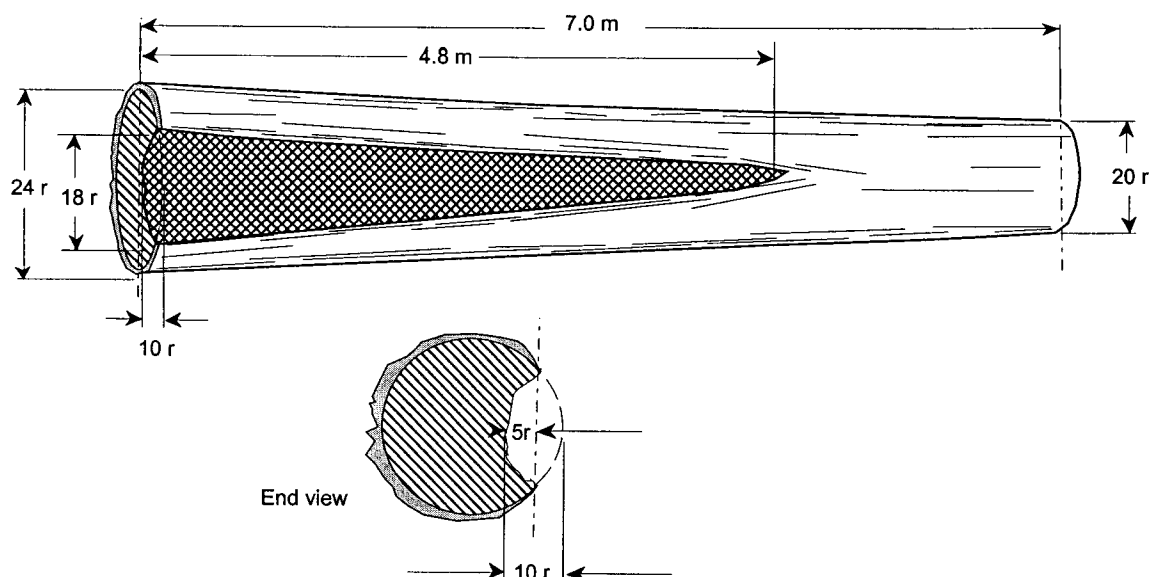


Figure 5.37 A log with conical catface.

5.8.2.2.2 Formal Calculation - Single Catface

Using the cone deduction formula described in Appendix 5, the net volume of the log is calculated to be 0.974 m³.

5.8.2.2.3 Field Calculation - Length Deduction

Calculate an end defect measurement in rads by dividing the sum of the width and height by 2.

$$\frac{10 + 18}{2} = 14 \text{ rads}$$

Calculate the defect volume by first looking up the half volume for 4.8 m 14 rads.

$$\text{Half volume of 4.0/14} = 123 \text{ dm}^3$$

$$\text{Half volume of 0.8/14} = + 25 \text{ dm}^3$$

$$\text{Half volume of 4.8/14} = 148 \text{ dm}^3$$

Next calculate the full volume by multiplying the half volume by two.

$$148 \times 2 = 296 \text{ dm}^3$$

Finally calculate the volume of the cone by dividing the cylinder volume by three.

$$\frac{296}{3} = 99$$

$$\text{Defect volume} = 99 \text{ dm}^3$$

Calculate the average unit volume of the log by adding the ten metre half volumes of the end measurements of the log and dividing by 10, or by adding the unit volumes of the measurements and dividing by 2.

$$\text{Half Volume of 10.0/24} = 905 \text{ dm}^3$$

$$\text{Half Volume of 10.0/20} = + 628 \text{ dm}^3$$

$$\text{Full Volume of 100/20/24} = 1533 \text{ dm}^3$$

$$\text{Unit volume of 010/20/24} = 153 \text{ dm}^3 \text{ (AUV)}$$

Calculate the length deduction by dividing the defect volume by the unit volume of the log.

$$\frac{99}{153} = 0.64 \text{ m}$$

Length deduction is rounded to 0.6 m.

Calculate the net length of the log by subtracting the length deduction from the gross length of the log.

$$7 \text{ m} - 0.6 \text{ m} = 6.4 \text{ m}$$

$$\text{Volume} = 0.981 \text{ m}^3 \text{ or } 981 \text{ dm}^3$$

Record the net dimensions as 064/20/24.

5.8.2.3 The Catface (Double Conical)

5.8.2.3.1 Example and Illustration - Double Catface

In Figure 5.38 a full double conical catface affects a 7 m log. A portion of the tree's stem has been scarred and does not form a cylinder for part of its length. Where the catface tapers out on both ends as illustrated, the defect approximates the shape of two cones attached at the base.

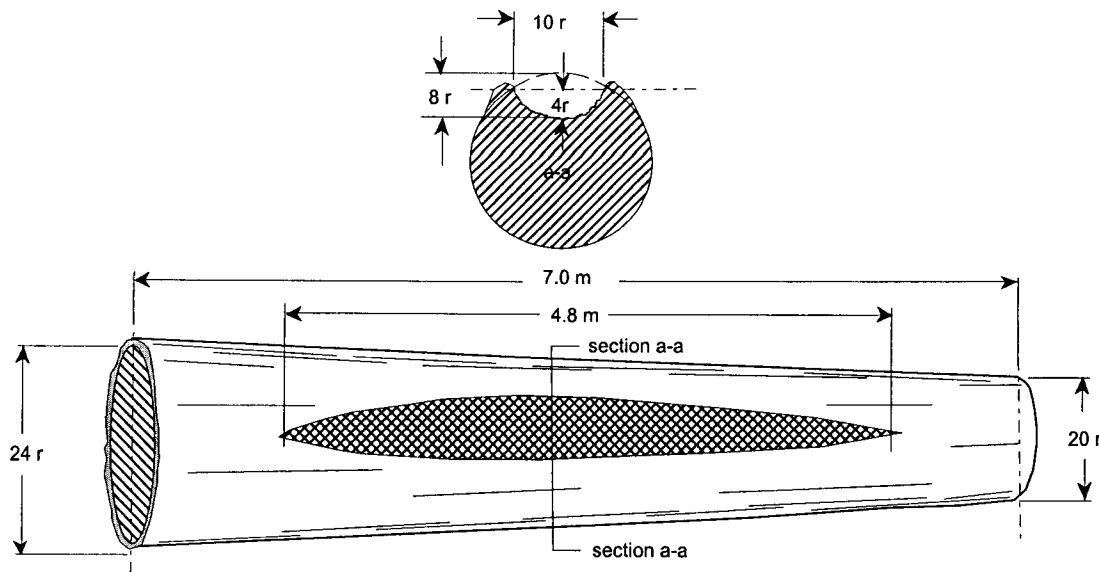


Figure 5.38 A log with a double conical catface .

5.8.2.3.2 Formal Calculation - Double Catface

Using the cone deduction formula described in Appendix 5B, the net volume of the log is calculated to be 1.032 m³.

5.8.2.3.3 Field Calculation - Length Deduction

Calculate a centre defect measurement in rads by dividing the sum of the width and height by two.

$$\frac{8 + 10}{2} = 9 \text{ rads}$$

Calculate the defect volume by looking up the half volume for the length of the defect, or 4.8 m and 9 rads.

$$\begin{aligned}
 \text{Half volume of } 4.0/09 &= 51 \text{ dm}^3 \\
 \text{Half volume of } 0.8/09 &= + \underline{10 \text{ dm}^3} \\
 \text{Half volume of } 4.8/09 &= 61 \text{ dm}^3 \\
 \text{Full volume of } 4.8/09/09 &= 122 \text{ dm}^3 \text{ (2 x half volume)} \\
 \text{Volume of cone } 4.8/09 &= \frac{122}{3} = 41 \text{ dm}^3
 \end{aligned}$$

Calculate the average unit volume of the log by adding the ten metre half volumes of the end measurements of the log and dividing by ten.

$$\begin{aligned}
 \text{Half volume of } 10.0/24 &= 905 \text{ dm}^3 \\
 \text{Half volume of } 10.0/20 &= + \underline{628 \text{ dm}^3} \\
 \text{Full volume of } 10.0/20/24 &= 1533 \text{ dm}^3 \\
 \text{Unit volume of } 1.0/20/24 &= 153 \text{ dm}^3
 \end{aligned}$$

Calculate the length deduction by dividing the defect volume by the unit volume of the log.

$$\frac{41}{153} = 0.267 \text{ m}$$

Length deduction is rounded to 0.3 m.

Calculate the net length of the log by subtracting the length deduction from the gross length of the log.

$$\begin{aligned}
 7 \text{ m} - 0.3 \text{ m} &= 6.7 \text{ m} \\
 \text{Volume} &= 1.025 \text{ m}^3 \text{ or } 1\,025 \text{ dm}^3
 \end{aligned}$$

Record the net dimensions as 067/20/24.

5.8.3 Cylindrical Defects

This method of calculation can be used for defects that have the geometrical shape of a cylinder.

This formula or combinations of this formula are used for calculating volumes of the following defects, through running heart defect, heart defect running partial length of a log, conk defect, sapwood defect, catface, dead side, missing wood, ring defect, ring shake, outside checks, and portions of collars.

5.8.3.1 Heart Defect - Through running

5.8.3.1.1 Example and Illustration - Heart Rot, Full Length

Heart rot extends completely through the log in Figure 5.39 and is measurable at both ends.

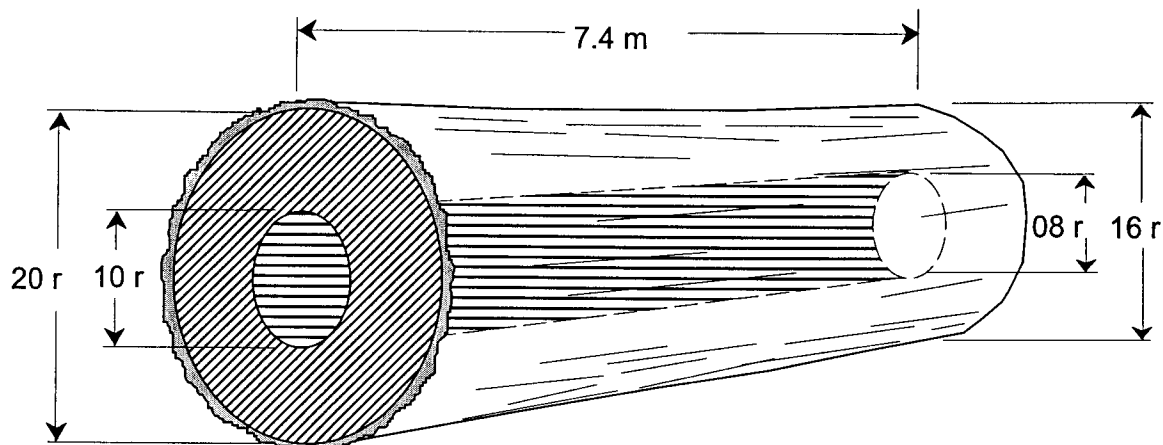


Figure 5.39 A log with through-running heart rot.

5.8.3.1.2 Formal Calculation - Heart Rot, Full Length

Using the cylinder deduction formula described in Appendix 5B, the net volume of the log is calculated to be 0.572 m^3 .

5.8.3.1.3 Field Calculation - Length Deduction

To reduce the recorded length measurement of the log to create a log with net dimensions equal to the net volume in the example, follow these steps:

With the scale stick, look up the volume of a cylinder of the diameter and length of the defect by adding the:

Top defect half volume:

$$\begin{aligned}\text{Half volume of } 7.0/08 &= 70 \text{ dm}^3 \\ \text{Half volume of } 0.4/08 &= \underline{+ 4 \text{ dm}^3} \\ \text{Half volume of } 7.4/08 &= 74 \text{ dm}^3\end{aligned}$$

to the butt defect half volume:

$$\begin{aligned}\text{Half volume of } 7.0/10 &= 110 \text{ dm}^3 \\ \text{Half volume of } 0.4/10 &= \underline{+ 6 \text{ dm}^3} \\ \text{Half volume of } 7.4/10 &= 116 \text{ dm}^3 \\ \text{Full defect volume of } 7.4/08/10 &= (74 + 116) = 190 \text{ m}^3\end{aligned}$$

Calculate the average unit volume for the log by adding the ten metre half volumes of the end measurements of the log and dividing by ten.

$$\begin{aligned}\text{Half volume of } 10.0/16 &= 402 \text{ dm}^3 \\ \text{Half volume of } 10.0/20 &= \underline{+ 628 \text{ dm}^3} \\ \text{Full volume of } 10.0/16/20 &= 1030 \text{ dm}^3 \\ \text{Full volume of } 1.0/16/20 &= 103 \text{ dm}^3\end{aligned}$$

Calculate the length deduction by dividing the defect volume by the average unit volume (the sum of the top one metre half volume and the butt one metre half volume) of the log:

$$\frac{190}{103} = 1.84 \text{ m}$$

The length deduction rounded is 1.8 m.

Calculate the net length by subtracting the length deduction from the gross length of the log.

$$\begin{aligned}7.4 - 1.8 &= 5.6 \text{ m} \\ \text{Volume} &= 0.564 \text{ m}^3 \text{ or } 564 \text{ dm}^3\end{aligned}$$

Record the net dimensions as 056/16/20.

5.8.3.1.4 Field Calculation - Diameter or Radius Deduction

Using unit volumes off the scale stick, find the unit volume for the top end measurement and subtract the unit volume of the defect.

$$\begin{array}{rcl} \text{Unit volume, top (16 r)} & = & 80 \text{ dm}^3 \\ \text{Less the unit volume, top defect (8 r)} & = & \underline{- 20 \text{ dm}^3} \\ \text{Net unit volume} & = & 60 \text{ dm}^3 \end{array}$$

Find the rad class corresponding closest to the unit volume of 60 dm^3 , which is 14 rads.

Calculate the unit volume for the butt end measurement and subtract the unit volume of the butt end defect.

$$\begin{array}{rcl} \text{Unit volume Butt (20 r)} & = & 126 \text{ dm}^3 \\ \text{Less unit volume Butt defect (10 r)} & = & \underline{- 31 \text{ dm}^3} \\ \text{Net unit volume} & = & 95 \text{ dm}^3 \end{array}$$

Find the rad class corresponding closest to the unit volume of 95 dm^3 , which is 17 rads.

The volume corresponding to the net dimensions of 7.4 m by 14 r by 17 r is 565 dm^3 .

Record the net dimensions as 074/14/17.

Use the diameter or radius deduction method only if heart defect or hole runs the full length or exactly half the length of the log.

5.8.3.2 Heart Defect - Partial Length of the Log

5.8.3.2.1 Example and Illustration - Heart Rot, Partial Length

The heart rot visible at the top end of the log shown in Figure 5.40 is estimated to travel 4.0 m and the diameter of the rot is assumed to be the same at both ends (10 rads). Although not demonstrated in this example, the diameter deduction method may be used if rot is assumed to travel exactly half-way or is through running.

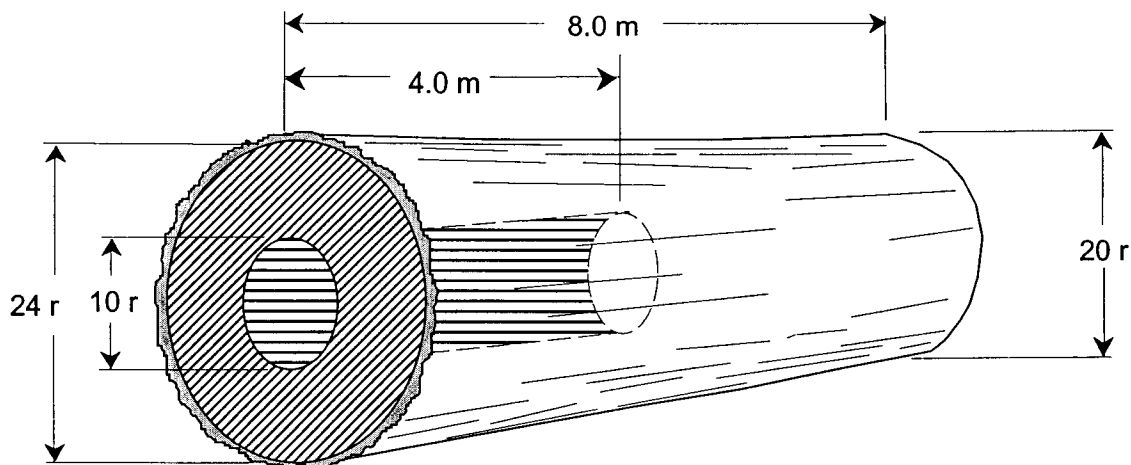


Figure 5.40 A log with partial length heart rot.

5.8.3.2.2 Formal Calculation - Heart Rot, Partial Length

Using the cylinder deduction formula described in Appendix 5B, the net volume of the log is calculated to be 1.100 m³.

5.8.3.3.3 Field Calculation - Length Deduction

Three steps are required for a ring defect deduction. Using the same methods as for heart rot:

1. Find a volume using the outside diameters and length of the ring.
2. Find the volume of the sound core using the inside diameters of the ring.
3. Subtract the volume of the sound core to get the volume of the outside ring (Step 2 minus Step 1).

To reduce the gross length of the log to create a log with net dimensions equal to the net volume in the above example:

Calculate the volume of the defect using the outside and inside diameters of the defect.

Outside diameter cylinder volume:

$$\begin{aligned}
 \text{Half volume of 12.0/24} &= 1086 \text{ dm}^3 \\
 \text{Half volume of 12.0/20} &= \underline{+ 754 \text{ dm}^3} \\
 \text{Full volume of 12.0/20/24} &= 1840 \text{ dm}^3
 \end{aligned}$$

Inside diameter cylinder volume:

$$\begin{aligned}
 \text{Half volume of 12.0/20} &= 754 \text{ dm}^3 \\
 \text{Half volume of 12.0/16} &= \underline{+ 483 \text{ dm}^3} \\
 \text{Full volume of 12.0/16/20} &= 1237 \text{ dm}^3
 \end{aligned}$$

Volume of defect equals outside cylinder volume minus inside cylinder volume.

$$\text{Defect volume} = 1840 - 1237 = 603 \text{ dm}^3$$

A percentage factor may be applied at this point for a partial ring defect (i.e., if the ring arc forms only one third of the circumference, multiply the above volume by 0.33 or 33 percent).

Calculate the unit volume for the log by adding the ten metre half volumes of the end measurements of the log and dividing by 10.

$$\begin{aligned}
 \text{Half volume of 10.0/27} &= 1145 \text{ dm}^3 \\
 \text{Half volume of 10.0/35} &= \underline{+ 1924 \text{ dm}^3} \\
 \text{Full volume of 10.0/27/35} &= 3069 \text{ dm}^3 \\
 \text{Full volume of 01.0/27/35} &= 307 \text{ dm}^3
 \end{aligned}$$

Calculate the length deduction by dividing the defect volume by the unit volume of the log:

$$\frac{603}{307} = 1.964 \text{ m}$$

The length deduction rounded is 2 m.

Calculate the net length by subtracting the length deduction from the gross length of the log.

$$\text{Net Length} = 12 \text{ m} - 2 \text{ m} = 10 \text{ m}$$

$$\text{Volume} = 3.069 \text{ m}^3 \text{ or } 3069 \text{ dm}^3$$

Record the net dimensions as 100/27/35.

5.8.3.4 Ring Defect - Partial Length of Log

5.8.3.4.1 Example and Illustration - Ring Rot, Partial Length

Ring rot is visible at only one end of the log in Figure 5.42. Because there are no other indicators, the rot is estimated to travel one half the length of the log and the ring's inner and outer diameters are assumed to be the same at both ends.

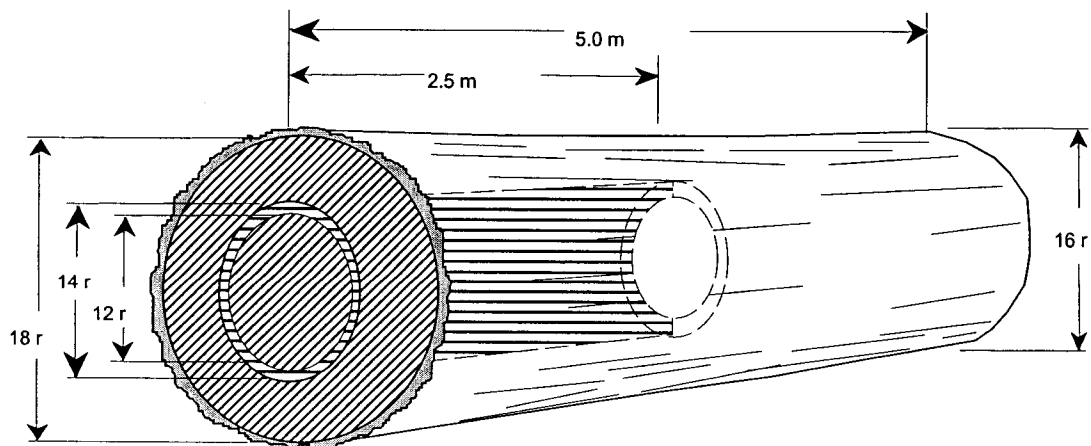


Figure 5.42 A log with partial length ring rot.

5.8.3.4.2 Formal Calculation - Ring Rot, Partial Length

Using the same cylinder deduction formulas described in Appendix 5B, the net volume of the log is calculated to be 0.415 m³.

5.8.3.4.3 Field Calculation - Length Deduction

To reduce the gross length of the log to create a log with net dimensions equal to the net volume in the above example:

Calculate the volume of the defect using the outside and inside diameters of the defect.

Outside diameter cylinder volume:

$$\begin{aligned}
 \text{Half volume of 020/14} &= 62 \text{ dm}^3 \\
 \text{Half volume of 005/14} &= + 15 \text{ dm}^3 \\
 \text{Half volume of 025/14} &= 77 \text{ dm}^3 \\
 \text{Full volume of 025/14} &= 154 \text{ dm}^3 (2 \times \text{half volume})
 \end{aligned}$$

Inside diameter cylinder volume:

$$\begin{aligned}
 \text{Half volume of 020/12} &= 45 \text{ dm}^3 \\
 \text{Half volume of 005/12} &= + 11 \text{ dm}^3 \\
 \text{Half volume of 025/12} &= 56 \text{ dm}^3 \\
 \text{Full volume of 025/12} &= 112 \text{ dm}^3 (2 \times \text{half volume})
 \end{aligned}$$

Volume of defect equals outside diameter cylinder volume minus inside diameter cylinder volume.

$$\text{Defect volume} = 154 - 112 = 42 \text{ dm}^3$$

A factor may be applied at this point for a partial ring defect (i.e., if the ring arc forms only one half of the circumference, multiply the above volume by 0.5 or 50 percent).

Calculate the unit volume for the log by adding the ten metre half volumes of the end measurements of the log and dividing by 10.

$$\begin{aligned}
 \text{Half volume of 10.0/16} &= 402 \text{ dm}^3 \\
 \text{Half volume of 10.0/18} &= + 509 \text{ dm}^3 \\
 \text{Full volume of 10.0/16/18} &= 911 \text{ dm}^3 \\
 \text{Full volume of 01.0/16/18} &= 91 \text{ dm}^3
 \end{aligned}$$

Calculate the length deduction by dividing the defect volume by the average unit volume of the log:

$$\frac{42}{91} = 0.46 \text{ m}$$

The length deduction is rounded to 0.5 m.

Find the net length by subtracting the length deduction from the gross length of the log.

$$5.0 \text{ m} - 0.5 \text{ m} = 4.5 \text{ m}$$

$$\text{Volume} = 0.410 \text{ m}^3 \text{ or } 410 \text{ dm}^3$$

Record the net dimensions as 045/16/18.

5.8.3.5 Sap Rot

The log in Figure 5.43 was bucked from a windfall tree and has been lying on the ground long enough for fungi to have eaten into the sap wood 2 rads deep at the butt end and between 1 and 2 rads deep at the top end.

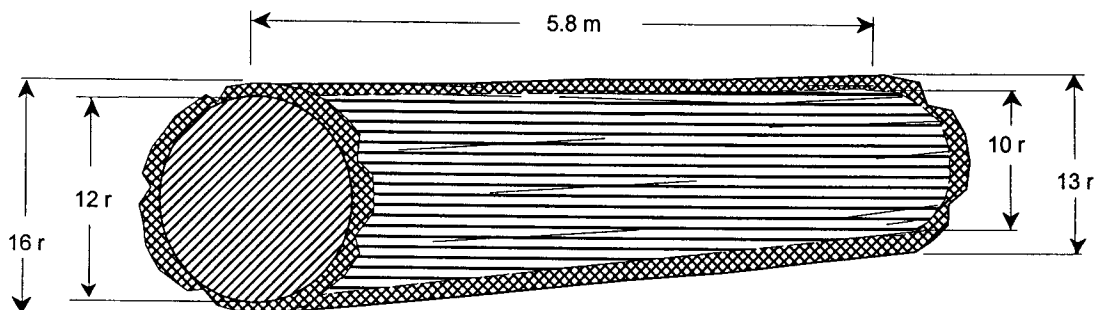


Figure 5.43 A log with sap rot.

5.8.3.5.1 Formal Calculation - Sap Rot

Using the cylinder deduction formulas described in Appendix 5B, the net volume of the log is calculated to be 0.222 m^3 .

5.8.3.5.2 Field Calculation - Diameter Deduction

This method simply ignores the sap rot and uses the diameters of the sound core of wood to find the net volume and recorded net dimensions. Although very simple to apply, it is a "net" method, and does not provide users of scale data with any information about the rot. Scalers using "gross-net" scale may use the length deduction method demonstrated next, to provide additional information on the gross dimensions and volume of the log, the volume of the rot, and the net dimensions and volume.

Using the diameters of the firm core inside the rot:

Calculate the half volume of the top net inner cylinder:

$$\begin{aligned} \text{Half volume of 050/10} &= 79 \text{ dm}^3 \\ \text{Half volume of 008/10} &= + \underline{13 \text{ dm}^3} \\ \text{Half volume of 058/10} &= 92 \text{ dm}^3 \end{aligned}$$

Calculate the half volume of the butt net inner cylinder:

$$\begin{aligned} \text{Half volume of 05.0/12} &= 113 \text{ dm}^3 \\ \text{Half volume of 00.8/12} &= + \underline{18 \text{ dm}^3} \\ \text{Half volume of 05.8/12} &= 131 \text{ dm}^3 \end{aligned}$$

Add the half volume of the top cylinder to the half volume of the butt cylinder:

$$\begin{aligned} 92 + 131 &= 223 \\ \text{Full volume of 05.8/10/12} &= 223 \text{ dm}^3 \\ \text{Volume} &= 0.223 \text{ m}^3 \text{ or } 223 \text{ dm}^3 \end{aligned}$$

Record the net dimensions as 058/10/12.

5.8.3.5.3 Field Calculation - Length Deduction

Although more difficult to apply, method is a "gross-net" method, with the advantage of providing users of scale data with more information about the rot. Scalers using "gross-net" scale use this method, rather than the diameter deduction method described above, to provide additional information on the gross dimensions and volume of the log, the volume of the rot, and the net dimensions and volume.

Therefore, the volume of defect equals outer gross cylinder volume minus inner net cylinder volume, and to find it:

Calculate the gross top half volume of the outer cylinder:

$$\begin{aligned} \text{Half volume of } 05.0/13 &= 133 \text{ dm}^3 \\ \text{Half volume of } 00.8/13 &= \underline{+ 21 \text{ dm}^3} \\ \text{Half volume of } 05.8/13 &= 154 \text{ dm}^3 \end{aligned}$$

Calculate the gross butt half volume of the outer cylinder:

$$\begin{aligned} \text{Half volume of } 05.0/16 &= 201 \text{ dm}^3 \\ \text{Half volume of } 00.8/16 &= \underline{+ 32 \text{ dm}^3} \\ \text{Half volume of } 05.8/16 &= 233 \text{ dm}^3 \end{aligned}$$

Add the half volumes to find the full volume of the outer cylinder:

$$\begin{aligned} \text{Full volume of } 058/13/16 &= 387 \text{ dm}^3 \\ \text{Less the inner cylinder volume:} &= \underline{- 223 \text{ dm}^3} \\ \text{Equals the defect volume} &= 164 \text{ dm}^3 \end{aligned}$$

Find the average unit volume of the log using the gross diameters:

$$\begin{aligned} \text{Unit volume } 13 &= 53 \text{ dm}^3 \\ \text{Unit volume } 16 &= \underline{+ 80 \text{ dm}^3} \\ \text{Total} &= 133 \text{ dm}^3 \\ \text{Divide by } 2 = \text{AUV} &= 66 \text{ dm}^3 \end{aligned}$$

Find the length deduction:

$$\text{Divide the rot volume by unit volume} = 164/66 = 2.484 \text{ rounded to } 2.5$$

Subtract the length deduction from the gross length

$$\begin{aligned} 5.8 - 2.5 &= 3.3 \text{ m} \\ \text{Volume} &= 221 \text{ dm}^3 \end{aligned}$$

Record the net dimensions as: 033/13/16.

Notes:

5.8.4 Cubical Defects

5.8.4.1 Pocket Defect - Through-running

5.8.4.1.1 Example and Illustration - Pocket Defect, Through-running

The log in Figure 5.44 is infected with a type of rot which forms in pockets rather than following the growth rings. Its shape is closer to being rectangular than circular.

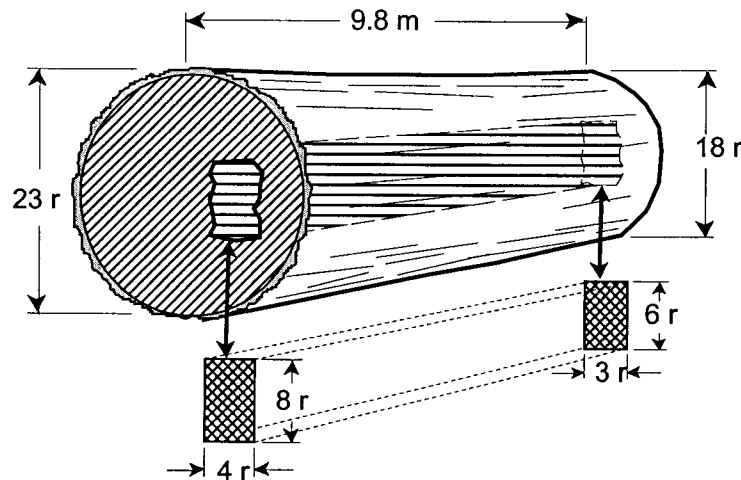


Figure 5.44 A log with through-running pocket rot.

5.8.4.1.2 Formal Calculation - Pocket Rot, Through Running

Using the four-sided prism or "rectangular box" deduction formulas described in Appendix 5B, the net volume of the log is calculated to be 1.215 m³.

5.8.4.1.3 Field Calculation - Length Deduction

To reduce the gross length measurement of the log to create a log with net dimensions equal to the net volume in the example, the defect is enclosed in a box representing the area of the defect. The measurements section of this chapter provides detailed information on enclosing irregular defects and determining representative dimensions. An example of grouping multiple pockets into a unit is provided in Section 5.8.5.3, where three individual pockets of rot are enclosed in a triangular shape.

5.8.4.2 Pocket Defect - Partial Length of the Log

The log in Figure 5.45 is infected with a heart rot in the shape of a pocket, and it is estimated to travel 2.4 m  .

5.8.4.2.1 Example and Illustration - Pocket Rot, Partial Length

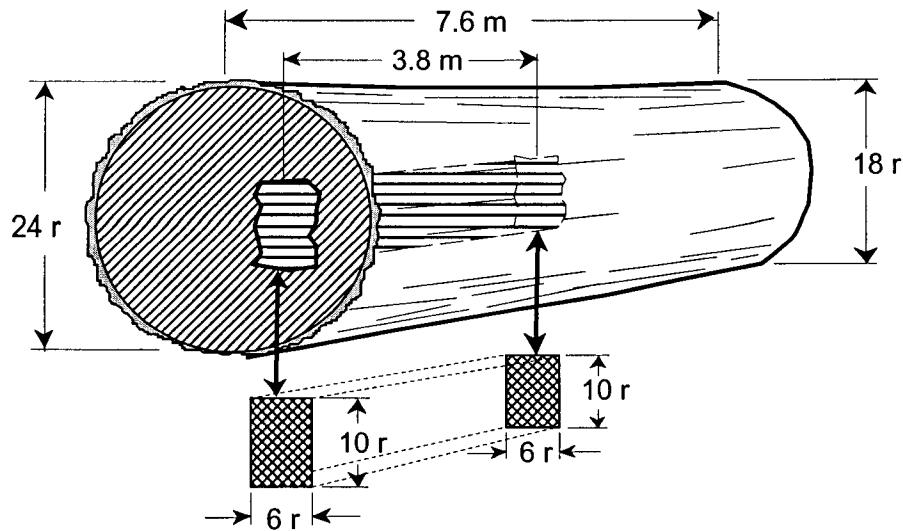


Figure 5.45 A log with partial-length pocket rot.

5.8.4.2.2 Formal Calculation

Using the cubical or "rectangular box" deduction formulas described in Appendix 5B, the net volume of the log is calculated to be 1.038 m³.

5.8.4.2.3 Field Calculation - Length Deduction

To reduce the gross length measurement of the log to create a log with net dimensions equal to the net volume in the example, the defect is enclosed in a box representing the area of the defect. The measurements sections of this chapter provides detailed information on enclosing irregular defects and determining representative dimensions.

In the case of multiple scattered pockets (5 rads or more apart) pockets or pipes, calculate the volume of each one and add them together. Where there are several small close pockets (less than 5 rads apart), visually group them together and use one measurement. An example is provided in Section 5.8.5.3.

Calculate the unit volumes of the defect ends by multiplying the height by the width by the factor of 0.4 to convert the end area of the defect from "square rads" to unit volumes, and multiply by the defect length to obtain the defect volume.

$$\text{Unit volume} = 6 \text{ R} \times 10 \text{ R} \times 0.4 = 24 \text{ dm}^3$$

$$\text{Defect Volume} = 24 \text{ dm}^3 \times 3.8 \text{ m} = 91 \text{ dm}^3$$

Calculate the average unit volume for the log by adding the unit volumes and dividing by two:

$$\text{unit volume of 18} = 102 \text{ dm}^3$$

$$\text{unit volume of 24} = \underline{+ 181 \text{ dm}^3}$$

$$\text{Sum of unit volumes} = 283 \text{ dm}^3$$

$$\text{Average unit volume} = 141.5 = 142 \text{ dm}^3$$

Calculate the length deduction by dividing the defect volume by the average unit volume of the log.

$$\frac{91}{142} = 0.641 \text{ m}$$

Length deduction is rounded to 0.6 m.

Calculate the net length by subtracting the length deduction from the gross length of the log.

$$7.6 - 0.6 = 7.0 \text{ m}$$

$$\text{Volume} = 0.989 \text{ m}^3 \text{ or } 989 \text{ dm}^3$$

Record the net dimensions as 070/18/24.

5.8.5 Other Defects

5.8.5.1 Missing Segments

Missing wood can take many forms. This example demonstrates the use of a percentage factor to represent the missing part, but any of the other methods described previously will serve just as well if they are more representative of the shape of the defect.

5.8.5.1.1 Example and Illustration - Missing Wood

The defect shown in Figure 5.46 is typical of missing wood. Such defects as burn saddles or charred wood could also apply to this example, and in this case, the missing portion is equal to 50 percent or $1/2$ the diameter of the log for 4.8 m.

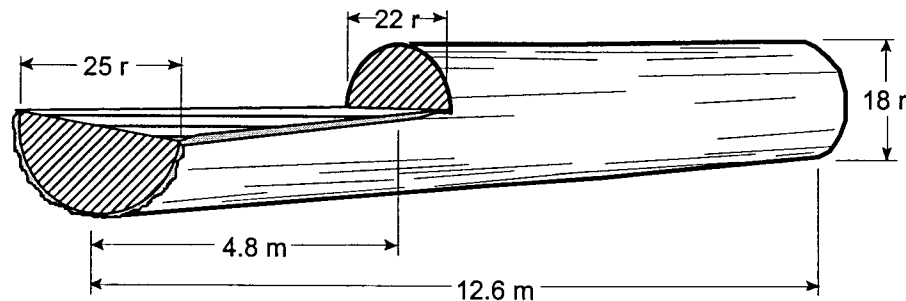


Figure 5.46 A log with missing segment.

5.8.5.1.2 Formal Calculation - Segment Defect

Using the cylindrical deduction formula with factor as described in Appendix 5B, the net volume of the log is calculated to be 1.460 m^3 .

5.8.5.1.3 Field Calculation - Length Deduction

To reduce the recorded length measurement of the log to create a log with net dimensions equal to the net volume in the example, first look up the volume of a cylinder of the diameter and length of the log affected by the defect.

The half volume at the upper limit of the defect:

$$\text{Half volume of 04.0/22} = 304 \text{ dm}^3$$

$$\text{Half volume of 00.8/22} = \underline{+ 61 \text{ dm}^3}$$

$$\text{Half volume of 04.8/22} = 365 \text{ dm}^3$$

Plus the half volume at the lower limit of the defect:

$$\text{Half volume of 04.0/25} = 393 \text{ dm}^3$$

$$\text{Half volume of 00.8/25} = \underline{+ 79 \text{ dm}^3}$$

$$\text{Half volume of 04.8/25} = 472 \text{ dm}^3$$

equals the full volume of the portion of the log affected by the defect:

$$\text{Full volume of 4.8/22/25} = (365 + 472) = 837 \text{ dm}^3$$

multiplied by the percentage missing, is the volume of the defect:

$$\text{Volume of defect} = 837 \times 0.5 = 418.5 = 418 \text{ m}^3$$

Calculate the average unit volume for the log by adding the ten metre half volumes of the end measurements of the log and dividing by 10 or by adding the unit volumes and dividing by 2.

$$\text{Half volume of 10.0/18} = 509 \text{ dm}^3$$

$$\text{Half volume of 10.0/25} = \underline{+ 982 \text{ dm}^3}$$

$$\text{Full volume of 10.0/18/25} = 1491 \text{ dm}^3$$

$$\text{Unit volume of 010/18/25} = 149 \text{ dm}^3$$

Calculate the length deduction by dividing the defect volume by the unit volume:

$$\frac{418}{149} = 2.805 \text{ m}$$

The length deduction rounded is 2.8 m.

The amount of lumber lost due to deep checks is increased if they are combined with spiral grain. The most common situations where spiral checks occur are in logs with frost checks and in snags. The check wraps around the log, following the grain slope. Delays in presenting logs for scaling, such as leaving logs in the woods or in cold decks, often result in a type of surface check known as weather checks or sun checks, which are caused by rapid seasoning. These checks are usually about twice in depth at the ends of the log than elsewhere on the log, because the apex is where the fastest drying occurs, and observation of the log ends will tend to overestimate the overall penetration of the check.

Surface and end checks due to delays in processing are disregarded for the purposes of grading. The Forest Service may order that surface checks be ignored.

Breakage (splits and shatter), as a consequence of normal harvesting and log handling operations must be accounted for in the process of grading.

6.3.1.2 Bark Seams

Bark seams are formed as a result of bark enclosing a point on the outside of a tree which has no wood growth, so that over time a seam of bark is left extending inward from the edge of the tree. Lumber and veneer cannot be recovered from the area of the seam. The volume of firmwood that cannot be manufactured because of bark seams must be determined by blocking out the end area of the wood lost for product recovery and multiplying the cross sectional area by the length of the seam.

6.3.1.3 Sweep, Crook and Pistol Grip

Sweep is a bow like bend in the trunk of a tree, whereas crook is a definite kink at one point in the stem as a result of the tree losing its leader. Pistol grip is a pronounced bend at the butt end of a log resembling the handle of a pistol and is often seen on trees growing on steep sidehills. All three reduce the amount of product that can be recovered. Crook also frequently accompanies a firmwood loss since decay fungi may have entered the stem through the broken leader. The volume of wood that cannot be manufactured because of sweep, crook, or pistol grip must be estimated.

6.3.1.4 Rot, Hole, Char, and Missing Wood

Rot is caused by a variety of fungi which break down and feed off the lignin and/or cellulose in the wood. Hole is rot in its final stages. Char is wood that has been reduced or severely weakened by combustion or extreme heat exposure. Rot is the most common firmwood defect for which a grade reduction must be made.

The rot fungus typically enters the tree through a root, a broken branch, a damaged leader or a scar on the stem. The remains of an old scar, a damaged leader, a crook or fork in a log often means rot is present. Scalers must carefully inspect all visible log surfaces for indicators of firmwood defects. Logs cut from older trees are more likely to contain rot, especially logs cut from tree species such as cedar, hemlock and balsam which are more susceptible to attack by fungi.

No firmwood deductions are made for stain (incipient decay), as long as the wood is still firm, but it may be a consideration in assessing coast grades. If bits or fragments of wood can be picked more easily with the tine of the scale stick from the area in question than from the surrounding area, then the wood is rotten, not firm, and both a firmwood deduction and a grade reduction is made (see Chapters 4 and 5).

In grading, the scaler must estimate how much the rot will reduce the percentage of the log that can be manufactured. Some of the sound wood adjacent to the rot is also lost to lumber production since the sawyer must square out around the defect. To account for this additional loss a trim allowance around the defect is usually made.

The scaler must also consider collars and shells of firmwood which surround defects as well as logs and log segments, which are too short to manufacture the products assumed in the grade rules. Section 6.4.2 details the methods of grading for log characteristics which reduce product recovery.

6.3.2 Log Characteristics Which Reduce Product Quality

In addition to the defects that reduce the potential product recovery volume, some log characteristics reduce the quality of the products which may be recovered. These characteristics include twist (or spiral grain) and knots.

6.3.2.1 Twist (Spiral Grain)

As trees grow they often spiral about their central axis. When these twisted trees are manufactured into lumber, slope of grain may affect strength, and therefore the quality of the lumber. When twist is excessive, no merchantable lumber can be milled from a log. Where other, *quantity* reducing, defects which follow the grain such as spiral surface checks occur in conjunction with twist, the loss in terms of product recovery caused by those defects is greatly increased.

Twist must be measured where it is representative, given what the scaler can see and assumptions may not be made about portions of a log not visible. Areas around large knots, knot clusters, crooks, forks, burls and other irregularities are not representative and must be avoided. Twist may also show a general change over the length of a log.

Grain deflection is expressed as a percentage of log diameter using the measurement perpendicular to the longitudinal axis of a log. In coast grading it is the top diameter, and in interior grading it is the top diameter for logs up to and including 8 m and the measured mid-point diameter for logs over 8 m. For example, a 5 m log with a 24 rad top showing 3 rads of deflection over 15 rads length, has 12.5 percent twist ($3/24 * 100 = 12.5\%$).

To avoid “half-rads” scalers may use centimetres. For example, a 24 rad top showing 4.5 rads of grain deflection is calculated as $9/48 * 100 = 18.75\%$.

The application of these principles is detailed in Section 6.4. Twist allowances for specific log grades are detailed in Sections 6.5 and 6.6.

6.3.2.2 Knots

The size, type, and distribution of knots have a significant impact on lumber quality. As such, knots are a key consideration in applying the grade rules.

6.3.2.2.1 Size of Knots

The presence of any knots in lumber disqualifies it from being classified as clear. Knots larger than 1 rad will lower the strength of lumber and hence the amount of merchantable lumber cut. The larger the knot size, the greater the grain deflection, causing cross grain in the region of the knot. Extremely large knots will make the cutting of merchantable lumber impossible. Knot size is measured in centimetres or rads of diameter.

Individual grade definitions specify maximum knot sizes by top diameter class. In the interior, an exception is made for logs over 8 m in length where both the top diameter and midpoint diameters are referred to for knot assessment. For these longer, interior logs the top half is assessed using the top diameter while the bottom half is assessed against the measured mid point diameter.

6.3.2.2.2 Types of Knots

Knots in timber are sound or rotten, and tight or loose.

Sound knots may be tight or loose, and lumber sawn from logs with sound, tight knots is generally of a higher quality than lumber with loose knots or rotten knots.

Rotten knots in timber occur when there are broken and dead branches in trees as these represent an entry point for fungus spores, which lead to decay. Rotten knots can be indicators of internal decay; the appearance of log ends that have been bucked through, or adjacent to such knots serve as good evidence of the general pattern of decay characteristics for a particular timber stand and species.

Tight knots are found where the branches on the tree were still living or green when the tree was harvested. The tissue system of the branch is interconnected or intergrown with the tissue of the log, and the grain orientation in the trunk wood is laterally distorted around the knot and passes in a wide sweep on either side. In lumber grading, these are also known as intergrown or red knots.

When a branch dies, the cambium in the branch ceases to function, and there is a break in the continuity of the woody tissue between the branch and the stem. The portion of the branch base that is embedded in the tree trunk after the branch dies causes a loose, encased, or black knot in lumber. Since the wood of the tree trunk is not continuous with that of the encased knot, there is less distortion of the grain around it than with tight knots.

Considering knots in the application of the grading rules is covered under Section 6.4.3.1.

6.3.2.2.3 Distribution of Knots

The distribution of knots in logs is determined by the growth characteristics of the tree.

After getting established, coniferous trees typically grow 0.2 to 1 m per year depending on the species and suitability of the growing site. When the tree matures, apical or upward growth decreases significantly. As balsam, fir, pine, spruce and larch grow, they add a whorl of branches at the start of each year. Normal branch distribution in small diameter stems sees whorls spaced between 0.3 and 0.5 m apart. Red cedar, yellow cedar, and hemlock branches are not produced in regular whorls. Instead, their branches are spaced on the stems of young trees 0.3 to 0.5 m apart.

After a tree reaches mature height, additional branch whorls are still added each year but the branches are much closer together. Sometimes trees produce a number of branches in a bunch, resulting in a cluster of knots in the wood. A close grouping of knots (cluster knots or bunch knots) reduces the strength of the lumber cut from that portion of the log containing the cluster or bunch of knots.

The volume of the log not available for the manufacture of lumber or the other products is the grade reduction volume. In applying the grading rules, the scaler must deduct this volume from the gross log volume and express the remaining volume as a percentage of the gross volume. This percentage represents the percentage of the log which can be manufactured.

$$\% \text{ Suitable for Manufacture} = \frac{\text{Gross Volume} - \text{Grade Reduction}}{\text{Gross Volume}} \times 100$$

Determining the grade reduction volume and calculating the percentage suitable for product recovery, while not difficult, can be time consuming. As scalers gain experience and complete numerous grade reduction calculations, they become proficient at estimating grade reductions.

Experienced scalers usually find it necessary to perform only periodic full calculations for confirming their estimates and determining grades on borderline logs.

Experienced scalers follow a number of approaches to avoid needless calculations:

- they look for obvious tree characteristics which may impact the grade (e.g., excessive knots or twist will considerably narrow a logs grade potential), and
- they understand the relationship between certain defects and log size (e.g., a 2 rad surface check on a small log may have a very significant impact compared to the same check on a large log).

These types of judgements become second nature to experienced scalers. Initially, scalers are strongly advised to calculate all grade reductions. It is only through such a background of disciplined practice that "log sense" and good judgement will develop.

While this log sense is never really lost, it can be weakened by periods of inactivity and even highly experienced scalers should periodically reconfirm their skills especially after periods of layoff.

6.4.1.1 Field Methods for Determining Grade Reduction

Instead of using a full metric volume approach with Smalian's formula, shortened field methods may also be used to estimate grade reduction. Field methods such as that outlined in Appendix 6A reduce scaling time and the number of calculations, and at the same time can yield reliable results.

The reliability of field methods is dependent upon the specific characteristics of the logs being scaled.  

As such, it is most important for scalers to know the limitations and range of application of field methods if they are contemplating their use.

Coastal timber types and piece scale production scaling support the use of field methods to estimate grade reduction. The field methods contained in Appendix 6A are considered reliable for the purpose of applying the Coastal Schedule of Timber Grades.

Interior timber types are generally characterized as having more taper than coastal timber. Using field methods which do not account for taper (known as linear methods) may not yield the same results as methods which employ a full metric volume approach using Smalian's formula (known as volumetric methods). Where linear and volumetric methods yield different grade reductions, the volumetric method is deemed to be correct.

6.4.2 Assessing Product Recovery

Grade rules require that a certain specified percentage of the gross log volume must be available for manufacture. This requires the grade reduction volume to be calculated. The net log volume, available for manufacture, must then be calculated and expressed as a percentage of the logs gross volume.

The official methods and field methods for calculating grade reduction are similar to those used for determining firmwood deduction. Scalers should carefully study Chapter 5 and practice these procedures on logs until they are thoroughly understood.

Except for logs with sap rot or char, which are otherwise sound, the grade reduction volume is always larger than the firmwood deduction volume. There are three reasons for this:

- there are a number of defects such as fractures, bark seams, goitre, sweep, and crook that reduce product recovery but do not cause firmwood loss,
- additional defect free volume around the allowable defects (i.e., the trim) is lost in the manufacturing process, and
- while the firmwood loss is related only to the size of the defect, the grade reduction loss is also dependent upon the orientation of the defects in the log. That is, a defect may be so positioned as to render additional log segments too short or may cause the residual collar (log shell) to be too thin for manufacture.

The following sub-sections detail grade reductions which affect lumber recovery.

6.4.2.1 Determining Grade Reduction for Collars (Shells)

Where logs have heart defects, the collar or shell of sound wood surrounding the defect must meet a minimum thickness requirement in order for lumber or shingles to be cut from it, according to the following specifications:

1. The minimum collar thickness specified is the actual unrounded measurement of the collar taken before trim allowance has been added to the defect.
2. For all coast species, the minimum collar or shell thickness needed in order to produce lumber is *5 rads (10 cm)*. This applies to all collars surrounding internal (heart) defects such as heart rot, pocket rot, holes, ring rot, ring shake, water shake, and star shake.
3. For all interior species, the minimum outer collar thickness is *7.5 rads (15 cm)* for heart rot, holes, and star shakes only. For pocket rot, ring rots, ring shake and water shake in these species the minimum collar thickness is *5 rads (10 cm)*.
4. Where a collar or a portion of a collar does not meet the minimum thickness requirement, the volume of the collar or portion must be included in the grade reduction. An exception is where the diameter of the defect is 20 percent or less than the diameter of the log end in which it appears. In such cases, the collar is deemed to be thick enough to cut lumber, so trim allowance is added to the defect measurement and the grade reduction is then calculated. This rule is used to prevent unreasonable down grading of smaller diameter logs with a very small core of heart rot. Only logs up to  12 rads in diameter (with 5 rad collar requirement) or logs up to  18 rads in diameter (with 7.5 rad collar requirement) are affected.

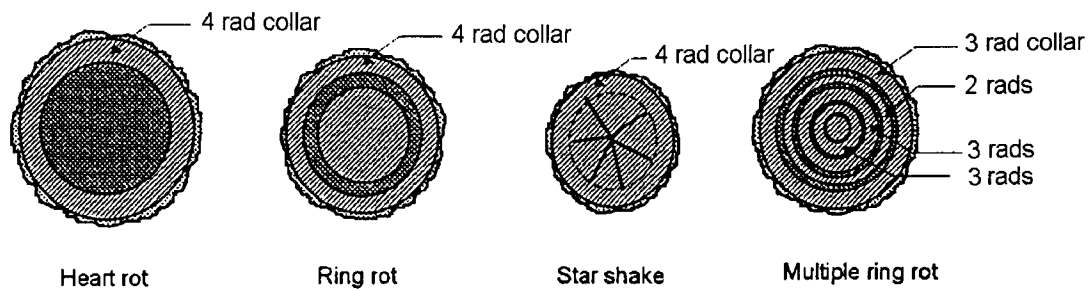
Scalers must exercise care when measuring or estimating collar thickness by taking actual, unrounded measurements of the collar. It is tempting to simply subtract the defect diameter from the recorded log diameter and divide the difference by two, but this method of averaging the collar thickness can lead to mistaken assumptions. For example:

- on logs with excessive butt flare, this method will often considerably underestimate the true collar thickness since the butt diameter has been reduced by calipering to compensate for the flare, but the defect is not. Experience has shown that defects usually follow the growth rings, so it is more reasonable to presume that if there is collar at the end of a log, there will still be collar at the point where the log was calipered, and
- on logs which have an off-centre defect, this method will not reflect the possibility that a portion of the log will or will not meet the grade requirement. For example, in Figure 6.10(1) the off-centre star shake has a portion with sufficient collar and a portion without. By averaging, a scaler may not take a grade reduction when one is available, and may take an excessive reduction when a portion of the collar actually does meet the grade requirement.

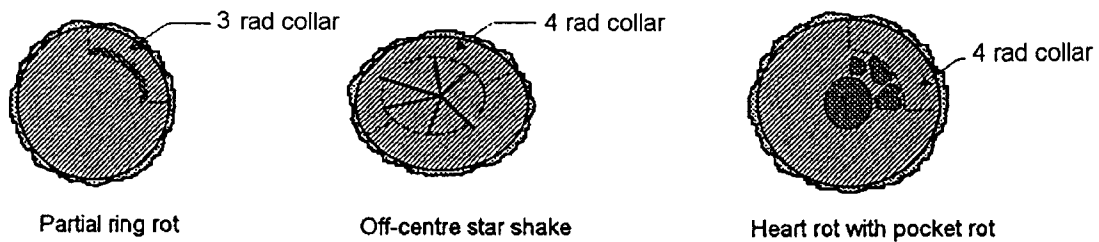
The following conventions are used to help ensure consistency in assessing collars:

- collar thickness is obtained by direct measurement of the collar with the scale stick at the log end in which the defect appears, including flared butt logs,
- if adequate collar is found on the cut face of a flared butt log, there will be adequate collar where the butt diameter was calipered,
- where a defect runs a partial length of a log, the measured collar thickness is presumed to hold true for the entire length affected by the defect, except for cone shaped defects (butt rot),
- where a defect runs the full length of a log, the collar determination made at each end is presumed to hold true for half the length of the log, and
- where a defect is located so that merely a portion of a collar is below the minimum requirement, only that portion is considered grade reduction and added to any other grade reduction.

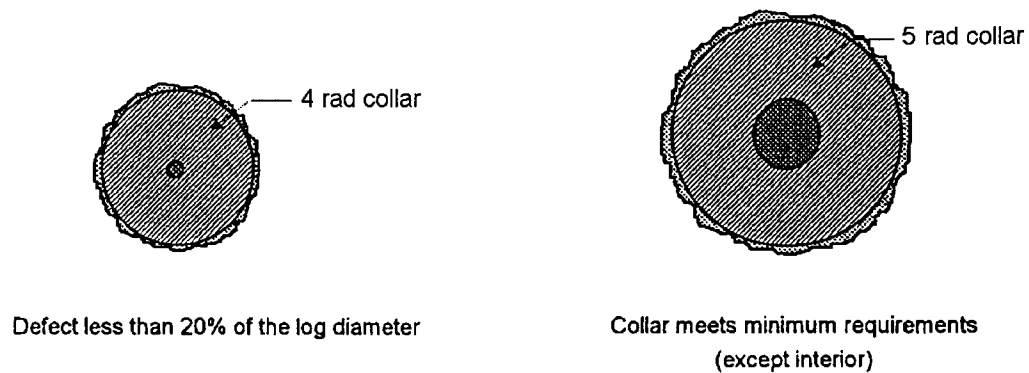
Collar thickness principles are provided in Figure 6.1, without showing trim allowance. Trim allowance is added *after* any collar assessments and is described fully in Section 6.4.2.5.



1. Examples of logs with entire collars too thin to produce lumber



2. Examples of logs with a portion of the collar too thin to produce lumber.



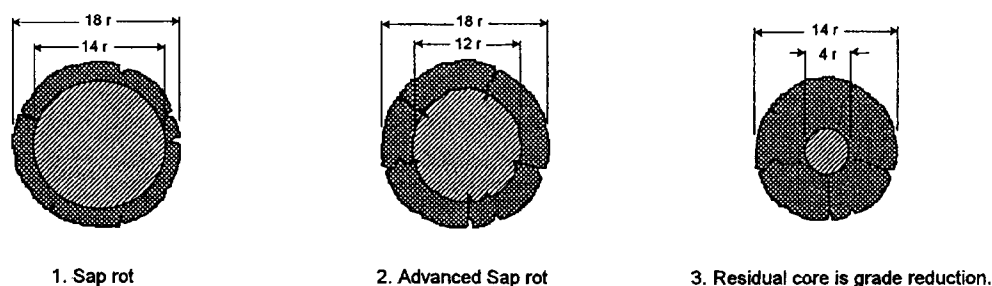
3. Examples of logs with sufficient collar to produce lumber.

(trim allowance is added to the collar surrounding the defect when calculating grade reduction).

Figure 6.1 Examples of collars around internal defects.

6.4.2.2 Determining Grade Reduction for Sound Hearts (Residual Cores)

Sound hearts inside defects such as sap rot, charred wood, ring rot and ring shake are considered suitable for lumber production if they are 5 rads (10 cm) or more in diameter. Hearts less than 5 rads are included in the grade reduction. The treatment of sap rot is illustrated in Figure 6.2. Examples of grading residual cores inside ring shake and ring rot are provided in Section 6.4.2.5 (trim allowance section).



Trim allowance is not added to sap rot but may be added to surface checking of the residual core.

Figure 6.2 Residual Cores in Sap rot.

The first example in Figure 6.2 shows the end of a log with sap rot with an outer diameter of 18 rads and a residual core diameter of 14 rads. The grade reduction is the outer portion of the log for the distance the rot travels. From the scale stick:

$$\begin{aligned}
 \text{Gross unit volume} &= \text{UV } 18 \text{ r} &= 102 \text{ dm}^3 \\
 \text{Grade reduction} &= \text{UV } 18 \text{ r} - \text{UV } 14 \text{ r} &= (102 - 62) &= 40 \text{ dm}^3 \\
 \% \text{ of log which can be manufactured} &= \frac{102 - 40}{102} \times 100 &= 60.8 \text{ percent}
 \end{aligned}$$

The second example in Figure 6.2 shows relatively advanced sap rot with an outer diameter of 18 rads and a residual core diameter of 12 rads. Advanced sap rot like this often requires an additional firmwood adjustment to account for irregular rot penetration, and a further grade adjustment for checks which penetrate into the sound core.

From the scale stick:

$$\begin{aligned}
 \text{Gross unit volume} &= \text{UV } 18 \text{ r} &= 102 \text{ dm}^3 &\text{ per metre} \\
 \text{Grade reduction} &= \text{UV } 18 \text{ r} - \text{UV } 12 \text{ r} &= (102 - 45) &= 57 \text{ dm}^3 \text{ per metre} \\
 \% \text{ of log which can be manufactured} &= \frac{102 - 57}{102} \times 100 &= 44.1 \text{ percent}
 \end{aligned}$$

The third example in Figure 6.2 shows a log with sap rot which has advanced to the point where the residual core is less than 5 rads in diameter. This log is 100 percent grade reduction for the distance the rot travels, and automatically qualifies as firmwood reject.

Although the following calculations are unnecessary in field practice, they are shown to illustrate the principle of a cumulative grade reduction.

From the scale stick:

Gross unit volume = UV 14 r = 62 dm³ per metre

The first grade reduction is the sap rot for the distance it travels the log:

Grade reduction = UV 14 r - UV 4 r = (62 - 5) = 57 dm³ per metre

The second grade reduction is for the firmwood core which is under 5 rads in diameter:

Grade reduction = UV 4 r = 5 dm³ per metre

Total grade reduction = (57 + 5) = 62 dm³ per metre

% of log which can be manufactured = $\frac{62 - 62}{62} \times 100 = 00.0\%$

6.4.2.3 Determining Grade Reduction for Multiple Defects

Occasionally, scalers will encounter log ends with two or more defects positioned such that there is less than 5 rads (10 cm) of usable fibre available between the defects. In these situations, simply adding the trim around each defect and calculating the grade reduction would understate the loss in recovery. In such cases the available material separating the defects is also unsuitable for manufacture and is added to the grade reduction. Examples of grading multiple defects with less than 5 rads of separation are provided in the trim allowance Section 6.4.2.5.

6.4.2.4 Slab Thickness and Grading

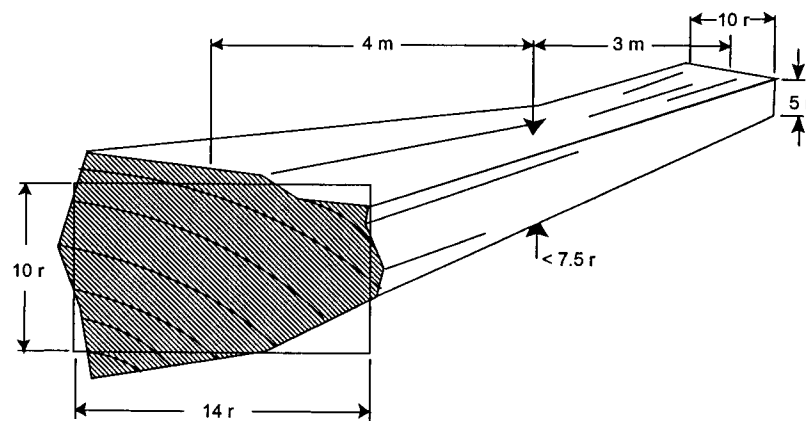
To be considered suitable for various grades, slabs must achieve certain thicknesses. thick.

Drawing 2 m Figure 6.3 illustrates how slab thickness is determined. For interior grading, slabs or portions must be at least 7.5 rads (15 cm) thick to be considered suitable for manufacture into lumber.

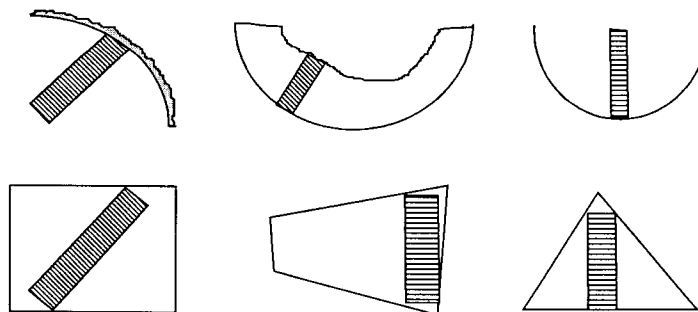
For coastal grading, the maximum thickness at right angles to the grain where a 2 rad board can be sawn is used to determine whether a slab qualifies for a particular grade. Grades D, E, F, G, H, I, and K require 19 rads; L requires 13 rads; M and U require 8 rads; X requires 5 rads, and no slabs are allowed in B, C, and J grades.

The specified minimum thicknesses in the grade rules are the actual, unrounded measurements.

Portions of slabs which do not meet the minimum thickness must be assessed as grade reduction. This includes measured lineal portions since, unlike collars on round logs which can be measured only on the ends, slab thicknesses can be measured at any point along their length.



1. 4 m portion of log which is thick enough to cut lumber (interior only)



2. Maximum thickness is at right angles to the grain (coast).

Figure 6.3 *Slabs with portions meeting the grade rule.*

Drawing 1 in Figure 6.3 is measured for firmwood content according to the methods described in Chapter 5, where the cut faces are enclosed in a rectangle which has an area equivalent to the slab end. The dimensions are 7 by 14 rads and 5 by 10 rads by 7 m, and an equivalent radius class unit is found for each end of the slab:

$$\begin{aligned}
 \text{Slab Unit volume, big end} &= 10 \times 14 \times 0.4 = 56 \text{ dm}^3 \\
 \text{Slab Unit volume, small end} &= 05 \times 10 \times 0.4 = 20 \text{ dm}^3 \\
 \text{Average unit volume} &= (56 + 20) / 2 = 38 \text{ dm}^3 \\
 \text{Gross volume} &= 38 \times 7 \text{ m} = 266 \text{ dm}^3
 \end{aligned}$$

The portion of the slab less than 7.5 rads thick is 3 m long. The width at 3 m from the small end is 12 rads. The interior volumetric calculation is:

$$\begin{aligned}
 \text{Unit volume @ } < 7.5r &= 7 \times 12 \times 0.4 = 34 \\
 \text{Unit volume, small end} &= 5 \times 10 \times 0.4 = 20 \\
 \text{Average unit volume} &= (34 + 20) / 2 = 27 \text{ dm}^3 \\
 \text{Grade reduction volume} &= 27 \times 3 \text{ m} = 81 \text{ dm}^3 \\
 \text{\% of slab which can be} &= \frac{266 - 81}{266} \times 100 = 69.5 \text{ percent} \\
 \text{manufactured} &
 \end{aligned}$$

6.4.2.5 Determining Trim Allowance

Trim allowance is included in the grade reduction and refers to the firmwood surrounding rot and other internal defects which is lost to lumber recovery when squaring up the areas adjacent to a defect. The standard trim allowance is 1 rad (2 cm) on all sides of the defect if the collar thickness requirements are met.

Once the trim allowance has been added, the total dimension is inserted into the appropriate formulae from Chapter 5 and the individual grade losses for the measured defects calculated. The individual losses are then summed to derive the total grade reduction.

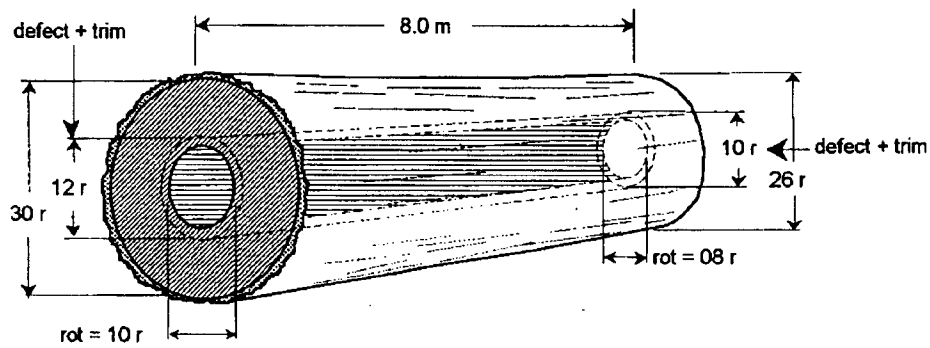
The conventions associated with trim allowance are:

1. Trim allowance is added to internal defects such as heart rot, through running butt rot, pocket rot, ring rot, ring shake, water shake, heart shake, star shake, deep surface checks , and fractures.
2. Trim allowance is not added to external defects such as sap rot, cat face, missing wood, shallow surface checks, sweep, crook, pistol grip,  char, and goitre.

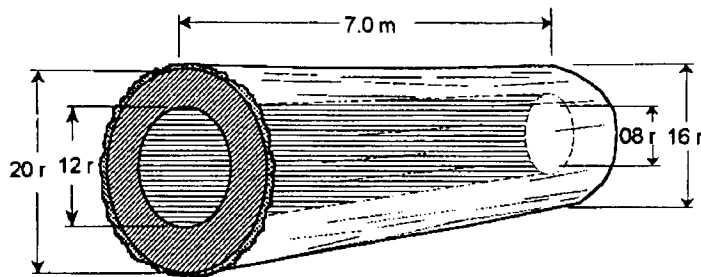
3. Ring rot, ring shake, and water shake are characterized by having one or more *collars* of firmwood, interspersed by concentric rings or partial rings of defect surrounding one central *core* of firmwood. Trim allowance is applied to firmwood adjacent to the defect(s) as follows:
 - where the collar outside a ring defect and the core inside are both thick enough to produce lumber, a trim allowance is added to both the collar outside of the defect and the core inside of the defect in calculating the grade reduction,
 - where a sound collar does not meet the minimum thickness required to produce lumber, trim allowance is neither added to the collar nor to the core; the entire collar is included as grade reduction, and the entire core is considered to be available for manufacture (where the residual core is at least 5 rads or 10 cm in diameter),
 - where a sound core does not meet the minimum diameter of 5 rads (10 cm) trim allowance is not added to the core; the entire core is included as grade reduction, and trim allowance is added to the collar surrounding the core if it meets minimum thickness requirements.
 - where both the collar(s) and core do not meet the minimum thickness required to produce lumber, the length of the log affected is included as grade reduction, and
 - where there are multiple rings of defect, trim allowance is added to each collar which meets the minimum thickness required to produce lumber.
4. Trim allowance is added to the collar of firmwood surrounding the core of rot in heart rot and through running butt rot if the collar meets the minimum thickness required to produce lumber.
5. Trim allowance is added to all sides of pocket rot whether enclosed in a circle or a square or rectangle. Where numerous pockets are separated by less than 5 rads (10 cm) of firmwood, trim allowance is added around the group of pockets; the entire area of firmwood between the pockets is included as grade reduction.
6. Trim allowance is added to both sides of single shakes, deep checks, and fractures. If they are irregular, the total width of the irregularity is determined, and the trim allowance added to it.
7. Star shakes and multiple deep surface checks  are trimmed out in their entirety. The average diameter of a circle or ellipse to just enclose the star shake or to just exclude the deep surface checks is used to determine the grade reduction.
8. Spiral checks are trimmed out in their entirety; the amount of twist in the check is observed or calculated over a given length.

Note:

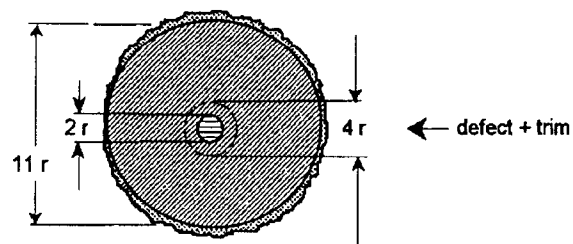
The following figures demonstrate examples of the principles of trim allowance in calculating grade reductions.



1. A log with heart rot and the collar is thick enough to produce lumber.



2. A log with heart rot and the collar is too thin to produce lumber.



3. Defect not more than 20% of the end diameter

Collar thickness is always measured exclusive of trim

Figure 6.4 The application of trim allowance around heart rot and hole.

In Figure 6.4, the first log has a rot diameter of 8 rads at the top and 10 rads at the butt. The grade reduction will be for a 10 rad top defect and a 12 rad butt defect after the 1 rad trim allowance is added around the defect. From the scale stick:

$$\begin{aligned}
 \text{Gross volume} &= 8 \text{ m}/26 \text{ r}/30 \text{ r} = (849 + 1131) = 1980 \text{ dm}^3 \\
 \text{Grade reduction} &= 8 \text{ m}/10 \text{ r}/12 \text{ r} = (126 + 181) = 307 \text{ dm}^3 \\
 \text{\% of log which can be manufactured} &= \frac{1980-307}{1980} \times 100 = 84.5 \text{ percent}
 \end{aligned}$$

The second log in Figure 6.4 has a collar thinner than the 5 rad minimum thickness requirement so the entire log is grade reduction. It is unnecessary to add trim allowance.

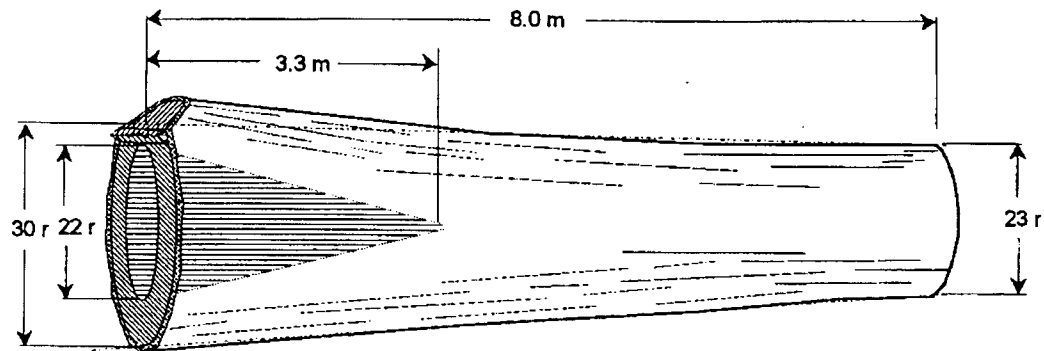
The following calculation is also unnecessary but is given to illustrate the principle of calculating a 100 percent grade reduction.

From the scale stick:

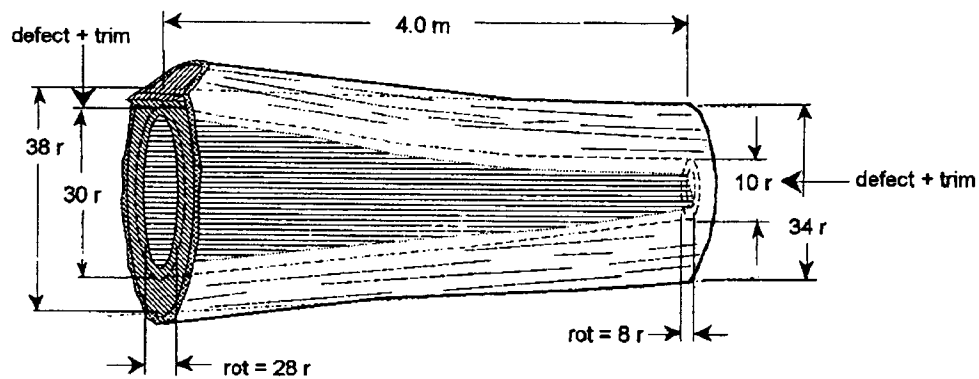
$$\begin{aligned}
 \text{Gross volume} &= 7 \text{ m}/16 \text{ r}/20 \text{ r} = (281 + 440) = 721 \text{ dm}^3 \\
 \text{Grade reduction} &= 7 \text{ m}/16 \text{ r}/20 \text{ r} = (281 + 440) = 721 \text{ dm}^3 \\
 \text{\% of log which can be manufactured} &= \frac{721-721}{721} \times 100 = 00.0\%
 \end{aligned}$$

An exception to the grade rule is the third log and in Figure 6.4. It has a heart defect diameter not more than 20 percent of end log diameter (2 rads divided by 11 rads times 100 = 18 percent) *and* the residual collar is less than 5 rads thick. If the heart defect is not more than 20 percent of the end diameter, collar thickness is not considered and trim allowance is added. Therefore, in this example, the grade reduction per metre of length from the scale stick is:

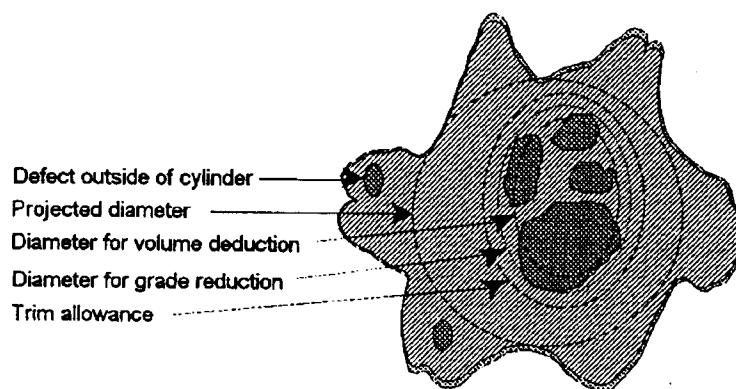
$$\begin{aligned}
 \text{Gross volume per metre (11 r)} &= \text{Unit volume: log} = 38 \text{ dm}^3 \\
 \text{Grade reduction per metre (04 r)} &= \text{Unit volume: defect} = 5 \text{ dm}^3 \\
 \text{\% of log which can be manufactured} &= \frac{38-05}{38} \times 100 = 86.8 \text{ percent}
 \end{aligned}$$



1. A log with simple butt rot estimated to penetrate 3.3 metres into the log ($22 \times 0.15 = 3.3\text{m}$)



2. A log with through running butt rot



3. Irregular butt defects in fluted butt log.

Figure 6.5 The application of trim allowance around butt rot.

The first example in Figure 6.5 is the exception to the convention of adding trim allowance to a collar of firmwood. Because conical butt rot has a much more variable and complex effect on grade reduction, a number of approaches to a reasonable solution have been tested. Of those methods, doubling the firmwood deduction is a reliable and simple convention, which allows for both trim allowance and minimum collar requirements.

With the scale stick:

$$\begin{aligned}
 \text{Gross volume} &= 8 \text{ m}/23 \text{ r}/30 \text{ r} = (665 + 1131) = 1796 \text{ dm}^3 \\
 \text{Cone volume} &= 3.3 \text{ m}/22 \text{ r} = \frac{(251 + 251)}{3} = 167 \text{ dm}^3 \\
 \text{Grade reduction} &= 167 \times 2 = 334 \text{ dm}^3 \\
 \text{\% of log which can be manufactured} &= \frac{1980 - 307}{1980} \times 100 = 81.4 \text{ percent}
 \end{aligned}$$

The second example of butt rot in Figure 6.5 follows the standard convention for adding trim allowance because the butt rot takes the form of heart rot. However, in the case of through running butt rot with the rot diameter at the butt more than 1.5 times the rot diameter at the top, an overstatement of the grade reduction may result from summing the half volumes or from finding the average unit volume. And, because of the neiloid or "golf tee" shape of the rot in this example, the grade reduction may be based on the average of the two diameters, which is nearer to the true volume of the defect. If the shape of the rot is presumed to be a frustum of a cone, it is necessary to increase the average diameter. If the shape is presumed to be parabaloid or "bullet" shape, half volumes or average unit volumes may be used. See the example in Chapter 5 showing a volume deduction for conoid through running butt rot.

With the scale stick:

$$\begin{aligned}
 \text{Gross volume} &= 4 \text{ m}/34 \text{ r}/38 \text{ r} = (726 + 907) = 1633 \text{ dm}^3 \\
 \text{Average defect diameter} &= \frac{10 + 30}{2} = 20 \text{ rads} \\
 \text{Grade reduction} &= 4 \text{ m}/20 \text{ r}/20 \text{ r} = (251 + 251) = 502 \text{ dm}^3 \\
 \text{\% of log which can be manufactured} &= \frac{1633 - 502}{1633} \times 100 = 69.3 \text{ percent}
 \end{aligned}$$

In this example, it is assumed that the collar is thick enough to cut lumber. Where the collar does not meet the minimum thickness, the lineal portion of the log without collar must be included as grade reduction. The collar thickness is determined by actual measurement, *not* as 1/2 the difference between the projected butt diameter and the defect diameter.

As with many procedures described in this manual, considerable field instruction is required to accurately apply these grade reduction procedures.

The third example in Figure 6.5 shows scattered butt rot. Irregular or sporadic rot and water shake and those with defect extending into the collar will require a significantly larger initial measurement (before adding trim) than what would be used for a firmwood deduction. The illustration includes the following relationships:

- any defects outside of the gross butt diameter (projected butt diameter) are not considered for either firmwood deduction or grade reduction, although these defects may serve to indicate the severity of a butt defect. i.e. the distance it penetrates up the log,
- the firmwood deduction diameter is *reduced* to account for firmwood in-between the scattered defects,
- the grade reduction diameter is *increased* to include all the rot and other defect within the cutting cylinder that affects lumber recovery,
- trim allowance is added to the diameter for grade reduction in through running butt rot, and
- when two or more defects are positioned such that there is less than 5 rads (10 cm) of usable fibre available between the defects, the available material separating the defects is also unsuitable for manufacture and is included in the grade reduction.

From the scale stick:

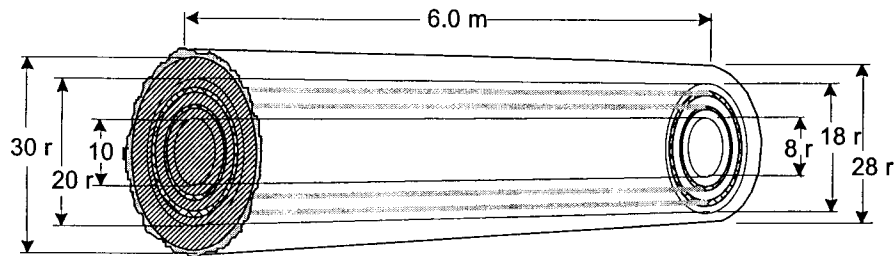
$$\begin{aligned}
 \text{Gross volume} &= 5 \text{ m}/30\text{r}/32 \text{ r} = (707 + 804) &= 1511 \text{ dm}^3 \\
 \text{Grade reduction} &= \text{Outside cylinder } 5 \text{ m}/17 \text{ r}/19 \text{ r} &= (227 + 284) = 511 \text{ dm}^3 \\
 \text{less} &= \text{Inside cylinder } 5 \text{ m}/11 \text{ r}/13 \text{ r} &= (95 + 133) = 228 \text{ dm}^3 \\
 &= (511 - 228) &= 283 \text{ dm}^3 \\
 \text{\% of log which can be} &= \frac{1511-283}{1511} \times 100 &= 81.3 \text{ percent} \\
 \text{manufactured} &&
 \end{aligned}$$

The second example in Figure 6.7 shows a log where the sound heart is only 4 rads, which is less than the 5 rads (10 cm) required to cut lumber. Because the entire core is a grade reduction, trim allowance is added only to the collar. With the scale stick:

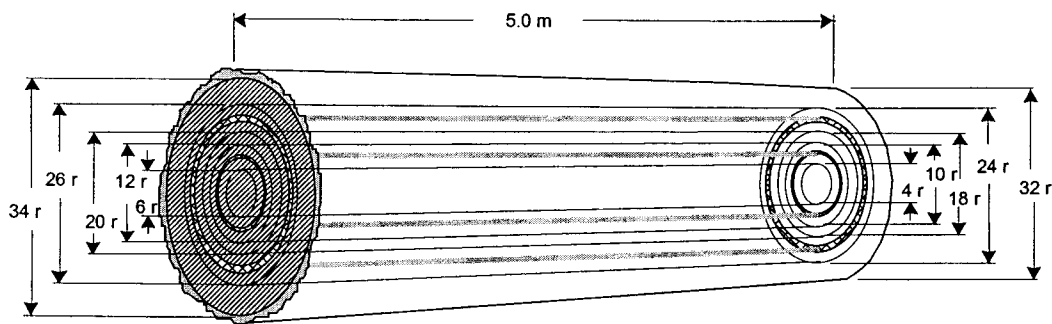
$$\begin{aligned}
 \text{Gross volume} &= 8 \text{ m}/20 \text{ r}/28 \text{ r} = (503 + 985) &= 1488 \text{ dm}^3 \\
 \text{Grade reduction} &= 4 \text{ m}/11 \text{ r}/11 \text{ r} = (76 + 76) &= 152 \text{ dm}^3 \\
 \text{\% of log which can be manufactured} &= \frac{1488-152}{1488} \times 100 &= 89.8 \text{ percent}
 \end{aligned}$$

The third example in Figure 6.7 shows a log where the sound collar is less than the minimum thickness required to cut lumber. Trim allowance is not added to either the collar or the core; the entire collar is grade reduction and the entire core is available for manufacture (when it is 5 rads or more in diameter).

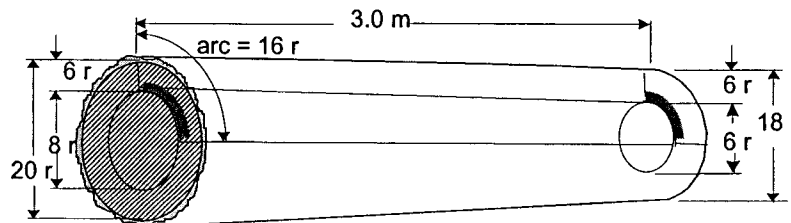
$$\begin{aligned}
 \text{Gross volume} &= 10 \text{ m}/27 \text{ r}/32 \text{ r} = (1145 + 1608) &= 2753 \text{ dm}^3 \\
 \text{Volume available} &= 10 \text{ m}/16 \text{ r}/20 \text{ r} = (402 + 628) &= 1030 \text{ dm}^3 \\
 \text{Grade reduction} &= 2753 - 1030 &= 1723 \text{ dm}^3 \\
 \text{\% of log which can be manufactured} &= \frac{2753-1723}{2753} \times 100 &= 37.4 \text{ percent}
 \end{aligned}$$



1. A log with multiple ring rot and the firmwood between rings is less than 5 rads.



2. A log with multiple ring rot and the firmwood between rings is 5 rads or greater.



3. A log with partial ring rot 2 rads thick.

Figure 6.8 The application of trim allowance around multiple and partial rings.

The first example in Figure 6.8 shows a log with two 1 rad rings of rot penetrating the full length and circumference of the log. Because both the collar and the residual core meet minimum thickness requirements, trim allowance is added to both the outer collar and the core, but the residual collar between the two rings does not meet the requirements, and it is grade reduction. If the outer collar and core also did not meet the minimum requirements, the whole log would be grade reduction.

Although the two examples in Figure 6.10 are completely different types of defect, they are treated in a very similar manner to each other, where a heart defect extends into a portion of a collar. The only difference between the two is in the application of trim allowance, as described in the example calculations.

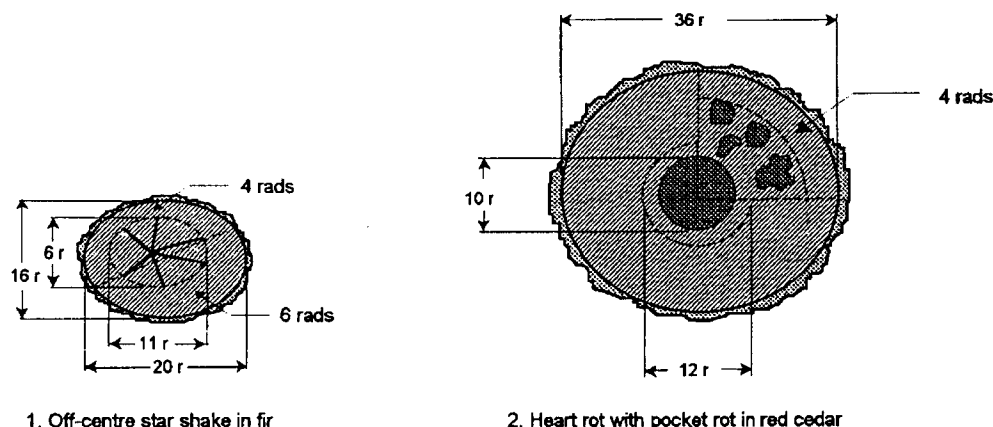


Figure 6.10 The application of trim allowance to off-centre and overlapping defects.

The first example in Figure 6.10 shows the end of a fir log which has grown with an off-centre heart. Typical of this type of log, the defect- radiating from the pith, is also off-centre, and one-half of the collar is too thin to produce lumber. Since there are too many arms to add an allowance to each one, the affected area is completely enclosed in a circle or ellipse. The first grade reduction is for the star shake *for the distance it is estimated to travel*. From the scale stick:

$$\begin{aligned}
 \text{Gross unit volume} &= \text{UV } 18 \text{ r} &= 102 \text{ dm}^3 \\
 \text{Grade reduction} &= (6 + 11)/2 &= \text{UV } 08 \text{ r} &= 20 \text{ dm}^3 \\
 \text{Net unit volume} &= 102 - 20 &= 82 \text{ dm}^3
 \end{aligned}$$

The second grade reduction is for the collar which is less than 5 rads thick for 1/2 the circumference (based on the net unit volume from the first calculation to avoid duplication of the overlapping grade reductions):

$$\begin{aligned}
 \text{Grade reduction} &= 82 \times 0.5 &= 41 \text{ dm}^3 \\
 \text{Total reduction} &= 41 + 20 &= 61 \text{ dm}^3 \\
 \text{\% of log which can be manufactured} &= \frac{82-41}{82} \times 100 &= 40.2 \text{ percent}
 \end{aligned}$$

This example also demonstrates the need to go through the calculations to achieve and maintain proficiency. At first glance, a scaler may decide that this log were 100 percent grade reduction, but because the defect is offset, it is not.

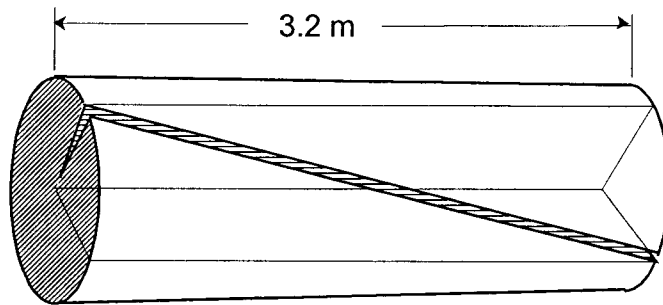
The second example in Figure 6.10 shows a  red cedar log which has a rotten core and scattered pocket rot with less than 5 rads separation between the pockets. The entire area enclosing the pockets are grade reduction, and because the pockets are closer than 5 rads of the bark, the collar is 100 percent grade reduction. Trim allowance is added to the core of rot and to the area enclosed by the pockets. From the scale stick:

The first grade reduction is for the rotten core:

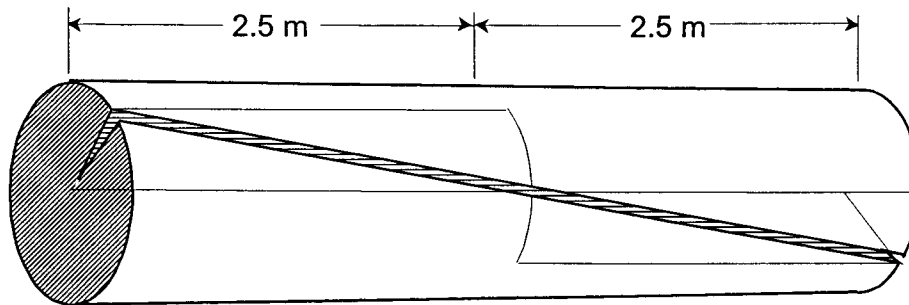
$$\begin{aligned} \text{Gross unit volume} &= \text{UV } 36 \text{ r} &= 407 \text{ dm}^3 \\ \text{Grade reduction} &= \text{UV } 12 \text{ r} &= 45 \text{ dm}^3 \\ \text{Net unit volume} &= 407 - 45 &= 362 \text{ dm}^3 \end{aligned}$$

The second grade reduction is for the collar which is less than 5 rads thick for 1/4 the circumference (based on the net unit volume from the first calculation to avoid duplication of the overlapping grade reductions):

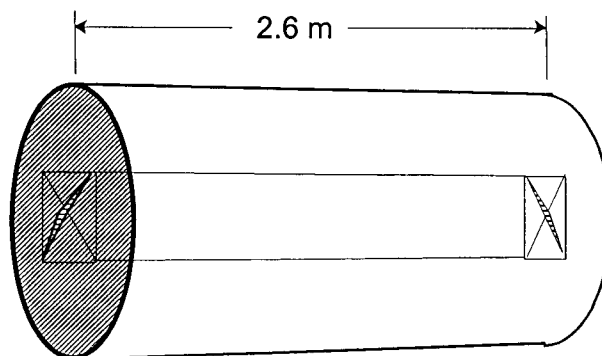
$$\begin{aligned} \text{Grade reduction} &= 362 \times 0.25 &= 90 \text{ dm}^3 \\ \text{Total reduction} &= 45 + 90 &= 135 \text{ dm}^3 \\ \text{\% of log which can be manufactured} &= \frac{362-90}{362} \times 100 &= 66.8 \text{ percent} \end{aligned}$$



1. Logs shorter than 5 m are assessed on their length.



2. Logs 5 m and longer are assessed in 2.5 m segments.



3. A log with spiral heart shake.

Figure 6.11 *The effect of spiral check and shake on grade.*

6.4.2.7 Determining Lengths for Purposes of Grade - Logs and Log Segments

Logs and slabs must be at least 2.5 m long to produce lumber. Logs, slabs, and chunks shorter than 2.5 m are considered to be 100 percent grade reduction. In most instances, the portion of the log's  length which is 5 rads or more in diameter is the basis for its grade.

Some situations, however, require the scaler to deem the log to be another length for the purpose of establishing its grade. Where timber has been cut into lengths less than 2.5 m (interior), or 5.2 m (coast); for the purpose of grading they may be *deemed* to be 2.5 m (interior), or 5.2 m (coast) long if:

- the portion of a log cut from the top of a tree exceeds 5 rads (10 cm) in diameter and the log displays a cut face on the butt end, or
- the log is scaled after it has been bucked at the scale site, or
- if a scaler is instructed under the *Scaling Regulation* to use deemed lengths for the purpose of grading.

In all instances, breakage is always graded on the basis of its actual length (breakage is defined as any piece, meeting the minimum diameter of the cutting authority, which is shorter than 2.5 m in length and broken at the large end or at both ends).

For reporting purposes, the actual net length of a log is always recorded on the tally sheet, not the deemed length.

In general, deemed lengths are used in scaling short pieces for two purposes:

- they help to ensure that scaling is consistent with the utilization policy, and
- and they facilitate more consistent grading decisions.

The following figures demonstrate examples of the principles of length determination for calculating grade reduction in scaling, including situations where short logs are deemed to be another length for purposes of grading.

The first log in Figure 6.14 is a log with severe crook near the top end of the log. The crook is grade reduction because that portion is not straight enough to recover lumber. The portion above the crook is also grade reduction because it is too short to cut lumber, so the log is 100 percent grade reduction for 2.6 m.

The second log in Figure 6.14 has severe sweep which is *uniform throughout* the length of the log. If a log can be bucked into two or more lengths before milling, the lumber loss caused by the sweep can be greatly reduced, and scalers should assess the grade reduction accordingly: the scaler visualizes the log being milled after bucking in order to assess the grade reduction for the sweep. Depending on the length of the log, two situations can occur:

1. If this log were 5 m long or more, visually bucking the log at its mid-point would produce two logs of adequate length and reduced sweep which would be suitable to produce lumber. Therefore milling losses are minimized.
2. If this log were less than 5 m long, visually bucking the log at its mid-point would produce two logs which are now too short to produce lumber even though each section has reduced sweep. Visually bucking at any other point would produce one log with too much sweep and one log which is too short. Therefore milling losses are not minimized and the log is assessed for loss over its full length.

The pistol grip in the fourth log in Figure 6.14 affects 0.8 m of the butt end of the log, and because this section is too short to manufacture lumber, it is a 100 percent grade reduction for 0.8 m.

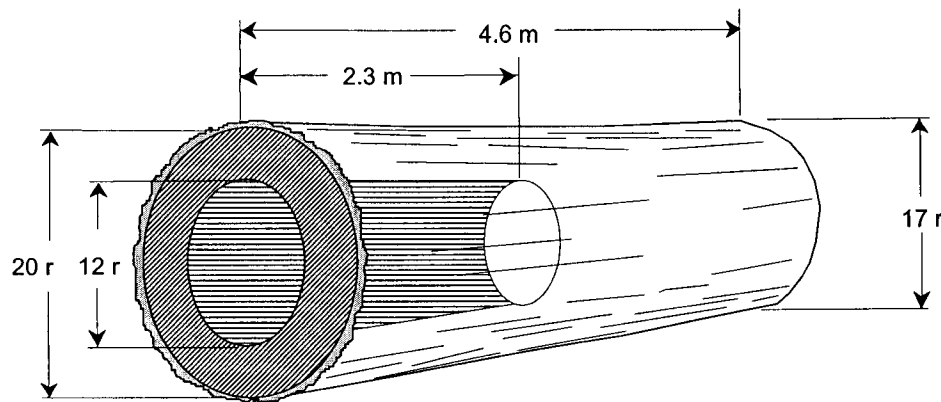


Figure 6.15 Assessing grade in log with severe heart rot and residual length is too short to cut lumber.

The log in Figure 6.15 has severe heart rot which is estimated to travel for half the length of the log. The 4 rad collar is too thin to cut lumber, and a normal grade reduction is made to include the rotten heartwood and the sound collar. That is, the gross volume attributable to the rotten end is a 100 percent grade reduction for 2.3 m. The other half of the log is sound but is shorter than the 2.5 m required for manufacture, so it must also be included as 100 percent grade reduction for 2.3 m. As a result, the entire log is 100 percent grade reduction.

Although the following calculations are unnecessary in field practice, they are shown to illustrate the principle of a cumulative grade reduction.

From the scale stick:

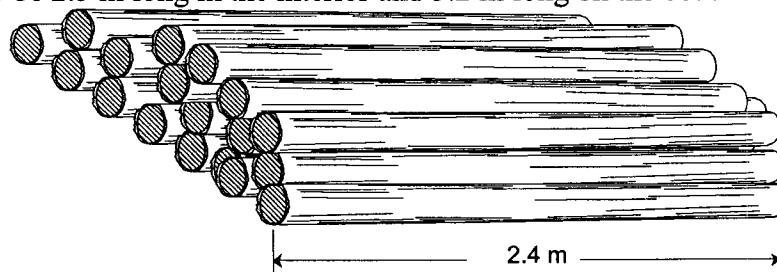
The first grade reduction is the heart rot for one-half the length of the log:

$$\begin{aligned} \text{Gross volume} &= 17 \text{ r}/20 \text{ r}/4.6 \text{ m} = (209 + 289) = 498 \text{ dm}^3 \\ \text{Grade reduction} &= 12 \text{ r}/12 \text{ r}/2.3 \text{ m} = (52 + 52) = 104 \text{ dm}^3 \end{aligned}$$

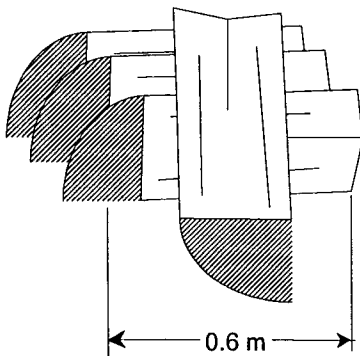
The second grade reduction is the collar which is too thin to produce lumber:

$$\begin{aligned} \text{Grade reduction} &= UV \ 20 \text{ r} - UV \ 12 \text{ r} \times 2.3 \text{ m} = (126 - 45) \times 2.3 \\ &= 81 \times 2.3 = 186 \text{ dm}^3 \end{aligned}$$

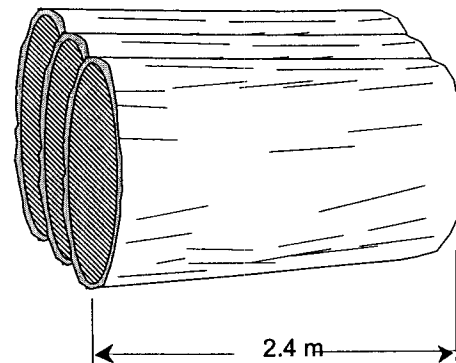
Where unscaled timber is bucked and delivered to a scale site or bucked at the scale site for the purpose of manufacturing special forest products prior to scaling, the timber is to be scaled and graded as logs unless it has been classified as a special forest product. The classification and scaling of special forest products are described in Chapter 8. Figure 6.17 provides examples of different logs which were bucked to specific lengths to suit the specifications of the product, but do not have special forest product status. Therefore, just as with other logs and chunks shorter than 2.5 m long *for grading purposes*, they are deemed to be 2.5 m long in the interior and 5.2 m long on the coast.



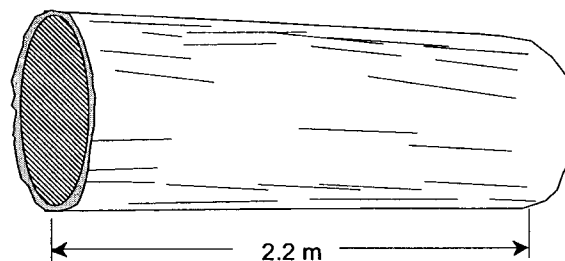
1. Fence posts



2. Shake blocks



3. Shingle bolts



4. Mining timber

Figure 6.17 Examples of logs cut to special forest product lengths but not classified as such, and deemed to be 2.5 m long (interior) and 5.2 m long (coast).

6.4.3 Assessing Product Quality

Section 6.4.2 looked at the grade reductions that tend to reduce the quantity of product that a given log is likely to yield. In log grading, we are also concerned with the quality of the products which can be produced from the log (i.e., its product out-turn).

In addition to the percentage of a log which can be manufactured into a given product, the grade rules also specify that a minimum percentage of the product manufactured from the log must be merchantable and/or clear.

Merchantability is determined by assessing the size and placement of knots, and the degree of any spiral or twist observed on the log. Merchantable lumber is considered to be lumber which grades out better than utility. There is no direct relationship between log grading and lumber grading, as lumber graders assess the finished product, whereas scalers must assess the round log from which the product is cut. For instance, the grain slope permitted in the NLGA Lumber Grade Rules differ from the twist allowance in the log grading schedules; a scaler cannot presuppose the affect of grain slope on lumber, because sawing methods have a major impact on grain slope. The log grading rules therefore only gauge the recovery potential of a log under average sawing conditions.

Where the grade rules require that a percentage of the out turn be clear, it means that the stated proportion of the product must be free of knots and stain.

In addition to the quantity and the quality of the product out turn, some grade rules require a log to be fine grained. The fineness of grain relates to the separation between seasonal growth rings. Fine grained logs have a higher fibre density (i.e., proportionately more cellulose and lignin per unit volume) and will, therefore, produce stronger lumber and higher quality veneer.

6.4.3.1 Assessing Knots

Knots larger than 1 rad (2 cm) reduce lumber quality because the grain deflection around the knots weaken the recovered lumber, even though the actual knot fibres may be denser and stronger than its supporting tissue.

Maximum allowable knot size increases with the diameter of the log and are expressed in radius class units (rads) or centimetres of diameter. When taking this measurement, only the actual knot should be measured and not the shoulder surrounding it. Figure 6.18 shows a log section with typical knot forms. Critical to the assessment of knot diameter is to exclude grain deflection around the knot in the measurement. Under close examination, the knot will have a circular grain pattern, like a log end, and this is the area measured. The tree stem wood grows around the knot (deflection), and forms the shoulder wood. It is easy to measure loose or encased knots, because there is a clear distinction between the knot wood and the tree wood; tight or inter grown knots are harder to learn to assess, because the two are interconnected.

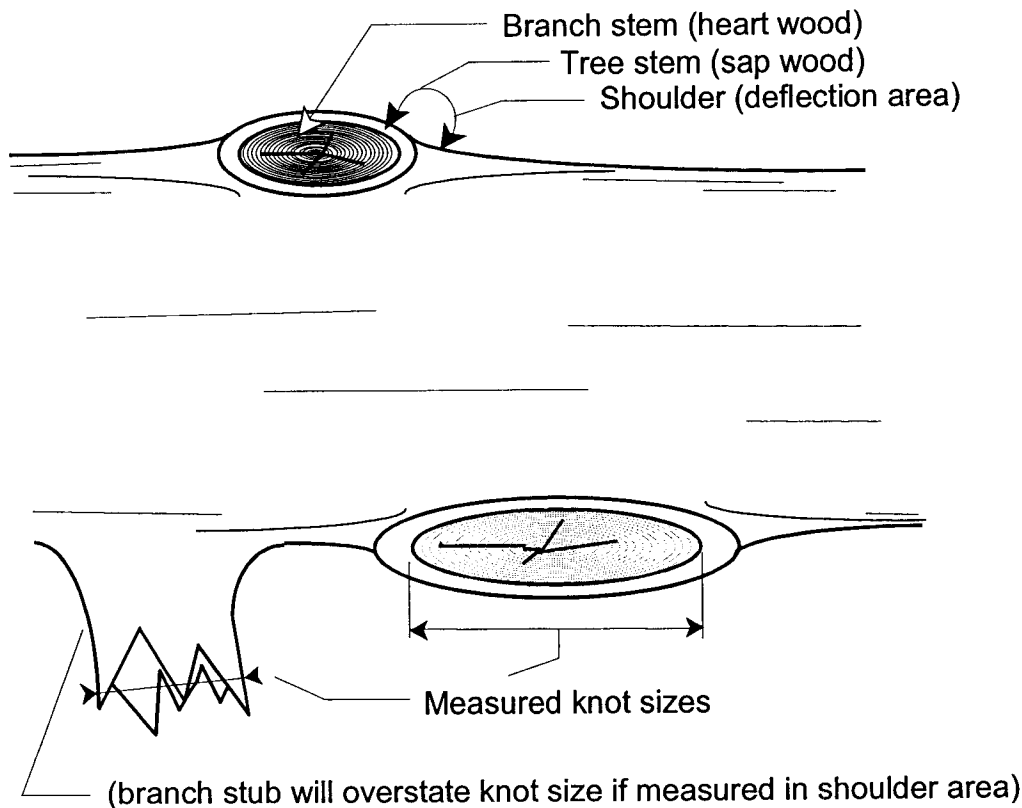


Figure 6.18 Measuring knot diameters.

Figure 6.19 shows the measurement of bunch knots. Bunch knots or cluster knots are defined as those circumstances where the majority of the log's grain deflects around, rather than through or between a close grouping of knots, reducing the strength of lumber produced. Where this occurs, the group of knots is assessed the same as an oversized knot; the smallest circle or ellipse that will surround the cluster is taken as the knot diameter.

Certain species such as Douglas-fir, larch, cedar, cypress and alder, when stressed, produce adventitious branches (sucker limbs) which, after a period of time, may come to take the appearance of knots or knot clusters. These sucker limbs do not, however penetrate very far into the log since they form much later in the tree's life cycle than regular branches. Therefore, they do not have nearly as much impact on the manufacturing potential of the log as their size might suggest. Scalers working with such logs should come to recognise this characteristic and observe some of these logs in the breakdown process.

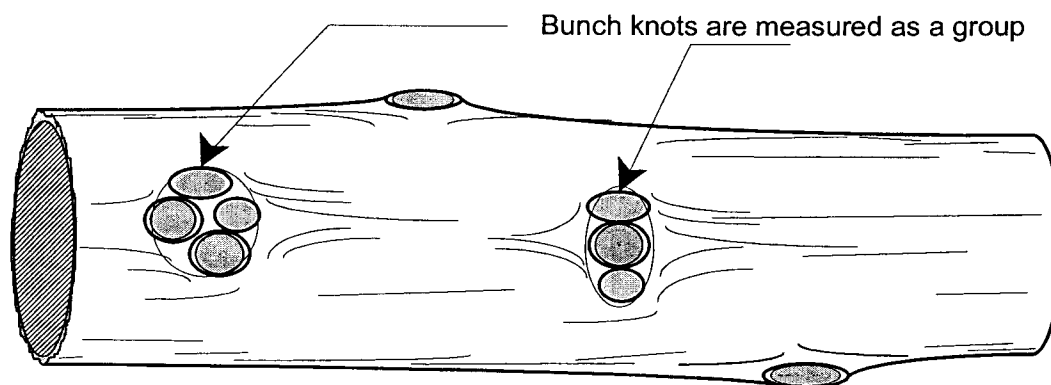


Figure 6.19 Measuring bunch (cluster) knots.

Knots which indicate the presence of conk or other stem rots should also be used in terms of their potential to indicate the extent of heart rot, rather than simply in terms of lowering lumber quality. For example, even though a knot may be under the maximum allowable size but is rotten, there is a good chance of a grade reduction for heart rot. However, the firmwood loss from rot confined to the knot is not significant enough to warrant a volume deduction or grade reduction in the large majority of cases.

The conventions used to assess knots are:

- the specified knot size and distribution in the grade schedules for any log grade is always based on the gross log diameter inside bark before any deduction is made for sap rot or other defects,
- knots are measured at right angles to the log length except in peeler grades where the maximum diameter is used,
- for interior logs up to and including 8 m in length and for all coastal logs, knots are assessed against the top diameter of the log (Figure 6.20),
- for interior logs greater than 8 m in length, a midpoint diameter must be taken. Knots on the butt half are assessed against the maximums specified for the midpoint diameter, and knots on the top half of the log are assessed against the maximums specified for the top diameter (Figure 6.20), and
- slabs are measured across their width for determining knot allowances. Widths for slabs of all shapes are illustrated in Chapter 5. For purposes of knot assessment, if the thickness exceeds the width, the wider measurement is used.

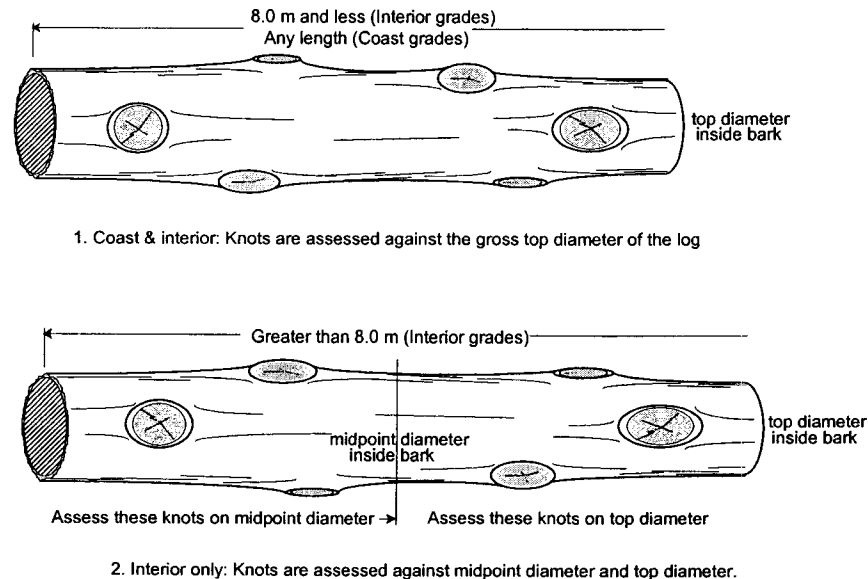


Figure 6.20 The relationship between log diameters and knot diameters.

In addition to their size and characteristics, the location and distribution of knots must be carefully considered. For example, if log segments must be 2.5 m long to produce merchantable lumber, occasional oversized knots are permitted if it is possible to cut merchantable lumber from between them. In general, one oversized knot is permitted every 3 m, allowing ample room for recovery of merchantable lumber between the knots. Similarly, where the oversized knots are concentrated in one quadrant, along one side, or near one end of the log, the remaining portions will yield merchantable lumber.

Figure 6.21 illustrates three logs with identical gross dimensions with oversized knots distributed in three typical patterns;. In these figures, they are all closer together than the allowed 3 metre spacing.

As knots are a key determinant in log grading, it is important that scalers become very familiar with their impact. This knowledge is best achieved through on-site training, observation of log breakdown, and practice.

Once the scaler has:

- identified the oversized knots from the top or top and mid-point diameters,
- determined that their spacing is less than 3 m along the length,

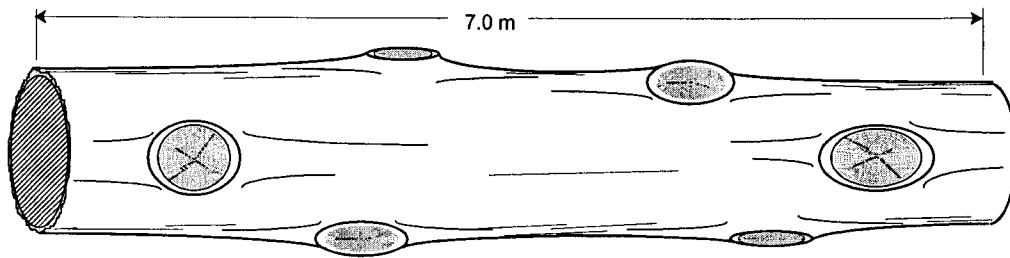
- decided that a grade reduction is warranted, then
- it becomes necessary to observe the orientation and distribution of the knots in order to evaluate the affect on grade.

The first log in Figure 6.21 has its oversize knots distributed over the entire length of the log. Because there is no portion of the log which allows 2.5 m lumber, the log will not produce merchantable lumber.

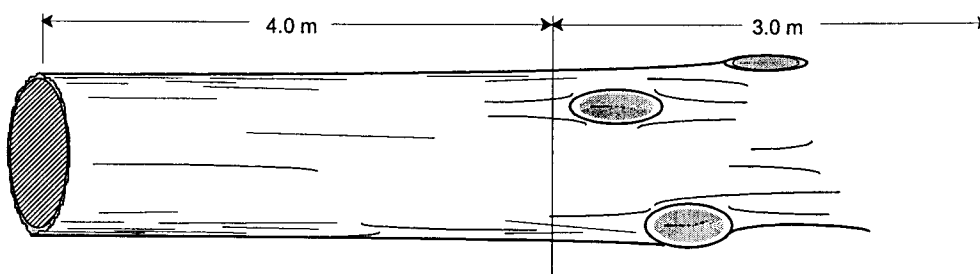
The second log has oversize knots concentrated near the top of the log. After the scaler notes that 3 m of the log will not produce merchantable lumber, the impact on the quality of the whole log is calculated to be about 43 percent of its total length, but somewhat less than 43 percent of it's volume.

The third log has its oversize knots concentrated along one side. Almost half of the log will not produce merchantable lumber because of this, but more than half is not affected at all by knots. Therefore, the impact on the quality of the whole log is estimated to be about 45 percent of its volume. However, size is also a factor in the assessment; a 30 rad log may be broken down into quarters to maximize merchantability, where a 5 rad log cannot even be halved.

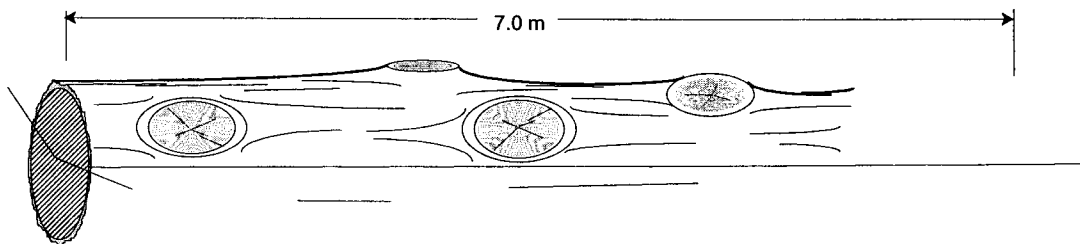
Of course, these examples are somewhat conceptual in that knots do not usually present themselves so obligingly. Although, in time, scalers will learn to quickly understand the impact of knot location and distribution, it is best for the beginner to pick out each of the elements in turn. For example, if the knots are distributed along one quadrant *and* around the top end, do one assessment, then the other. The total assessment is the cumulative effect on the log.



1. A log with oversized knots distributed over entire length.



2. A log with oversized knots concentrated near top end.



3. A log with oversized knots concentrated along one side.

Figure 6.21 Typical knot distributions and their effect on grade.

6.4.3.2 Twist (Spiral Grain)

Twist is measured over a representative 30 cm (15 rad) section of log length according to the principles outlined in Section 6.3. These are:

1. Twist is measured where it can be seen,
2. Assumptions are not made about portions of a log not visible, and
3. Areas around irregularities are avoided.

The amount of twist permitted for a particular grade is expressed as a percentage of log diameter according to the grade rules. Figure 6.22 demonstrates placing the scale stick, and Figure 6.23 shows one method for reading the deflection.



Specific twist requirements by grade are described in Section 6.5 (coast) and Section 6.6 (interior).

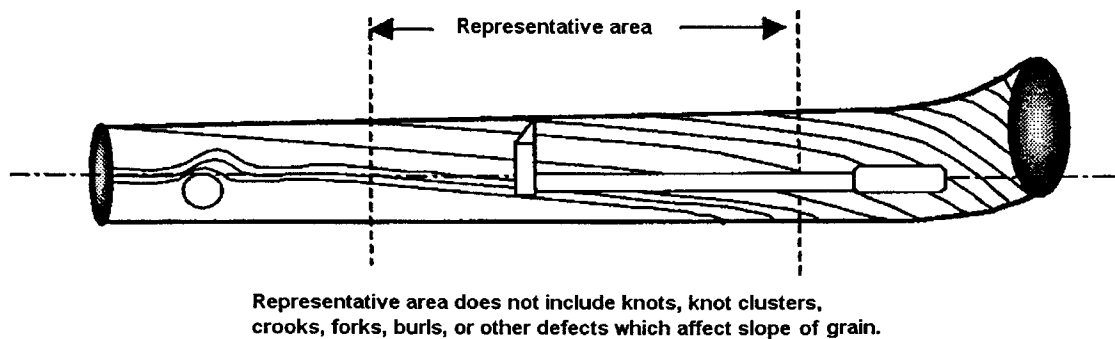


Figure 6.22 Measuring twist - placing the stick.

As shown in Figure 6.22, orient the scale stick parallel with log's longitudinal axis on an area where the grain deflection is representative. 

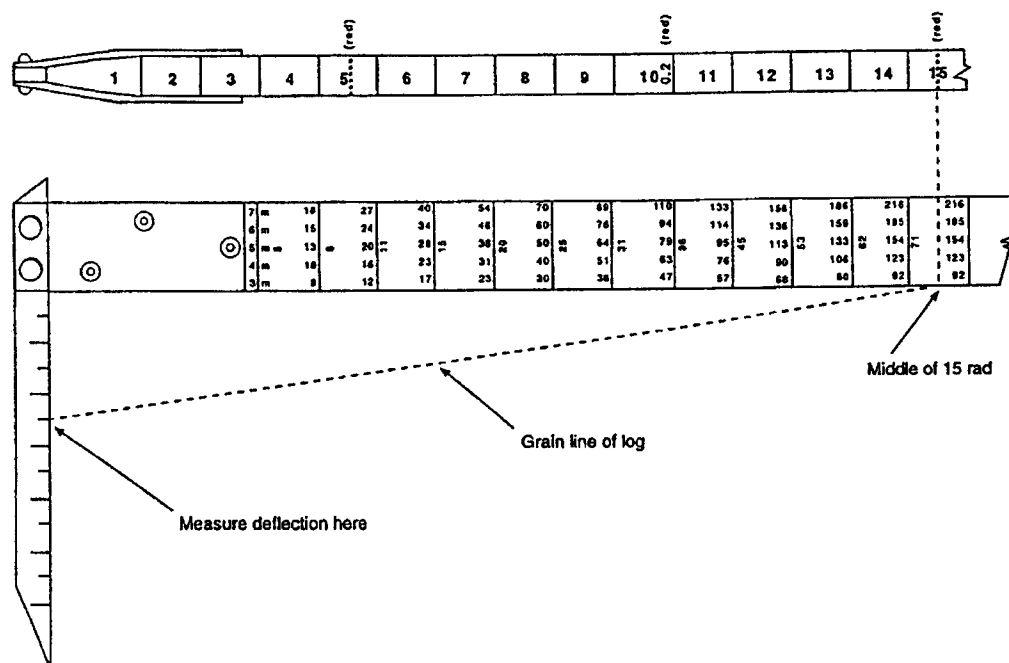


Figure 6.23 Measuring twist - reading the deflection.

With its shaft parallel to the log's central axis, the stick is positioned such that one of the log's grain lines passes right through the middle of the 15 rad class. The point where this grain line intersects the tine is the deflection. The deflection is then read where the grain line intersects the tine. Here, it reads as 5 cm or 2.5 rads. Note: the tine of this stick is graduated in centimetres. Although not a requirement, scalers often mark them out to improve accuracy.

6.4.3.3 Grain Density (Ring Count) - Coastal Grading Only

The ring count of a log can greatly affect its value. The reason for this is that the narrower the separation between the rings, the denser the woody tissue. Denser woody tissue has more cellulose and lignin and is, therefore, stronger. In addition to this strength factor, fine grained logs are easier to peel into veneer on a rotary lathe and yield higher quality and stronger veneer.

The annual rings may all be of equal thickness and centred perfectly around the central pith of the log, or they may be of varying thickness as a result of variations in growth rates (usually attributable to factors such as variations in nutrient availability, temperature, rainfall, and sunlight). They also may be offset from the geometric centre of the log.

When growth is not equally distributed and the heart is offset, the log will not peel well on a rotary lathe and can not yield high quality veneer no matter how fine grained.

Growth rings are counted at a point $\frac{1}{3}$ of the radius in from the logs outer circumference at the small end. The rings are then to be counted in the one rad (2 cm) area from this point towards the outer circumference of the log. Where a log has an off-centre heart, the rings are to be counted where their separation is widest. For a centered heart, count the rings where representative of the ring density for the entire end.

6.4.3.4 Stain - Coastal Grading Only

As described in Chapter 4, the oxidation of phenolic compounds in tree tissues invaded and damaged or killed by micro-organisms (predominantly fungi) results in a pronounced discoloration of the woody tissue. This discoloration is commonly referred to as stain.

Some stains result soon after harvesting with the oxidation of newly exposed heartwood. Such stains are superficial and do not penetrate far into the log.

Also, the sawdust compacted between the cuts of logs bucked in the bush, but not separated, is often subject to staining fungus. These stains are also superficial and do not penetrate the log.

Stain does not cause any significant weakening of the wood fibre but it can detract from the appearance of the manufactured end products. Where these end products are for decorative or finishing purposes their value is lessened. For this reason the presence of stain is a grading consideration in some very valuable "clear lumber" coastal grades (refer to Section 6.5 for specific details).

Scalers must also be aware that some types of stain can be faded when logs are left exposed to the ultraviolet component of sunlight. Usually when this has happened the affected wood will still appear subtly different than the surrounding unaffected tissues.

6.4.4 Factors Unique to Interior Grading

Application of the Interior Schedule of Timber Grades requires the scaler to consider two additional factors:

- was the log cut from a tree which was dead when it was harvested, and

- was the log cut from a tree which was undersized for the purposes of utilization.

Interior grading rules must account for these factors for administration of cut control and the utilization policy.

6.4.4.1 Dead/Dry Log Status

Administration of the annual allowable cut (AAC) in the interior requires interior scalers to identify logs cut from trees which were dead and dry when harvested. Unlike the cruiser who identifies dead trees largely by looking at the tree's foliage, the scaler's job is more complex and requires experience and good judgement.

Identifying logs cut from trees which were dead and dry when harvested is not confined to simply looking at one characteristic. Rather, scalers must look for a number of characteristics known as indicators which indicate the tree may have been dead and dry when harvested. Scalers must also look for characteristics known as contraindicators which indicate the tree was green or living when harvested.

6.4.4.1.1 Indicators

To be classified as dead/dry a log must have at least one indicator to indicate it was cut from a tree which was dead when harvested. Indicators include:

- deteriorated cambium,
- loose or shedding bark,
- sap rot (encircling log end),
- wood borers, or
- deep checks (not weather checks).

6.4.4.1.2 Contraindicators

Contraindicators are log characteristics which indicate a log was cut from a living tree. Logs showing any contraindicators are deemed to be cut from a living tree.

Green logs which have not been scaled soon after harvesting, often display bark that has curled away from the wood as a result of rapid drying of the inner layer of bark.

Green logs, when stored in decks for extended periods, often display darkened and weathered ends. Such logs often show evidence of mould and/or mildew on exposed wood surfaces.

Some species, notably pines, are resinous and continue to exude pitch for some time after harvesting. As such, pitchy log ends are a contraindicator and indicate the log was cut from a live, green tree. However, fir and larch will exude pitch long after they are dead; therefore, pitchy log ends are not a reliable contraindicator in these species.

If branches with green foliage are attached to a log, the log must be assumed to have been cut from a tree which was living when harvested.

Bark beetle larvae feed on fresh, living cambium and are a good indicator that parts of a log are still fresh. If active larvae are observed, the scaler should look carefully for any contraindicators. Larvae are white, legless, stout-bodied grubs with pale, brown heads and range from 1 mm to 7 mm, with few differences in appearance between species.

Logs cannot be classified as dead/dry if they display any of the following characteristics:

- curling bark,
- green needles,
- fresh cambium (sticky),
- mildew or mould on wood surface (except on windthrow),
- dark weathered ends (indicative of decked timber),
- pitching log ends (not reliable in fir and larch), or
- charred wood (recent fire damaged).

Mortality in trees is often a gradual process and, as such, logs may display both indicators and contraindicators. In all cases, logs displaying both indicators and contraindicators are deemed to be cut from a living tree.

Two other principles apply:

- logs subjected to prolonged decking prior to scaling and logs cut from trap trees (an insect control measure) are graded as if they were cut from living trees, and

- where fire damaged timber is incidentally harvested from undamaged or lightly fire damaged stands, recent fire damage will normally be taken to mean any dead standing timber that is felled within one calendar year of the fire being declared out, unless the Regional Manager orders otherwise. Where fire damaged timber is harvested from moderate to heavily damaged stands (as assessed in accordance with Appendix A.7.2 of the *Cruising Manual*) that have been appraised in accordance with Section 4.4.4 of the *Interior Appraisal Manual*, the determination of what is recent fire fill will be based upon a stand-specific decision of the Regional Manager.

Specific details of the interior dead/dry grades (grade codes 3 and 5) can be found in Sections 6.6.4 and 6.6.6.

6.4.4.2 Identifying Undersized Logs in the Interior

Cutting specifications in interior cutting authorities make reference to the diameter outside bark at stump height (DSH). This diameter is important as it determines whether or not the tree has to be utilized.

When scaling interior timber, scalers must assign an undersized grade to logs which are cut from trees which are smaller than the diameter at stump height specified in the cutting authority.

The DSH is measured outside the bark at a point 30 cm (15 rads) above the highest ground at the base of the tree. Since scalers do not see the stump, but only the butt log cut from it, the DSH is measured outside the bark at a point 15 cm (7.5 rads) from the butt end on candidate logs.

To be considered for the undersized grade:

- a log must show sufficient evidence such as an undercut, butt flare, or other butt characteristics to indicate it comprises a tree and not a top cut or long butted log, and
- the outside bark measurement (averaged) at a point 15 cm from the butt face must be less than the minimum diameter at stump height specified in the cutting authority.

If there is no evidence a log was cut from an undersized tree, it must not be graded as Grade 6.

The minimum DSH is set by the *Provincial Utilization Policy* at 15 cm (7.5 rads) for lodgepole pine, and 20 cm (10 rads) for all other species. More stringent utilization requirements may be set under the cutting authority. Utilization standards on the coast do not refer to the DSH. As such, the coast schedule of grades does not have an undersized log grade.

Where timber is cut on an area where cutting specifications are not in place, scalers are to assume a DSH of 15 cm (7.5 rads) for lodgepole pine and 20 cm (10 rads) for all other species.

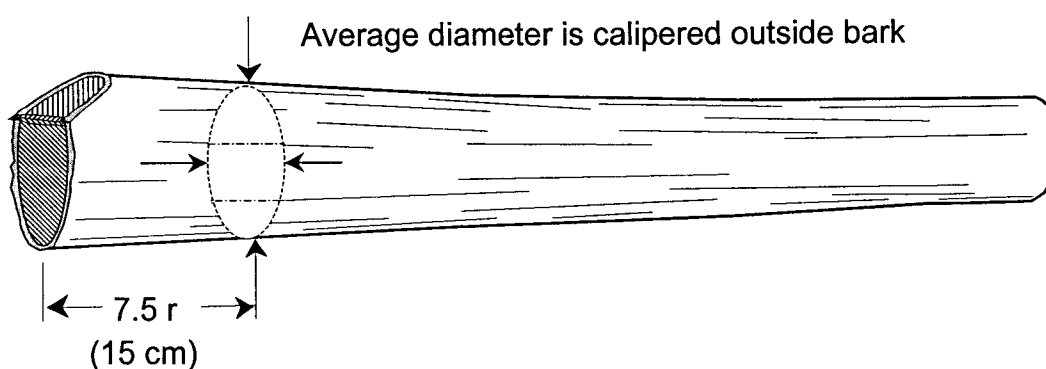


Figure 6.24 Measuring diameter for interior undersize grade.

6.5 Interpreting the Schedule of Coast Timber Grades

The Schedule of Coast Timber Grades is part of the *Scaling Regulation*. It is comprised of three parts. Part 1 applies to all species and describes the Firmwood Reject Grade (i.e., Grade Code Z). Part 2 describes the grades (other than Z) applicable to all commercial coniferous species except yew (i.e., *Taxus brevifolia*). Part 3 describes the grades (other than Z) applicable to all commercial broadleaf (i.e., deciduous or "hardwood") species, and yew.

6.5.1 Grade Applicability

The Schedule of Coast Timber Grades applies to all timber harvested in the Vancouver Forest Region and the North Coast Forest District, regardless of where it is actually scaled.

6.5.1.1 Grade Precedence

Timber that meets the requirements of more than one grade should ideally be placed in the grade of greater value. Since market demands affect values from day to day, a scaler may not know at any particular time which of two grades has the greater value. For this reason scalers are instructed to record a log against the first grade in order of presentation in the scaling regulation. The same order is followed in this chapter. Borderline logs should be taken one up and one down so as not to bias the scale. Some exceptions in the order of grade precedence are employed for shingle cedar, and are explained in this chapter.

6.5.2 Physical Characteristics Affecting Log Grades

Although characteristics are described individually, scalers must consider the whole log in determining its grade. Generally speaking, the scaler must determine and consider the following factors:

- log size,
- what proportion of the log will produce end products (lumber, veneer, shakes or shingles, and chips),
- the quality of end products,
- the presence of non-permissible defects, and
- whether a round log or a slab.

Some aspects of the above factors have been explained earlier in this chapter, while others require further explanation specific to coastal grading.

6.5.2.1 Log Size

6.5.2.1.1 Radius or Diameter

Potential end use and product recovery is in large part determined by each log's end diameter. Other factors being equal, larger logs will produce more and better quality lumber than smaller diameter logs. As such, grade rules specify minimum log diameter criteria.

While the official coastal grade rules are expressed as centimetres of radius, this unit is the equivalent to "radius class units" (RADS) which are expressed as "RADS of diameter". The scaling convention is that diameters are measured and recorded in RADS. For example, a recorded measurement of 5 rads is equal to 5 cm of radius for the purpose of grading.

In applying the diameter criteria, note the following:

- Unless otherwise specified, diameters are the gross diameter inside bark at the small end of the log. The gross diameter is the actual measured diameter before making any deduction for any defect, including sap rot, for all species.
- For logs which require more than one diameter measurement, the diameter for the purpose of grading is the rounded gross diameter for the small end, or top of the log. As described in Chapter 5, a log which rounds up to the minimum diameter for a grade qualifies for that grade.
- For logs which exceed 12.8 metres in length, the diameter for purposes of applying coast grade rules is the diameter inside bark at a point 12.8 metres above the large end, or butt, of the log.

6.5.2.1.2 Length

Length measurements specified in the grade rules are the actual unrounded gross measurements.

Where a log meets the minimum gross length for a grade but requires a deduction which reduces the net recorded length below the minimum, it is graded based on its gross length.

Length is a factor in log value, both in terms of efficiency in handling and lumber value potential.

6.5.2.2 Potential for Manufacture of Product Quantity

The proportions of a log's gross scale which are suitable, and not suitable, for the manufacture of products are important factors in determining its commercial value.

All the grades higher than No. 7 Chipper (Y) specify percentages of the gross scale which must be suitable to cut out lumber, veneer for fir peelers or shingles and shakes for shingle cedar.

Log defects which reduce recovery of the above products are identified in Section 6.3, and procedures for calculating the amount of loss they cause (grade reduction) are outlined in Section 6.4, and in Appendix 6A.

In order to ensure standard application of grade reduction procedures, some additional information on assessment of defect in coastal timber is provided here.

6.5.2.2.1 Length of Defects

Where defects affect the heart of a log, scalers usually cannot see how far defects penetrate the length. In some cases experienced scalers can use various accepted indicators to accurately estimate this. In cases where there are no accepted indicators the following conventions are to be employed in order to maintain consistency among scalers in determining grade reduction.

1. Butt rot, butt shake and related butt defects have the length of defect estimate based on the relation between the defect diameter and the recorded butt diameter of the log.

Where rot measures	It often penetrates
1/4 of the recorded butt dia.	1.8 - 2.4 m
1/2 of the recorded butt dia.	3.6 - 4.2 m
3/4 of the recorded butt dia.	5.4 - 6.0 m
4/4 of the recorded butt dia.	7.2 - 7.8 m

These figures may be adjusted slightly up or down depending on the species and visible butt flare. Douglas-fir and spruce, having pronounced butt flare may use the lower figure mentioned as butt rot in these species usually does not run far past the flare. In hemlock, balsam, and sometimes red cedar, where butt flare is minimal, rot may run further into the log and a larger estimate is required. These are general guidelines only.

2. Heart rot, pocket rot, ring rot, heart checks, ring shake and similar defects when showing in only one end of the log are presumed to run half the length of the log to a maximum of 6 m, unless there is evidence to the contrary.
3. Conk, pin rot and Indian paint rot are grouped together as heart rots which often show in the knots of a log. Such knots are collectively known as "conk knots", and must not be confused with rotten knots which do not indicate the presence of heart rot.

Where one or more conk knots are present, but the rot does not show in the log end(s), the rot is presumed to travel 2.4 m above the uppermost conk knot and 3.6 m below the lowest conk knot.

Where conk shows in one log end and there are conk knots, the rot should be run the greater distance of half the log length to a maximum of 6 m, or 2.4 m above the uppermost conk or 3.6 m below the lowest conk knot.

Where conk, pin rot or Indian paint rot shows in one end of a log but there are no visible conk knots, the rot is presumed to travel half the length of the log to a maximum of 6 m. For example, penetration would be 2.5 m on a 5 m log, 6 m on a 12 m log, and 6 m on a 15 m log.

6.5.2.2.2 Grade Reduction for Conk, Pin Rot and Indian Paint Rot

Where there are conk knots present, but the conk does not show in the log ends, the entire length affected is grade reduction. It is assumed that no lumber can be cut from 2.4 m above and 3.6 m below the conk knots. Of course, residual sound end segments less than 2.5 m long must also be included as grade reduction:

- where conk shows in one or both ends and there are conk knots, it is presumed that no lumber can be cut from the length of log affected by the defect, with the following exceptions,
- where the defect showing in the end(s) and the conk knots are confined to the same half of the log's diameter, it is possible to cut lumber from the unaffected side. In such cases scalers should calculate a partial grade reduction for the affected log length based on the visual information available, or
- where the defect is visible in the log end(s) but there are no conk knots, the grade reduction should be calculated in the same manner as for other rots.

6.5.2.3 Potential Quality of Manufactured Products

As well as prescribing a percentage of the gross scale which must be suitable to produce manufactured products, each grade rule above Y includes a specification regarding the quality of the potential product. Specifically, percentages of the lumber or shingles are required to be "clear" or "merchantable".

Each grade rule has guidelines appended which state requirements regarding quality factors.

The quality considerations of knots, twist, stain and annual ring count are described in Sections 6.3 and 6.4. Some additional considerations specific to coastal grades are described below.

6.5.2.3.1 Size of Knots

Clear knot free timber is highly valued. Knots less than 1 rad detract from the appearance and lessen the value of lumber. Knots larger than 1 rad will reduce the strength of the

lumber. The larger the knot size the greater the loss in lumber strength, with extremely large knots making the cutting of merchantable lumber impossible.

In the sawlog grades, where knots are out of round, knot size is determined by averaging the maximum and minimum measurements. Peeler grades use the maximum measurement for out of round knots. The size of the knot does not include the shoulder.

Where the Grade Rule requirements stating maximum knot sizes and/or location are met, the merchantable or clear lumber percentage requirement for the grade will be satisfied.

6.5.2.3.2 Occasional Larger Knots

All sawlog grades can have occasional larger knots. Occasional larger knots are allowed to the extent of one per 3 m of log length and must be located where knot sizes for portions of logs are specified.

Interpretation:

If a grade requirement allows 4 cm knots over the entire log, occasional larger knots can be anywhere on the log. Where the requirement states 4 rads knots are allowed on the upper half of a log, the occasional larger knots must be confined to this area as well, with knots no larger than 1 rad permitted on the lower half of the log.

6.5.2.3.3 Pitch

Pitch may accumulate in pockets between the rings or within a ring shake. The presence of pitch will lower the value of clear lumber and veneer.

The requirements for the peeler grades and the premium and lumber grades for subject species include limits on the number and size of pitch pockets allowed. For butt cut logs, pitch pockets are assessed in the top end only.

6.5.2.3.4 Growth Rate (Ring Count)

As noted in Section 6.4, rings are counted at a point $\frac{1}{3}$ of the radius (or $\frac{1}{6}$ of the diameter) in from the outer circumference. The annual rings are then counted over 2 cm (1 rad) of distance from this point back toward the outer circumference.

Where logs have off centre hearts the rings are counted where they are widest. Where the heart is centred the rings are counted where they represent an average.

Ring counts are always taken at the top end of the log.

6.5.2.3.5 Insect or Worm Holes

A number of insects lay eggs under the bark of trees and the larvae will bore through the wood as they develop. When the presence of borings is observed, the quality of potential products may be reduced and the log grade affected.

Several grades of fir, pine and spruce do not allow borings other than those of the ambrosia beetle to penetrate beyond the sap wood.

The ambrosia beetle attacks felled timber, and the small holes made by this insect are common. This is not a serious defect for sawlog and utility grades which require merchantable quality lumber. Where the borings penetrate beyond the sap wood, the affected portion of the heart wood may not produce any clear lumber.

Cedar is affected by the borings of larvae of the western cedar borer. It is known as powder worm, and it is a serious defect, not allowed in six of the cedar grades.

Damage caused by marine creatures, including teredos, is not considered in the official scale for volume or grading purposes, but should be noted as a remark on the scale return.

6.5.2.4 Non-Permissible Defects

There are a number of defects which are not permitted to be present in certain grades of logs. Where such a defect is present, the log is disqualified from the grade, and from lower grades where the log is required to have been "otherwise" the higher grade for which it has a prohibited defect.

Examples of defects which are not permitted in certain grades are conk stain, powder worm and over-size knots.

Some grades permit certain defects only to a clearly defined limited extent. Examples are ring shake, pocket rot, pitch pockets and a number of peeler defects. When the defect is not confined to the stated limit, it is treated as a non-permissible defect for that grade.

All of the above defects are defined by log grade in Section 6.5.1.1 under the Log Requirements to Make the Grade.

6.5.2.5 Slabs

Slabs are not permitted in the sawlog J grade.

Slabs must be at least 38 cm (19 rads) to qualify for classification as D, E, F, G, H, I and K grades, and meet the minimum diameter for the grade.

The minimum slab thicknesses for the shingle grades are specified in the grade rule for each grade.

To qualify for the utility U grade slabs must be at least 16 cm (8 rads) thick with a mean diameter of 8 rads, and a shape suitable for lumber manufacture.

To qualify for the utility X grade slabs must be at least 10 cm (5 rads) thick, meet the grade rule minimum diameter of 5 rads and have a shape suitable for lumber manufacture.

6.5.4.7 No. 2 Sawlog Balsam and Hemlock, Grade Code H

6.5.4.7.1 Grade Rule

A log 5 m or more in length and:

1. 19 cm or more in radius where at least 75 percent of the gross scale can be manufactured into lumber and at least 65 percent of that lumber will be merchantable.
2. Otherwise Grade Code D or F, 25 cm or more in radius, where at least 50 percent of the gross scale can be manufactured into merchantable lumber, and at least 25 percent of that lumber will be clear.

6.5.4.7.2 Log Requirements to Make the Grade

1. There must be no fewer than five annual rings in each 2 cm of diameter.
2. On logs 19 to 24 cm in radius there must be no more than well-spaced knots up to 5 cm in diameter on the upper 50 percent of the visible surface, or reasonably well-spaced knots up to 4 cm in diameter over all the visible surface.
3. On logs 25 cm or over in radius there must be no more than occasional knots up to 8 cm in diameter on the upper 50 percent of the visible surface, or reasonably well-spaced knots up to 5 cm in diameter on the upper 66 2/3 percent of the visible surface or reasonably well-spaced knots up to 4 cm in diameter over all the visible surface.
4. Maximum twist permitted over 30 cm in length is 7 percent of the diameter up to a maximum deviation of 8 cm.
5.  Butt rot, butt shake, checks, conk, conk stain, crook, goitre, heart rot, loose knots, oversized knots, pocket rot, rotten knots, sap rot, shatter, splits, sweep, or other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.4.8 No. 3 Sawlog Balsam and Hemlock, Grade Code I

6.5.4.8.1 Grade Rule

A log:

1. 3.8 m or more in length and 19 cm or more in radius where at least 75 percent of the gross scale can be manufactured into lumber, and at least 50 percent of that lumber will be merchantable, or

- otherwise Grade Code H, 5 m or more in length and 19 cm or more in radius, where less than 75 percent but at least 50 percent of the gross scale can be manufactured into lumber and at least 65 percent of that lumber will be merchantable.

6.5.4.8.2 Log Requirements to Make the Grade

- By log radii, maximum knot size diameters that should not prevent the manufacture of the lumber requirements of the grade are:

Log radius	Knot size diameter
19 - 24 cm	8 cm
25 - 37 cm	9 cm
38 + cm	10 cm

- Maximum twist permitted over 30 cm of length is 10 percent of the diameter up to a maximum deviation of 9 cm.
-  Butt rot, butt shake, checks, conk, conk stain, crook, goitre, heart rot, loose knots, oversize knots, pocket rot, rotten knots, sap rot, shatter, splits, sweep, or other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.4.9 No. 4 Sawlog Balsam and Hemlock, Grade Code J

6.5.4.9.1 Grade Rule

A log 5 m or more in length and 8 to 18 cm in radius where at least 75 percent of the gross scale can be manufactured into lumber and at least 50 percent of that lumber will be merchantable.

6.5.4.9.2 Log Requirements to Make the Grade

- By log radii, maximum knot size diameters that should not prevent the manufacture of the lumber requirements of the grade are:

Log radius	Knot size diameter
8 - 13 cm	4 cm
14 - 18 cm	6 cm

- Maximum twist permitted over 30 cm of length is 10 percent of the diameter.
-  Butt rot, butt shakes, checks, conk, conk stain, crook, goitre, heart rot, loose knots, oversized knots, pocket rot, rotten knots, sap rot, shatter, splits, sweep, or other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.4.10 No. 5 Utility Balsam and Hemlock, Grade Code U

6.5.4.10.1 Grade Rule

A log:

1. 5 m or more in length and,
 - a. 5 to 7 cm in radius where at least 75 percent of the gross scale can be manufactured into lumber, or
 - b. 8 to 18 cm in radius where at least 66 2/3 percent of the gross scale can be manufactured into lumber, or
2. 3.8 m or more in length and 19 cm or more in radius where at least 50 percent of the gross scale can be manufactured into lumber,

and at least 35 percent of that lumber will be merchantable.

6.5.4.10.2 Log Requirements to Make the Grade

1. By log radii, maximum knot size diameters that should not prevent the manufacture of the lumber requirements of the grade are:

Log radius	Knot size diameter
5 - 7 cm	4 cm
8 - 13 cm	6 cm
14 - 18 cm	8 cm
19 - 24 cm	10 cm
25 - 37 cm	12 cm
38 + cm	14 cm

2. Maximum twist permitted over 30 cm of length is 13 percent of the diameter up to a maximum deviation of 13 cm.
3. Butt rot, butt shake, checks, conk, conk stain, crook, goitre, heart rot, loose knots, oversized knots, pocket rot, rotten knots, sap rot, splits, shatter, sweep, and the other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.4.11 No. 6 Utility Balsam and Hemlock, Grade Code X

6.5.4.11.1 Grade Rule

A log 3 m or more in length and 5 cm or more in radius where at least 33 1/3 percent of the gross scale can be manufactured into lumber and at least 35 percent of that lumber will be merchantable.

6.5.4.11.2 Log Requirements to Make the Grade

1. By log radii, maximum knot size diameters that should not prevent the manufacture of the lumber requirements of the grade are:

Log radius	Knot size diameter
5 - 7 cm	4 cm
8 - 13 cm	6 cm
14 - 18 cm	8 cm
19 - 24 cm	10 cm
25 - 37 cm	12 cm
38 + cm	14 cm

Logs 25 cm and over in radius will allow oversize knots up to a maximum of two per 3 m of log length.

2. Maximum twist permitted over 30 cm of length is 13 percent of the diameter up to a maximum deviation of 13 cm.
3.  Butt rot, butt shake, checks, conk, conk stain, crook, goitre, heart rot, loose knots, oversized knots, pocket rot, rotten knots, sap rot, splits, shatter, sweep, and other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.4.12 No. 7 Chipper Balsam and Hemlock, Grade Code Y

6.5.4.12.1 Grade Rule

A log lower in grade than utility and higher in grade than firmwood reject.

6.5.5 Cedar Grades

These grades apply only to red cedar.

6.5.7.1 No. 2 Sawlog Cedar, Grade Code H

6.5.7.1.1 Grade Rule

A log 5 m or more in length and 19 cm or more in radius where at least 75 percent of the gross scale can be manufactured into lumber and at least 65 percent of that lumber will be merchantable.

6.5.7.1.2 Log Requirements to Make the Grade

1. No powder worm damage is permitted.
2. On logs 19 to 24 cm in radius there must be no more than well-spaced knots up to 5 cm in diameter on the upper 50 percent of the visible surface or reasonably well-spaced knots up to 4 cm in diameter over all the visible surface.
3. On logs 25 cm or over in radius there must be no more than occasional knots up to 8 cm in diameter on the upper 50 percent of the visible surface, or well-spaced knots up to 5 cm in diameter on the upper 66 2/3 percent of the visible surface or reasonably well-spaced knots up to 4 cm in diameter over all the visible surface.
4. Maximum twist permitted over 30 cm of length is 7 percent of the diameter up to a maximum deviation of 8 cm.
5. Bark seams, burls, butt rot, catface, checks, heart rot, oversized knots, pocket rot, sap rot, shatter, splits, or other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.7.2 No. 3 Sawlog Cedar, Grade Code I

6.5.7.2.1 Grade Rule

A log:

1. 3.8 m or more in length and 19 cm or more in radius where at least 75 percent of the gross scale can be manufactured into lumber and at least 50 percent of that lumber will be merchantable.
2. 9.8 m or more in length and 25 cm or more in radius where at least 50 percent of the gross scale can be manufactured into lumber and at least 50 percent of that lumber will be merchantable.
3. Otherwise grade code H, 9.8 m or more in length and 19 cm or more in radius where at least 50 percent of the gross scale can be manufactured into lumber and at least 65 percent of that lumber will be merchantable.

6.5.7.2.2 Log Requirements to Make the Grade

1. By log radii, maximum knot size diameters which should not prevent the manufacture of the lumber requirements of the grade are:

Log radius	Knot size diameter
19 - 24 cm	8 cm
25 - 37 cm	9 cm
38 + cm	10 cm

2. Maximum twist permitted over 30 cm in length is 10 percent of the diameter up to a maximum deviation of 9 cm.
3.  Butt rot, catface, checks, crook, bark seams, heart rot, insect holes, loose knots, oversized knots, pocket rot, powder worm, rotten knots, sap rot, shatter, splits, sweep, or other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.7.3 No. 4 Sawlog Cedar, Grade Code J**6.5.7.3.1 Grade Rule**

A log 5 m or more in length and 8 to 18 cm in radius where at least 75 percent of the gross scale can be manufactured into lumber and at least 50 percent of that lumber will be merchantable.

6.5.7.3.2 Log Requirements to Make the Grade

1. By log radii, maximum knot size diameters which should not prevent the manufacture of the lumber requirements of the grade are:

Log radius	Knot size diameter
8 - 13 cm	4 cm
14 - 18 cm	6 cm

2. Maximum twist permitted over 30 cm of length is 10 percent of the diameter.
3.  Butt rot, catface, checks, crook, bark seams, heart rot, insect holes, loose knots, oversized knots, pocket rot, powder worm, rotten knots, sap rot, shatter, splits, sweep, or other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.7.4 Shingle Grades

Shingle grade logs will have fewer but possibly larger knots than sawlogs, so spaced to permit the production of shingle blocks. Shingle logs are generally not best utilized for the manufacture of lumber because of the nature of the knots or because they are irregular in shape, have excessive butt or heart rot, bark seams, open checks, rotten knots, shatter, or combinations of the above defects.

1. The shingle grade rules make no reference to the recovery of lumber. Scalers will judge the recovery percentage required to produce shingles or shakes.
2. Some very defective cedar logs should go into shingle grades.
3. 'D' quality logs with less than 75 percent suitable for lumber become 'K' grade, except D's 60 rads or larger which become K's if they have less than $66 \frac{2}{3}$ percent suitable for lumber.
4. 'F' quality logs with less than 75 percent lumber become 'L' grade, except that those from 25 to 29 rads which become K's if they have less than 75 percent suitable for lumber.

6.5.7.5 Other Considerations

Other defective cedar logs may fit either into a sawlog or shingle grade. The following types of logs and slabs should be given serious consideration for the shingle grade.

1. Logs less than 7.8 m in length, broken at one end.
2. Logs less than 9.8 m in length, broken at both ends.
3. Those 'H' or 'I' quality logs at least 9.8 m in length containing 50 - 74 percent lumber, that are more suitable for quality shingle recovery and can meet grade 'L' requirements.
4. Logs less than 12.8 m in length and less than 75 percent lumber with a serious defect at both ends.
5. 'D' and 'F' quality logs cut too short for those grades.

6.5.7.6 No. 1 Shingle Cedar, Grade Code K

6.5.7.6.1 Grade Rule

A log 3.8 m or more in length and 25 cm or more in radius or a slab 3.8 m or more in length, 25 cm or more in radius and 38 cm or more in thickness, where at least 50 percent of the gross scale can be manufactured into shingles or shakes, and at least 75 percent of the shingles or shakes will be clear.

6.5.7.6.2 Log Requirements to Make the Grade

1. No powder worm damage is permitted.
2. Logs 25 to 29 cm in radius must have the visible surface clear of knots and knot indications.
3. Logs 30 to 37 cm in radius must have at least 75 percent of the visible surface clear with knots or knot indications permitted on the upper 25 percent of two sides or the upper 50 percent of one side.
4. Logs 38 cm or over in radius must have at least $66 \frac{2}{3}$ percent of the visible surface clear with knots or knot indications permitted on the upper $33 \frac{1}{3}$ percent of two sides or the upper $66 \frac{2}{3}$ percent of one side.
5. Maximum twist permitted over 30 cm in length is 4 percent of the diameter up to a maximum deviation of 6 cm.
6. Bark seams, burls, butt rot, catface, checks, crook, heart rot, oversized knots, pocket rot, sap rot, shatter, splits, sweep, or other defects are permitted providing that the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.7.7 No. 2 Shingle Cedar, Grade Code L

6.5.7.7.1 Grade Rule

A log 3.8 m or more in length and 19 cm or more in radius or a slab 3.8 m or more in length, 19 cm or more in radius and 26 cm or more in thickness where at least 50 percent of the gross scale can be manufactured into shingles or shakes and at least 50 percent of the shingles or shakes will be clear.

6.5.7.7.2 Log Requirements to Make the Grade

1. No powder worm damage is permitted.
2. Logs must have at least 50 percent of the visible surface clear, with knots and knot indications permitted on the upper 50 percent of two sides, or on all of one side.

2. Logs 30 cm or over in radius must have at least 50 percent of the visible surface clear with knots or knot indications permitted on the upper 50 percent of two sides or the upper 75 percent of one side.
3. Maximum twist permitted over 30 cm of length is 4 percent of the diameter up to a maximum deviation of 6 cm.
4. Adventitious knots, burls, butt rot, catface, checks, crook, frost checks, heart rot, oversized knots, pocket rot, ring rot, sap rot, shatter, splits, stain, sweep, or other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.8.3 No. 2 Sawlog Cypress, Grade Code H

6.5.8.3.1 Grade Rule

A log 4 m or more in length and 19 cm or more in radius where at least 50 percent of the gross scale can be manufactured into lumber and at least 65 percent of that lumber will be merchantable.

6.5.8.3.2 Log Requirements to Make the Grade

1. On logs 19 to 24 cm in radius there must be no more than well-spaced knots up to 5 cm in diameter on the upper 50 percent of the visible surface, or reasonably well-spaced knots up to 4 cm in diameter over all the visible surface.
2. On logs 25 cm or over in radius there must be no more than occasional knots up to 8 cm in diameter on the upper 50 percent of the visible surface, or well-spaced knots up to 5 cm in diameter on the upper 66 2/3 percent of the visible surface or reasonably well-spaced knots up to 4 cm in diameter over all the visible surface.
3. Maximum twist permitted over 30 cm of length is 7 percent of the diameter up to a maximum deviation of 8 cm.
4.  Butt rot, catface, checks, frost checks, heart rot, oversized knots, pocket rot, ring rot, sap rot, shatter, splits,  or other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.8.4 No. 3 Sawlog Cypress, Grade Code I

6.5.8.4.1 Grade Rule

A log 4 m or more in length and 19 cm or more in radius where at least 50 percent of the gross scale can be manufactured into lumber and at least 50 percent of that lumber will be merchantable.

6.5.8.4.2 Log Requirements to Make the Grade

1. By log radii, maximum knot size diameters that should not prevent the manufacture of the lumber requirements of the grade are:

Log radius	Knot size diameter
19 - 24 cm	8 cm
25 - 37 cm	9 cm
38 + cm	10 cm

2. Maximum twist permitted over 30 cm in length is 10 percent of the diameter up to a maximum deviation of 9 cm.
3.  Butt rot, catface, checks, crook,  frost checks, heart rot, insect holes, loose knots, oversized knots, pocket rot, ring rot, rotten knots, sap rot, shatter, splits,  sweep, or other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.8.5 No. 4 Sawlog Cypress, Grade Code J

6.5.8.5.1 Grade Rule

A log 4 m or more in length and 8 to 18 cm in radius where at least 75 percent of the gross scale can be manufactured into lumber and at least 50 percent of that lumber will be merchantable.

6.5.8.5.2 Log Requirements to Make the Grade

1. By log radii, maximum knot size diameters that should not prevent the manufacture of the lumber requirements of the grade are:

Log radius	Knot size diameter
8 - 13 cm	4 cm
14 - 18 cm	6 cm

2. Maximum twist permitted over 30 cm in length is 10 percent of the diameter.
3.  Butt rot, catface, checks, crook,  frost checks, heart rot, insect holes, loose knots, oversized knots, pocket rot, ring rot, rotten knots, sap rot, shatter, splits,  sweep, or other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.8.6 No. 5 Utility Cypress, Grade Code U

6.5.8.6.1 Grade Rule

A log:

1. 5 m or more in length and
 - a. 5 to 7 cm in radius where at least 75 percent of the gross scale can be manufactured into lumber, or
 - b. 8 to 18 cm in radius where at least 66 2/3 percent of the gross scale can be manufactured into lumber, or
2. 3.8 m or more in length and 19 cm or more in radius where at least 50 percent of the gross scale can be manufactured into lumber,

and at least 35 percent of that lumber will be merchantable.

6.5.8.6.2 Log Requirements to Make the Grade

1. By log radii, maximum knot size diameters that should not prevent the manufacture of the lumber requirements of the grade are:

Log radius	Knot size diameter
5 - 7 cm	4 cm
8 - 13 cm	6 cm
14 - 18 cm	8 cm
19 - 24 cm	10 cm
25 - 37 cm	12 cm
38 + cm	14 cm

2. Maximum twist permitted over 30 cm of length is 13 percent of the diameter up to a maximum deviation of 13 cm.

3.  Butt rot, catface, checks, crook,  frost checks, heart rot, insect holes, loose knots, oversized knots, pocket rot, rotten knots, sap rot, shatter, splits, , sweep, or other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.8.7 No. 6 Utility Cypress, Grade Code X

6.5.8.7.1 Grade Rule

A log 3 m or more in length and 5 cm or more in radius where at least 33 1/3 percent of the gross scale can be manufactured into lumber and at least 35 percent of the lumber will be merchantable.

6.5.8.7.2 Log Requirements to Make the Grade

1. By log radii, maximum knot size diameters that should not prevent the manufacture of the lumber requirements of the grade are:

Log radius	Knot size diameter
5 - 7 cm	4 cm
8 - 13 cm	6 cm
14 - 18 cm	8 cm
19 - 24 cm	10 cm
25 - 37 cm	12 cm
38 + cm	14 cm

Logs 25 cm and over in radius will allow oversize knots up to a maximum of two per 3 m of log length.

2. Maximum twist permitted over 30 cm of length is 13 percent of the diameter up to a maximum deviation of 13 cm.
3.  Butt rot, butt shake, checks,  crook, goitre, heart rot, loose knots, oversized knots, pocket rot, rotten knots, sap rot, splits, shatter, sweep, and other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.8.8 No. 7 Chipper Cypress, Grade Code Y

6.5.8.8.1 Grade Rule

A log lower in grade than utility and higher in grade than firmwood reject.

6.5.9 Fir and Pine Grades

With the exception that pine has no peeler grades, these two genera are graded the same. The grades apply to all species of pine found in the province.

6.5.9.1 No. 1 Lumber Fir and Pine, Grade Code D

6.5.9.1.1 Grade Rule

A log 5 m or more in length and 38 cm or more in radius where at least 75 percent of the gross scale can be manufactured into merchantable lumber and at least 50 percent of that lumber will be clear.

6.5.9.1.2 Log Requirements to Make the Grade

1. No conk or conk stain is permitted.
2. Pocket rot is allowable only if it is contained within a circle $\frac{1}{3}$ the log radius, measured from the pith.
3. There must be no fewer than six annual rings in each 2 cm of diameter.
4. Logs must have at least 90 percent of the visible surface clear with only a few well-spaced knots or knot indications permitted on the upper 10 percent of two sides or the upper 20 percent of one side.
5. Maximum twist permitted over 30 cm in length is 4 percent of the diameter up to a maximum deviation of 6 cm.
6. Only small pitch pockets ranging in numbers per end from three for logs 38 cm in radius to six for logs 76 cm or over in radius are permitted.
7. No ring shakes (full or partial) are permitted in that part of the log between 8 cm and 20 cm of the bark.
8. A ring shake within 8 cm of the bark is only permitted if the log inside the shake is at least 38 rads, and the log meets the rest of the grade rule.
9. Insect or worm holes other than ambrosia must not penetrate beyond the sap wood.
10. Ambrosia, butt rot, burls, checks, crook, heart rot, ring shake, sap rot, shatter, splits, sweeps, or other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.9.2 No. 2 Lumber Fir and Pine, Grade Code F

6.5.9.2.1 Grade Rule

A log 5 m or more in length and 30 cm or more in radius where at least 75 percent of the gross scale can be manufactured into merchantable lumber and at least 25 percent of that lumber will be clear.

6.5.9.2.2 Log Requirements to Make the Grade

1. No conk or conk stain is permitted.
2. Pocket rot is allowed only if it is contained within a circle 1/3 of the log radius, measured from the pith.
3. There must be no fewer than six annual rings in each 2 cm of diameter.
4. Logs 30 to 37 cm of radius must have at least 75 percent of the visible surface clear with only a few well-spaced knots or knot indications permitted on the upper 25 percent of two sides or the upper 50 percent of one side.
5. Logs 38 cm and over in a radius must have at least 50 percent of the visible surface clear with only a few well-spaced knots or knot indications permitted on the upper 50 percent of two sides or upper 75 percent of one side.
6. Maximum twist permitted over 30 cm in length is 4 percent of the diameter at the top of the log to a maximum deviation of 6 cm.
7. Only small pitch pockets ranging in number per end from two for logs 30 cm in radius up to six for logs 76 cm or over in radius are permitted.
8. A ring shake that encircles half or more of the circumference of the ring is not permitted in that portion of the log between 4 rads and 10 rads of the bark. A ring shake within 4 rads of the bark is only permitted if within that part of the log inside the shake is at least 30 rads and the log meets the rest of the grade rule.
9. Insect or worm holes other than ambrosia must not penetrate beyond the sap wood.
10. Ambrosia, butt rot, burls, checks, crook, heart rot, ring shake, sap rot, shatter, splits, sweeps, or other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

2. 25 cm or more in radius where at least 50 percent of the gross scale can be manufactured into lumber, and at least 65 percent of that lumber will be merchantable.

6.5.9.5.2 Log Requirements to Make the Grade

1. There must be no fewer than five annual rings in each 2 cm of diameter.
2. On logs 19 to 24 cm in radius there must be no more than well-spaced knots up to 5 cm in diameter on the upper 50 percent of the visible surface, or reasonably well-spaced knots up to 4 cm in diameter over all the visible surface.
3. On logs 25 cm or over in radius there must be no more than occasional knots up to 8 cm in diameter on the upper 50 percent of the visible surface, or reasonably well-spaced knots up to 5 cm in diameter on the upper 66 2/3 percent of the visible surface or reasonably well spaced knots up to 4 cm in diameter over all the visible surface.
4. Maximum twist permitted over 30 cm in length is 7 percent of the diameter up to a maximum deviation of 8 cm.
5. Insect or worm holes other than ambrosia must not penetrate beyond the sap wood.
6.  Butt rot, checks, conk, conk stain, crook, heart rot, oversized knots, pitch pockets, pocket rot, ring shake, sap rot, shatter, splits, sweep, or other defects are permitted providing the portion of log free from these defects is sufficient to meet the grade rule.

6.5.9.6 No. 3 Sawlog Fir and Pine, Grade Code I

6.5.9.6.1 Grade Rule

A log:

1. 3.8 m or more in length and
 - a. 19 cm or more in radius where at least 75 percent of the gross scale can be manufactured into lumber, or
 - b. 25 cm or more in radius where at least 50 percent of the gross scale can be manufactured into lumber
 - c. and at least 50 percent of that lumber will be merchantable, or
2. otherwise grade code H, 5 m or more in length and 19 to 24 cm in radius, where less than 75 percent but at least 50 percent of the gross scale can be manufactured into lumber and at least 65 percent of that lumber will be merchantable.

6.5.9.6.2 Log Requirements to Make the Grade

1. By log radii, maximum knot size diameters that should not prevent the manufacture of the lumber requirements of the grade are:

Log radius	Knot size diameter
19 - 24 cm	8 cm
25 - 37 cm	9 cm
38 + cm	10 cm

2. Maximum twist permitted over 30 cm of length is 10 percent of the diameter up to a maximum deviation of 9 cm.
3. Bunch knots,  butt rot, checks, conk, conk stain, crook, heart rot, insect holes, loose knots, oversized knots, pitch pockets, pocket rot, ring shake, rotten knots, sap rot, shatter, splits, sweep, or other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.9.7 No. 4 Sawlog Fir and Pine, Grade Code J**6.5.9.7.1 Grade Rule**

A log 5 m or more in length and 8 to 18 cm in radius where at least 75 percent of the gross scale can be manufactured into lumber and at least 50 percent of that lumber will be merchantable.

6.5.9.7.2 Log Requirements to Make the Grade

1. By log radii, maximum knot size diameters that should not prevent the manufacture of the lumber requirements of the grade are:

Log radius	Knot size diameter
8 - 13 cm	4 cm
14 - 18 cm	6 cm

2. Maximum twist permitted over 30 cm of length is 10 percent of the diameter.
3.  Butt rot, butt shakes, checks, conk, conk stain, crook, goitre, heart rot, loose knots, oversized knots, pocket rot, rotten knots, sap rot, shatter, splits, sweep, or other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.10.5 No. 2 Sawlog Spruce, Grade Code H**6.5.10.5.1 Grade Rule**

A log:

1. 4 m or more in length and 19 cm or more in radius where at least 75 percent of the gross scale can be manufactured into lumber and at least 65 percent of that lumber will be merchantable or,
2. Otherwise grade code D, E, F or G, 4 m or more in length and 30 cm or more in radius, where less than 75 percent but at least 50 percent of the gross scale can be manufactured into merchantable lumber and at least 25 percent of the lumber will be clear.

6.5.10.5.2 Log Requirements to Make the Grade

1. There must be no fewer than five annual rings in each 2 cm of diameter.
2. On logs 19 to 24 cm in radius there must be no more than well-spaced knots up to 5 cm in diameter on the upper 50 percent of the visible surface, or reasonably well-spaced knots up to 4 cm in diameter over all the visible surface.
3. On logs 25 cm or over in radius there must be no more than occasional knots up to 8 cm in diameter on the upper 50 percent of the visible surface, or reasonably well-spaced knots up to 5 cm in diameter on the upper 66 2/3 percent of the visible surface, or reasonably well-spaced knots up to 4 cm in diameter over all the visible surface.
4. Maximum twist permitted over 30 cm of length is 7 percent of the diameter up to a maximum deviation of 8 cm.
5. Insect or worm holes other than ambrosia must not penetrate beyond the sap wood.
6.  Butt rot, checks, conk, conk stain, crook, heart rot, oversized knots, pitch pockets, pocket rot, ring shake, sap rot, shatter, splits, sweep, or other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.10.6 No. 3 Sawlog Spruce, Grade Code I

6.5.10.6.1 Grade Rule

A log 4 m or more in length and

1. 19 cm or more in radius where
 - a. at least 75 percent of the gross scale can be manufactured into lumber and at least 50 percent of that lumber will be merchantable, or
 - b. otherwise grade code H, where less than 75 percent but at least 50 percent of the gross scale can be manufactured into lumber and at least 65 percent of that lumber will be merchantable, or
2. 25 cm more in radius where at least 50 percent of the gross scale can be manufactured into lumber and at least 50 percent of that lumber will be merchantable.

6.5.10.6.2 Log Requirements to Make the Grade

1. By log radii, maximum knot size diameters that should not prevent the manufacture of the lumber requirements of the grade are:

Log radius	Knot size diameter
19 - 24 cm	8 cm
25 - 37 cm	9 cm
38 - 49 cm	10 cm
50 + cm	13 cm

2. Maximum twist permitted over 30 cm of length is 10 percent of the diameter up to a maximum deviation of 9 cm.
3. Bunch knots,  butt rot, checks, conk, conk stain, crook, heart rot, insect holes, loose knots, oversized knots, pitch pockets, pocket rot, ring shake, rotten knots, sap rot, shatter, splits, sweep, or other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.10.7 No. 4 Sawlog Spruce, Grade Code J

6.5.10.7.1 Grade Rule

A log 4 m or more in length and 8 to 18 cm in radius where at least 75 percent of the gross scale can be manufactured into lumber and at least 50 percent of that lumber will be merchantable.

6.5.10.7.2 Log Requirements to Make the Grade

1. By log radii, maximum knot size diameters that should not prevent the manufacture of the lumber requirements of the grade are:

Log radius	Knot size diameter
8 - 13 cm	4 cm
14 - 18 cm	6 cm

2. Maximum twist permitted over 30 cm of length is 10 percent of the diameter.
3.  Butt rot, butt shakes, checks, conk, conk stain, crook, goitre, heart rot, loose knots, oversized knots, pocket rot, rotten knots, sap rot, shatter, splits, sweep, or other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.10.8 No. 5 Utility Spruce, Grade Code U**6.5.10.8.1 Grade Rule**

A log:

1. 5 m or more in length, and
 - a. 5 to 7 cm in radius where at least 75 percent of the gross scale can be manufactured into lumber, or
 - b. 8 to 18 cm in radius where at least 66 2/3 percent of the gross scale can be manufactured into lumber, or
2. 3.8 m or more in length and 19 cm or more in radius where at least 50 percent of the gross scale can be manufactured into lumber

and at least 35 percent of that lumber will be merchantable.

6.5.10.8.2 Log Requirements to Make the Grade

1. By log radii, maximum knot size diameters that should not prevent the manufacture of the lumber requirements of the grade are:

Log radius	Knot size diameter
5 - 7 cm	4 cm
8 - 13 cm	6 cm
14 - 18 cm	8 cm
19 - 24 cm	10 cm
25 - 37 cm	12 cm
38 - 49 cm	14 cm

50 + cm	16 cm
---------	-------

- Maximum twist permitted over 30 cm of length is 13 percent of the diameter up to a maximum deviation of 13 cm.
- Butt rot, butt shake, checks, conk, conk stain, crook, goitre, heart rot, loose knots, oversized knots, pocket rot, rotten knots, sap rot, splits, shatter, sweep, and other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

6.5.10.9 No. 6 Utility Spruce, Grade Code X

6.5.10.9.1 Grade Rule

A log 3 m or more in length and 5 cm or more in radius where at least 33 1/3 percent of the gross scale can be manufactured into lumber and at least 35 percent of that lumber will be merchantable.

6.5.10.9.2 Log Requirements to Make the Grade

- By log radii, maximum knot size diameters that should not prevent the manufacture of the lumber requirements of the grade are:

Log radius	Knot size diameter
5 - 7 cm	4 cm
8 - 13 cm	6 cm
14 - 18 cm	8 cm
19 - 24 cm	10 cm
25 - 37 cm	12 cm
38 - 49 cm	14 cm
50 + cm	16 cm

Logs 25 cm and over in radius will allow oversize knots up to a maximum of two per 3 m of log length.

- Maximum twist permitted over 30 cm of length is 13 percent of the diameter up to a maximum deviation of 13 cm.
- Butt rot, butt shake, checks, conk, conk stain, crook, goitre, heart rot, loose knots, oversized knots, pocket rot, rotten knots, sap rot, splits, shatter, sweep, and other defects are permitted providing the portion of the log free from these defects is sufficient to meet the grade rule.

2. Diameter References

This table summarizes the type and use of diameter measurements in interior grading.

Diameter	Referenced For
top diameter (inside bark)	assessing twist, lengths ≤ 8 m. assessing knots, lengths ≤ 8 m and, knots on the upper 1/2, lengths > 8 m. minimum top diameter.
midpoint diameter (inside bark)	assessing twist on logs > 8 m. assessing knots on lower half of logs > 8 m. assessing lumber recovery in red cedar > 25 r at midpoint.
diameter (outside bark) 15 cm from the butt end	assessing if logs cut from undersized tree

6.6.4.2 Logs Cut from Dead Trees

Scalers must closely follow the criteria detailed under Section 6.4.4.1 of this manual.

Logs showing both indicators and contraindicators must be assumed to be cut from living trees.

6.6.4.3 Logs Cut from Undersized Trees

Scalers must closely follow the criteria outlined under Section 6.4.4.2 of this manual.

To conclude that a log was cut from an undersized tree:

- the log must show sufficient evidence such as an undercut, butt flare, or other butt characteristics to indicate that it comprises a tree and not a top cut or second cut from a larger tree, and
- the outside bark measurement at a point 15 cm from the butt face, must be less than the minimum diameter at stump height specified in the cutting authority.

Logs must not be graded as Grade 6 if there is no evidence the log was cut from an undersized tree.

6.6.4.4 Knots

Merchantable lumber can be produced only from logs and log segments having knots not larger than specified maximums. For interior grading, both the midpoint and top diameters may be referenced in assessing knots. Knot specifications are as follows:

Log Diameter	Maximum Knot Diameter	
	RADS	CM
5 - 7	2	4
8 - 13	3	6
14 - 18	4	8
19 - 24	5	10
25 - 37	6	12
38+	7	14

To apply:

1. For logs ≤ 8 m in length assess knots against the top (inside) diameter.
2. For logs > 8 m in length, measure the midpoint diameter and:
 - a. assess knots on the top log segment against the top diameter, and
 - b. assess knots on the bottom log segment against the midpoint (inside) diameter.

Logs or log segments with excessive oversize knots are deemed to be unsuitable for the manufacture of merchantable lumber.

Knots which exceed the maximum are considered as oversize. Interior grading allows one oversize knot for every 3 m of log length. As the minimum log length for lumber recovery is 2.5, this assumes a 2.5 m sawlog segment could be cut between knots which are 3 m apart.

The location and frequency of oversize knots is a key determinant in assessing the merchantability of potential lumber recovery.

Refer to Section 6.4.3 for a more complete discussion.

6.6.4.5 Twist (Spiral Grain)

Measure twist over a representative 15 rad (30 cm) log section. To manufacture merchantable lumber, the grain deflection over the 15 rad (30 cm) section cannot exceed 15 percent of the reference diameter:

- for logs ≤ 8 m in length the reference diameter is the logs top diameter, and
- for logs > 8 m in length the reference diameter is the log's midpoint (inside bark) diameter.

Application of the interior twist criteria is subject to:

- twist must be in excess of 2 rads (4 cm) before it can be considered for grading purposes, and
- regardless of diameter, the maximum allowable twist for any log is 4.5 rads (9 cm).

Logs  displaying excessive twist are deemed to be unsuitable for the manufacture of merchantable lumber.

See Sections 6.32 and 6.4.3 principles and application of twist measurement.

6.6.5 Definition of Terms in the Schedule of Interior Timber Grades

Gross Scale

Gross scale means the volume of a log inside the bark and includes unsound wood and holes in the log.

Lumber

Lumber must be 2.5 m long and free of rot and fractures.

Merchantable Lumber

Merchantable lumber means good, strong, general purpose lumber graded as better than utility or number 3 (this is assessed on the basis of knots and twist).

Radius and Diameter

Log radius in the grade rules is expressed as centimetres of radius, which is equal to and interchangeable with, rads of diameter.

An exception should be noted in the grade rule for firwood reject where the measurement is expressed in centimetres of *diameter*.

6.6.6 Interior Grade Rules and Application

The following sections state each of the six interior grade rules as they appear in the *Scaling Regulation*.

The sections entitled "Application of the Grade Rule" which follows each grade rule includes information on how to apply the grade rule and enter the grade on the scale tally sheet or into a handheld data collector.

6.6.7 Firmwood Reject - Grade Code Z (weight scale species code R)

6.6.7.1 Grade Rule

1. A log where:
 - a. heart rot or hole runs the entire length of the log and the residual collar of the firmwood constitutes less than 50 percent of the gross scale of the log,
 - b. rot is in the log and the scaler estimates the net length of the log to be less than 1.2 m, or
 - c. sap rot or charred wood exists and the residual firmwood is less than 10 cm in diameter at the butt end of the log.
2. That portion of a log that is less than 10 cm in diameter or that portion of a slab that is less than 10 cm in thickness.

6.6.7.2 Application of the Grade Rule

1. Firmwood reject takes precedence over all other grades.
2. Part 2 of the grade rule requires that any parts of logs less than 10 cm (5 rads) in diameter must be recorded as separate logs and graded as firmwood reject.
3. Similarly, portions of logs and slabs less than 10 cm (5 rads) must be recorded as separate logs and graded as firmwood reject.
4. When scaling weight scale sample loads for recording firmwood reject logs the species is not recorded. Instead, the letter R followed by a blank is recorded in the species field.

	SP	G
Example Weight Scale Entry:	R	Z

5. For piece scales and scaling examinations, the correct species is always entered against all grades.

	SP	G
Example Piece Scale and Scaling Exam Entry:	CE	Z

6.6.8 Sawlog Grade Code () Blank

6.6.8.1 Grade Rule

A log or slab 2.5 m or more in length and 5 cm or more in radius where

1. for a hemlock log, at least 75 percent of the gross scale can be manufactured into lumber,
2. for a cedar log
 - a. up to and including 25 cm in radius at the midpoint, at least 75 percent of the gross scale can be manufactured into lumber, or
 - b. greater than 25 cm in radius at the midpoint, at least 50 percent of the gross scale can be manufactured into lumber,
3. for a balsam log, at least 67 percent of the gross scale can be manufactured into lumber, and
4. for a log of species other than hemlock, cedar or balsam, at least 50 percent of the gross scale can be manufactured into lumber, and
5. at least 50 percent of the lumber will be merchantable.

6.6.11 Dead and Dry Lumber Reject - Grade Code 5**6.6.11.1 Grade Rule**

A log or slab graded as lumber reject cut from a tree which was dead and dry when harvested.

6.6.11.2 Application of the Grade Rule

1. Grade 5 logs are lumber rejects (Grade 4) cut from logs which were dead and dry when harvested.
2. The criteria outlined in Section 6.4.4.1 must be strictly followed in determining whether logs are cut from living or dead trees.
3. Logs cut from dead and dry trees measuring 15 cm (7.5 rads) or less at the midpoint may be considered for grade reduction if they contain two or more surface checks at least 4 cm (2 rads) in depth. The length affected by the checking is 100 percent grade reduction, and if sufficient volume of the log is so affected, it shall be coded as grade 5.
4. The grade is recorded on the tally sheet as follows:

SP	G
CE	5

6.6.12 Undersized Log Grade - Grade Code 6**6.6.12.1 Grade Rule**

A log or slab higher in grade than firwood reject and cut from a tree which was below the minimum diameter, including the bark, at stump height.

6.6.12.2 Application of the Grade Rule

1. Logs qualify for Grade 6 only where they can be clearly identified as being cut from a tree which was below the minimum diameter at stump height (DSH) specified in the cutting authority.
2. The criteria outlined in Section 6.4.4.2 must be closely followed in identifying undersized logs.
3. If timber is harvested on an area not having cutting specifications set by the Ministry, Scalers are to assume a DSH of 15 cm for pine and 20 cm for all other species.
4. If logs do not show evidence they are cut from undersized trees they must not be graded as Grade 6.
5. The grade is recorded on the tally sheet as follows:

SP	G
CE	6

6.6.13 Grade Precedence

Where a log meets the criteria of more than one grade, the following grade precedence applies:

1. A log or portion of a log that qualifies as firmwood reject (grade code Z) takes precedence over other grades.
2. A log that qualifies as undersize (grade code 6) takes precedence over all other grades except firmwood reject.
3. A log that qualifies as a Dead/Dry lumber reject (grade code 5) takes precedence over lumber reject (grade code 4).
4. A log which qualifies as a Dead/Dry sawlog (grade code 3) takes precedence over a green sawlog (grade code blank).
5. A log which qualifies as a Lumber Reject, (grade code 4) takes precedence over a green sawlog (grade code blank).

Documenting and Reporting Scale

Results

7

Under the *Forest Act*, the owner of the scale site, the operator of the scale site, the mark holder and the scaler are all individually responsible for submitting the results of the scale in the form of a scale return. This chapter covers a number of related areas:

- an explanation on how to complete the different scale returns,
- an explanation of scale and royalty invoices,
- timing requirements for submission of scale returns,
- penalties for late submission of scale data,
- data retention requirements,
- computation standards and controls,
- electronic submission of scale results,
- approvals required to compile and submit scale data,
- data loss,
- Ministry of Forests checking functions,
- changes to scale data, and
- accessibility of scale data to the public.

7.1 Scale Documentation

7.1.1 Introduction

The purpose of this section is to familiarize all users with the completion and submission of the various forms used to document the scale and related scaling activities.

Two types of documents are in place:

- the scale return and the documents used to prepare the scale return, and
- the other documents which support the scale data control and scaling administration.

Scale Returns, for the purposes of this chapter, include the summary of scale, the original scale tally (or detailed log listing), the weight scale load slips and monthly summaries, and include any other documentation that is used as the basis for a billing.

7.1.2 Documentation Conventions

Before detailing each document you should understand the conventions common to completing every document. These conventions include:

- **Formats.** Standard formats, set by the ministry help ensure satisfactory control of scale data. All computer generated facsimiles of the scale returns must be approved prior to their use.
- **Originals.** In all cases the original signed copy of the scale return, and or tally sheet, must be submitted to the ministry for processing.
- **Legibility.** All documents  must be legible. Always use a sharp pencil, a pen or fresh printer cartridge when preparing originals for submission.
- **Scaler's Signature.** As detailed further in this section, the scaler performing the scale is responsible for signing various scale documents. In addition, the scaler performing the scale is responsible for initialing any changes to the scale return or other documentation.
- **Supporting Documentation.** Any supporting documentation, such as tally sheets, should always be attached to the scale return.

All documentation must be filed in an orderly manner, and submitted to the ministry, or retained in a safe place as per the applicable authorization. This will facilitate retrieval if required for review by a Forest Officer.

It is the obligation of the scaler, the site operator, and the computing service to ensure they are aware of all documentation requirements, including retention and submission as per the scaler authorization, the scale site authorization, and/or computing authorization.

Contact the local Ministry of Forests office if clarification on the completion or submission requirements of any document is required.

7.1.2.1 Recording Commonly Misinterpreted Characters

When hand-written scale returns are being used, the scaler should ensure the writing implement used provides clearly discernible figures.

Record the number zero, as 0, with no line through it.

Record the alpha character, Ø, with a stroke through it.

Record the number seven without any line through the centre, 7.

Record the letter, I, and ensure it is crossed at the top and bottom, to differentiate it from a one (1) or a lower case L.

Record the letter J, with the top crossed to distinguish it from a U.

Record the letter S with an underscore to distinguish it from a 5.

Record the letter Y, not 4, to distinguish it from a 4 and a U.

Record the letter Z with a line through it to distinguish the letter from a number 2.

Record the number 4, not 9, to distinguish it from a 9.

Record the following special symbols, which may form part of a timber mark, as follows:

Mark Symbol		Data Entry Key	
 (a crescent)	=	' (apostrophe)	
 (a wavy line)	=	:	(colon)
 < (a delta)	=	<	(less than symbol)
/ (a slash within mark)	=	/	(slash)
 (a bar)	=	-	(hyphen or dash)

7.1.3 Scale Documentation

As outlined in Figure 7.1, the type of scaling predicates which scale returns must be completed.

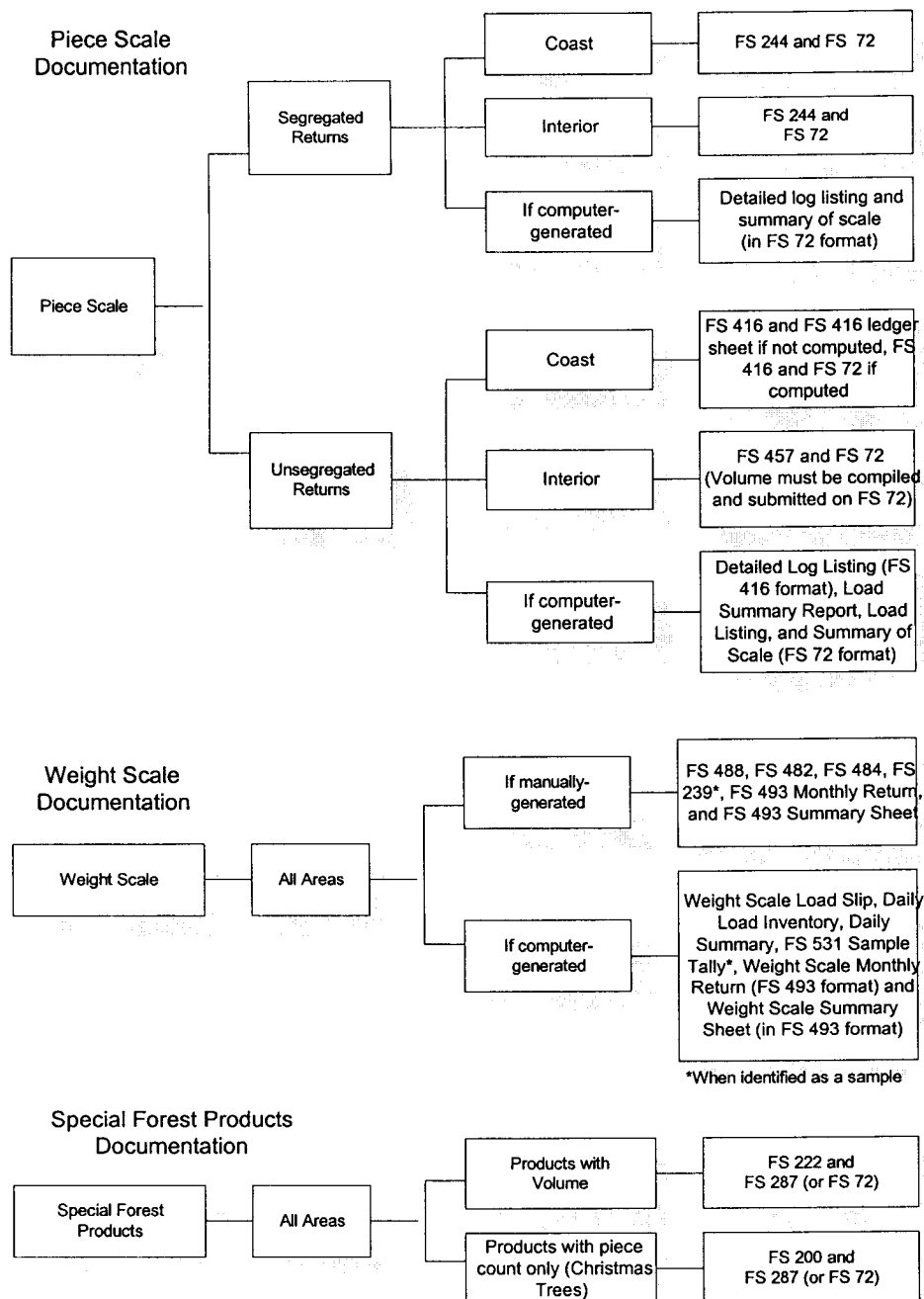


Figure 7.1 Flow chart showing documentation requirements for various scale types.

7.2.1 Penalties for Late Submission of Scale Returns

When a scale return is not received by the ministry within seven (7) days of the date specified in the scale site authorization penalties may be assessed.

When penalties are assessed, the amount of the penalty is the greater of:

- \$100.00, or
- a percentage of the stumpage or royalty payable as a result of the scale return.

The penalty percentage, as set under the *Scaling Regulation*, increases with the period of delay in receiving the scale return.

If no stumpage or royalty is payable, the minimum penalty of \$100.00 applies if a penalty is assessed.

To assess a penalty for late submission of scale data, the *Scaling Regulation* requires the scale site authorization to define when scale returns are to be received by the ministry.

7.2.2 Electronic Submission of Scale Results

The regional manager may order the scale site owner or operator to enter into arrangements to submit scale returns to the ministry electronically, under the authority of the *Forest Act*, where:

- the regional manager estimates the annual volume of timber scaled at a scale site will exceed 50 000 cubic metres per year, and
- the ministry has the ability to receive scale data electronically.

The reasons for using electronic data submission include:

- greater accuracy in scale returns, as errors in scale data processing are reduced,
- streamlining administrative effort in processing scale data, and
- significantly improved audit control.

7.3 Scale Data Computation and Documentation Standards and Controls

1. The completeness, accuracy and security of scale data is the responsibility of all parties who collect, process, or submit scale data.
2. All parties collecting, processing or submitting scale data must have an adequate system of internal controls, including scale data controls, processing conventions and administrative processes to ensure all scale data is complete, accurate and secure.
3. The Ministry of Forests will conduct checks and audits to assess the accuracy and completeness of scale data and the adequacy of controls.

To ensure that scale data is consistent and reliable for all users, it must be captured, compiled, and reported in accordance with set standards. These standards are set by the Ministry of Forests.

Appendix B of this chapter documents standards for:

- compiling log and segregation volumes,
- compiling weight scale data, and
- reporting requirements for documenting the summary of scale and computed weight scale samples.

The ministry may set other standards regulating the submission, computation, control, and documentation of scale data. All persons processing scale data must ensure they are conversant with ministry requirements and ensure their standards are current.

Appendix C of this chapter identifies control requirements which must be part of any system designed to capture, compile or report scale data. The appendix further describes those scale data controls and processing conventions which should be in place to meet the control requirements.

Parties processing scale data are subject to periodic audit by the ministry. Licensees and any other parties processing scale data may be required to assess and report their compliance with control requirements. Section 6 of Appendix 7C outlines self assessment procedures.

Where the ministry considers controls to be deficient, it may deny parties from processing and submitting scale data.

All parties compiling and reporting scale data must be thoroughly familiar with Appendices B and C of this chapter.

7.4 Ensuring Compliance with Standards

In addition to setting scale computation and documentation standards and controls, the Ministry of Forests is responsible for ensuring they are complied with. This responsibility is met through two activities:

- approving all applications to process scale data, and
- assessing compliance with standards and controls.

7.4.1 Approving Applications to Process Scale Data

The following procedures are in place to approve scale data processing.

7.4.1.1 Piece Scale Computation

For approval to compile piece scale data, an application must be submitted to the regional manager. This application must include copies of supporting documentation (including both final reports and raw data) as well as a completed copy of the self-assessment questionnaire/report included under Appendix 7C of this manual. The application may also require submission of supporting software and source code.

Following the forest region's approval, proposals to compile piece scale data for any specific scale site must be approved by the forest district as part of the scale site authorization for that scale site.

7.4.1.2 Weight Scale Computation

All weight scale releases including the software to select samples and compile data must be submitted to Revenue Branch for approval. The application must include all supporting documentation, as well as a completed copy of the self-assessment questionnaire/report included under Appendix 7C of this manual.

Following approval by Revenue Branch, proposals to use the program for specific sites must be approved by the forest district as part of the scale site authorization for that site.

7.4.1.3 Handheld Data Processing

Proposals to capture, compile, or report scale data using handheld computers are subject to approval by Revenue Branch.

For this approval, applications must include copies of the software and user guide, raw scale data, detailed log listings, and computed reports (FS 531 - Computed weight scale sample and FS 72 - Summary of scale) which will be submitted to the ministry for processing (see Appendix 7B). The application must also include a completed copy of the self-assessment questionnaire/report included under Appendix 7C of this manual.

Following approval by Revenue Branch, proposals to use the handheld and software at specific sites must be approved by the forest district as part of the scale site authorization for that site.

7.4.1.4 Electronic Submission of Scale Data

The standards, conditions, and approval of the electronic submission of scale data will be set by Revenue Branch.

7.4.1.5 New Releases and Upgrades to Scaling Hardware/Software

All new releases and upgrades to hardware and/or software are subject to review by the ministry before they are to be used to process production data at any scale site.

Parties proposing new releases or upgrades should contact ministry staff as follows, to familiarize themselves with requirements:

For	Contact
piece scale computation	Regional Scaling Manager
weight scale computation	Scaling Policy Forester
handheld data processing	Scaling Policy Forester

7.4.2 Compliance Checking

District, regional, and headquarters staff are jointly responsible for assessing and ensuring compliance with ministry scale computation and documentation requirements.

Related activities include:

- on-site inspections,
- routine checking of raw tallies and computed reports,
- periodic rekeying of data,
- routine checking of summaries of scale reports used for billing input,
- periodic audits of computed submissions including:
 - verifying that the parties submitting the data have the necessary approvals in place,
 - verifying receipt of all tallies (log listings from handhelds) for the submission or package,
 - verifying receipt of all supporting documentation as specified in the approval to compile data,
 - verifying that documentation is complete, is in the correct format, signatures are in place, and there are no omissions,
 - rekeying of raw data to ensure key entry, calculations, and roll up of segregations are correct,
 - notifying parties submitting data of unacceptable submissions or errors, and
 - follow-up checking to ensure deficiencies have been remedied.

7.5 Correction of Errors

All scale returns submitted to the ministry may be subject to scrutiny for completeness and accuracy prior to further processing. Where errors or omissions are detected, they must be corrected.

The following conventions apply to all errors:

- to facilitate timely processing, obvious errors will be corrected by the ministry, and
- a copy of the corrected return will be returned to the originator.

7.5.1 Key Punch/coding Errors

The following conventions apply:

- to enable timely processing, obvious errors will be corrected by the ministry, and
- a copy of corrected returns will be returned to the originator.

7.5.2 Measurement/Grade Errors and Missing Dimensions

The scaler should be contacted directly if feasible. If in agreement, the scaler should consent to changes by initialing all changes.

If the scaler is not in agreement with the changes, changes will not be made unless the return cannot be processed in which case ministry staff will use their best judgement. A copy of the corrected returns will be returned to the originator.

Where the scaler cannot be contacted, either verbally or in writing, and no response is received in seven (7) days, the return will be processed by ministry staff using their best judgement.

In the case of weight scale samples, missing dimensions will result in cancellation of the sample unless the missing dimension can be completed and there is little doubt about its accuracy.

7.6 Data Loss

While computer technology greatly enhances the collection, computation, and reporting of scale data, there is an ever present risk that data may be lost through hardware/software failure or user error. It is essential that provisions are always in place to:

- minimize the impact of data loss, and
- reconstruct data where they are deemed lost.

7.6.1 Conventions to Minimize Data Loss

Several computer software and operating conventions should be routine to prevent data loss and minimize loss where it does occur:

- always ensure staff are adequately trained and staff are conversant with procedures to follow in the event of an equipment failure,
- always ensure a person is named and available to support any system whether mechanical or manual,
- always backup data to a host computer or other backup device as often as feasible,
- always make hard copies of handheld data as often as feasible and preferably after each load scaled,
- always keep hand-written reports and printouts organized and stored in a safe place where they won't get lost (store copies off-site where feasible),
- always store diskettes in a safe, dry, dust free place, and avoid temperature extremes (keep away from heaters and magnetic fields),
- always use a reliable power source,
- always ensure backup tapes, diskettes, disk drives, and other devices are covered in dusty conditions, and
- always ensure any system compiling scale data makes provision for backing up and recovering data to and from an external backup device (e.g., tape backup unit, or floppy diskette).

If data loss is detected or suspected:

- contact the system support person for instruction, and
- contact the district scaling supervisor.

7.6.2 Reconstructing Data Which is Lost

Where data are known to be lost, it is essential that:

- the data loss be reported to the district office, and
- the lost data be estimated from previous data as instructed by the district office and submitted to the Forest Service for processing.

The following guidelines are in place:

1. Weight Scale Data

- Weight scale breakdown

The appendix to Chapter 10 of this manual lays out the procedures to be followed in the event of a weight scale breakdown as well as the detailed calculations required to reconstruct load weights, and

- Loss of Sample Scale Data

Because weight scale samples are used to estimate volumes for the entire population, it is essential that they are accurate. If any data loss is detected, the sample must be cancelled. Similarly, weight scale samples that contain missing dimension data would usually be cancelled unless the missing dimension(s) can be reconstructed with no doubt about their accuracy.

2. Piece Scale Data

Under piece scaling the log-by-log scale details are the basis for billing. Any loss of piece scale data represents a potential revenue loss. As such, it is essential that where losses of this kind are detected they must be estimated and the estimate used as the basis for billing.

Most piece scale production is scaled in the form of truckloads spread on the ground with all logs on each truck bearing the same timber mark. To reconstruct lost data, you must use the data from scaling immediately prior to the breakdown to estimate the volumes by species and grade for each missing truckload as follows:

- for each timber mark, determine the five most recently scale loads ensuring the truck size and timber mix are representative,
- based on the five loads, calculate average volumes for each species and grade combination, and
- for reporting purposes, ensure any estimated loads are noted with the notation "estimated volume" and include your background calculations identifying which load numbers were used for averaging.

Where data are lost during a boom scale or other scaling arrangements where truckload identities are not maintained, it may be essential to reconstruct lost data using approaches other than truckload averages. Such approaches may include using piece counts.

In all cases, data must be reconstructed using the best and most representative data available from previously scaled timber. Timber scaled after the data loss may be used where there is inadequate data available prior to the loss.

7.7 Access to Scale Data

The release of information such as scale data falls under the *Freedom of Information and Protection of Privacy Act*. The following guidelines apply to the release of scale data:

Release of Check Scale Data

1. Upon completion of a check scale, the check scale comparison reports and detailed log listing will always be provided to the scaler who performed the scale.
2. Check scale comparison reports and detailed log listings are available to other parties upon request, subject to provisions of the *Freedom of Information and Protection of Privacy Act*.

This page is intentionally left blank.

Appendix 7A Scale Documentation

1. Piece Scale.
2. Weight Scale.
3. Scale and Royalty Invoices.
4. Administrative Documentation.

This page intentionally left blank.

7A.1 Piece Scale Documentation

For piece scale billing there are various ways of scaling logs that require different forms. Segregated scaling requires the logs to be grouped together according to timber mark species and grade. This method is used primarily for water scaling, log salvage, and small mill operations. Unsegregated scaling is usually performed for truck loads at dryland sorts where unsorted logs are scaled in the order that they are spread out for scaling. As the billing system requires that the data be segregated prior to processing, the unsegregated tallies must first be computed and summarized in FS 72 format, either before submission to the ministry or by through a pre-processing system performed in the Revenue Branch.

7A.1.1 Tally Sheet Scale Returns for Segregated Scale

A scaler performing a scale using the segregated method must create separate *segregation* on the tally for each timber mark/species/grade, then record the log measurements beside the corresponding entry as it is scaled. The form used for segregated scaling is the FS 244. This form is available in wet (duksbak) and dry (paper) media.

A maximum of ten tally sheets may be used for a single submission, unless the volumes have been compiled, and summarized on a completed FS 72 (Summary of Scale; only available in electronic form from the Internet), which then becomes the document submitted for input into the billing system for invoicing. The signed and completed tally must be summarized and submitted to the ministry with the FS 72, within the time prescribed in the *Scaling Regulation*.

The data entered on piece scale tallies are formatted in lines called *records*. The record *number* identifies the type of information that will follow on the line. For example, there are two types of *header* records that provide information that identifies the scale, such as the scaler, the location, and the date the scale was performed. These records are followed by *detail* records, that provide the actual description of the logs, such as timber mark species, grade, and log dimensions.

Each record number contains a unique set of fields that are identifiable by both a field name and by position numbers. The column number is located directly below the first position in each data field.

7A.1.2 Tally Sheet Scale Returns for Unsegregated Scale

There are two types of unsegregated scale returns currently in use: the FS 457 is used commonly in the interior regions and contains only one mark per tally, and the FS 416, which can accommodate the identification of a second mark or NMV (no mark visible), as it is a requirement to record NMV logs on the coast. The FS 457 must be computed and summarized in an FS 72 summary format prior to submission. The FS 416 can either be summarized prior to submission, or put through a pre-processing system in the Revenue Branch. This system sorts the data into segregations in FS 72 summary format, which is an acceptable input document for the HDBS piece scale billing system.

This page is intentionally left blank.

1. FS 244 Tally Sheet Scale Return - Small

Tally Sheet Scale Return - Small - FS 244



- used for segregated scale
- available in wet (duksbak) and dry (paper) media

Recording a Tally Sheet Scale Return for Segregated Scale FS 244

See Figure 7A.1 (FS 244) for an example of a tally sheet.

Record Type 0 (1st Header)

PAGE		LINE	TYPE	SCALER'S NUMBER	RAFT	PREDOMINANT MARK	NUMBER OF CHAINS	SCALED FOR	SCALING ORDER NO.	STUMPAGE INVOICE NO.				
0	0	0		5	9	12	19							
CAMP BOOM NUMBER								NO. OF SEC-TIONS	DATE	PAYABLE BY	SECOND COPY TO	EXPENSES	TIME CHARGE	LAUNCH
								51	54	60	65	70	75	80

Figure 7A.1 FS 244 - Tally sheet scale return – small (Record Type 0, 1st Header).

Position	Field Name	Description
1	Page	If more than one tally sheet is required to record all the scale, the tallies must be numbered and put in sequential order. The one character field will accept numbers 0 to 9, to allow a maximum of ten pages for a single return.
2	Sequence or Line	This field is precoded on all lines of the tally sheets. The header lines are all 80 characters in length, though the header line on the FS 244 is split into 2 rows to fit the page.
4	Type	This field identifies the record type. The record type identifies the type of data that will be displayed on the remaining 76 positions of the line.
5	Scaler's number	The 4 character scaler licence number is entered in this field.

Position	Field Name	Description
9	Raft	Also called a return or tally number. For each scaler, at the beginning of each year the first raft number, 001, should be assigned to the first parcel the scaler scales, and run consecutively through to 999 regardless of the scale site at which they are employed. When the scaler reaches raft number 999, they must restart with 001.
12	Predominant mark	For ministry use only. This field identifies alternative billing logic methods.
19	Number of chains	The number of chains, swifter wires, dog straps, etc. used on a boom. This field is not edited and is provided for company use to record information.
33	Camp boom number	The boom number or other identification assigned to the parcel by the owner. As the field is not edited it may contain alpha and/or numeric characters.
51	Number of sections	The number of sections within the boom. There is an implied decimal point between the last two characters (e.g., code 10.0 as 100). If the boom is not sectioned leave the field blank, as alpha characters (e.g., bag), will cause the tally to be rejected by the billing system.
54	Date	Enter the date the timber is scaled in YY MM DD format. If the scaling spans more than one day, enter the day the scaling is completed. See Remarks section.
60	Payable by	For ministry use. This is the five digit Harvest Data Base System (HDBS) Name and Address (N&A) code for the party responsible for paying the invoice. This party will receive the original (first) copy of the invoice and the accounts receivable statement.
65	Second copy to	For ministry use. This is the five digit HDBS N&A code to be entered if a copy of the invoice is to be directed to a second party, such as a broker.

Position	Field Name	Description
70	Expenses	For ministry use. The field is in the format \$ nnn.nn, and is used to record any expenses, such as mileage, incurred by a ministry scaler when performing an original scale.
75	Time charge	For ministry use. The field is in the format \$nnn.nn, and is used to record the total charges for a ministry scaler's time based on an hourly rate. The hours are multiplied by the current rate and entered in this field with preceding zeros when necessary.
80	Launch	Leave blank. Obsolete field.

Record Type 1 (2nd Header)



LINE	TYPE	FRB	NSF	FRI	SCALER'S LOG COUNT	SCALING STATION NUMBER	PLACE OF SCALING												
0,1	1																		
		12	13	14	15	19	22											62	
																		72	80

Figure 7A.2 FS 244 - Tally sheet scale return – small (Record Type 1, 2nd Header).

Position	Field Name	Description
1	Page	The page number is automatically repeated from the header field of the tally.
2	Sequence or Line	This number is precoded on the line for all tally sheets. The second header is 01.
4	Type	This field identifies the record type. The record type identifies the type of data that will be displayed on the remaining 76 positions of the line.

Position	Field Name	Description			
12	FRS	Forest Region of Scale. This position must be coded with the numeric code for the corresponding region.			
		1	Vancouver	4	Prince George
		2	Prince Rupert	5	Nelson
		3	Kamloops	6	Cariboo
13	NSF	This field is no longer in use and any entry in this field will be disregarded.			
14	FRI	Forest Region of Invoice. This field, when populated with the corresponding region code (see Forest Region of Scale), will indicate the region that is to be invoiced when timber from one region is scaled in another region.			
15	Scaler's log count	The total number of pieces in the boom or parcel is entered in this field, right oriented and pre-filled with zeros if necessary. If the piece count for the return exceeds the space provided, the last 4 digits of the piece count are to be entered in this field, as the billing system will do an edit check to ensure the last 4 digits agree with the last four digits in the total pieces scaled.			
19	Scaling station number	The three character code identifying the scale site where the timber is scaled. This must be a valid site in the HDBS.			
22	Place of scaling	The name of the place where the timber is scaled.			
62	-	This field is not in use and any entry in this field will be disregarded by the system.			
68	-	This field is not in use and any entry in this field will be disregarded by the system.			
80	T	Topscale indicator for ministry use. This field is used to identify a top scale that must be prorated by the HDBS.			

Record Type 2 (Segregation Detail)

LINE	TYPE	MARK	PAIN	NUMBER OF PIECES	SPEC.	GRADE	OTHER DESC.	TYPE — ENTER 2 IF POSITIONS 12 - 32 CONTAIN IDENTIFICATION DATA — ENTER 3 IF POSITIONS 12 - 32 CONTAIN LOG MEASUREMENTS		
2	12	19	21 22	26 27	30	33	40	47	54	61
0 2	2									
0 3										
0 4										
0 5										

Figure 7A.3 FS 244 - Tally sheet scale return – small (Record Type 2, Segregation Detail).

This record type is used to identify the segregation and to record the first five sets of log dimensions. Additional lines each containing eight sets of log dimensions can be added to the segregation, as required, using a record type 3.

Position	Field Name	Description
1	Page	Automatically duplicated from the header record.
2	Sequence or Line	This number is precoded on the line for all tally sheets.
4	Type	This field identifies the record type. The record type identifies the type of data that will be displayed on the remaining 76 positions of the line. Record type 2 identifies the segregation.
5-11	Scaler's number/raft	These fields are not displayed on the form as they are repeated from the header for all lines of the tally.
12	Mark	The timber mark that is stamped on the logs. This mark must be a valid timber mark in the HDBS mark file, NMV (no mark visible) or SB4 (scaled before) or else the tally will be rejected by the HDBS.
19	Paint	This field is not in use and should be left blank.

Position	Field Name	Description			
721	-	One position field, used to identify NMV or SB4 in conjunction with a valid timber mark in position 12. An N in this field indicates the logs are unmarked but would be rated and the volume attributed to the mark indicated in position 12 to 18 (e.g., a truck load that was not 100 percent marked but all logs originate from the same setting). An S in this column would indicate the logs were previously scaled as the mark indicated in columns 12-18. If SB4 is entered in this field no charges are applied and no volumes are added to the harvest history.			
22	Number of Pieces	Once the scaling is completed the number of pieces for the mark/species/grade segregation should be added up and entered in this field. The piece count should be right oriented and the last digit should be entered in position 26.			
27	Species	The species of the timber in the segregation.			
29	Grade	The grade of the timber in the segregation.			
30	Other Description	Left blank or if applicable to the logs in the segregation it must be a valid code from the following list:			
		B/S	Boomsticks	SLA	Slabs
		CHU	Chunks	SLI	Silvers
		DEA	Deadheads	SUB	Submerged
		S/W	Swifters	SUN	Sunken
		CA	Cants		

Position	Field Name	Description
33	Length	The length of the log expressed in decimetres. There are three positions allocated for each length measurement, and they are displayed on the form with a white background to provide a visual distinction dimension of each log's measurements (e.g., the length of each new log will begin in a white 'em' dash field, the next dimension for a log length would be recorded in 40-42). The field must be pre-filled with zeros if the length dimension does not require the entire field. See <i>Recording log dimensions</i> , below.
34	Top	The radius of the top of the log, measured in centimetres. The top measurement is always recorded in the first two positions shaded in green following the white length measurement field. Therefore the next log's top measurement would be recorded in positions 43-44. See <i>Recording log dimensions</i> , below.
38	Butt	The radius of the butt of the log measured in centimetres. The butt measurement is always recorded in the two positions directly following the top measurement, shaded in green. Therefore the next log's butt measurement would be recorded in positions 45-46. See <i>Recording log dimensions</i> , below.

Recording of Log Dimensions

There are seven character spaces allotted on a tally sheet for recording the dimensions of one log. The first three are for recording the length, the next two are for recording the top radius, and the last two are for recording the butt radius. If the dimension does not fill the spaces allotted for the measurement, the space must be pre-filled with zeros so that all the seven character spaces are filled (e.g., a log with a length of 4.8 m, a top radius of 9 cm, and a butt radius of 11 cm, would be recorded as 0480911).

Oversize Logs

If a log has a top or butt measurement that exceeds the space allotted for it, or over 99, it should be recorded on a separate line and the first character shown as a dollar sign (\$). This allows three character spaces for each dimension (e.g., \$122082103, where the length is 12.2 m, the top is 82 cm, and the butt is 103 cm). If the next log for the segregation is also oversized, it may be recorded on the same line, again starting with a dollar sign (\$).

Record Type 3 (Log Detail)



LINE	TYPE	MARK	PAINT	NUMBER OF PIECES	SPEC	GRADE	OTHER DESC.	TYPE	ENTER 2 IF POSITIONS 12 - 32 CONTAIN IDENTIFICATION DATA ENTER 3 IF POSITIONS 12 - 32 CONTAIN LOG MEASUREMENTS			
2	12	19	21	22	26	27	30	33	40	47	54	61
0, 2	3											
0, 3												
0, 4												
0, 5												

Figure 7A.4 FS 244 - Tally sheet scale return – small (Record Type 3, Log Detail).

Record type 2 identifies the segregation and will accommodate up to five sets of log dimensions. Additional sets of dimensions can be added to the segregation using a record type 3, which allows eight sets of log dimensions per line.

Position	Field Name	Description
1	Page	Duplicated from the header record.
2	Sequence or Line	Pre-coded on the tally sheet. Starts at line 3 (header records are 00 and 01, record type 2 is line 02).
4	Type	Enter a 3 in this position. This record must always follow directly beneath a record type 2, which has identified the mark/species/grade.
5-11	Scaler's number/raft	These fields are not displayed on the form as they are repeated from the header for all lines of the tally.
12-14	Length	The length of the log measured in decimetres. The background for the length measurement on the tally sheet is always white, displaying the next log's length in positions 19-21, and the next log's length in positions, 26-28, etc.
15-16	Top	The radius of the top of the log measured in centimetres. The top measurement is always recorded in the first two positions shaded in green following the white length measurement field. Therefore, the next log's top measurement would be recorded in positions 22-23, and the next log's top measurement would be recorded in positions 29-30, etc.

Position	Field Name	Description
17-18	Butt	The radius of the butt of the log, measured in centimetres. The butt measurement is always recorded in the two positions directly following the top measurement, shaded in green. Therefore, the next log's butt measurement would be recorded in positions 24-25, and the next log's butt dimension would be recorded in positions 31-32, etc.

Non Coded Fields

The tally sheets also have fields for recording information that may be required but do not have record numbers. These fields are identified by name only.

Field Name	Description
Scaler's signature	All tally sheets must be signed by the scaler upon completion.
Scaled for	The name of the company or person the logs are being scaled for.
Scaling order number	Leave blank.
S&R invoice number	Leave Blank
Remarks	Any information pertinent to the scale such as log salvage, beachcombed, topscale, insect or fire damage.

2. FS 457 Interior Piece Scale Return

Recording the Interior Piece Scale Return - FS 457



Recording a Tally Sheet for Unsegregated Scale (Detailed)

Recording the FS 457

Record Type P (1st Header)



		Ministry of Forests				INTERIOR PIECE SCALE RETURN										S&R INVOICE NO.			
PAGE	LINE	RECORD TYPE	SCALER NO.	RETURN NO.	SCALING STATION	SCALE DATE			NO. OF PAGES THIS RETURN	LOG COUNT ALL PAGES THIS RETURN	TOTAL VOLUME THIS RETURN	PO F R M	TIME CHARGES	EXPENSES	P. R. L.	PAYABLE BY	ACCOUNT	COPY TO	
0	0	1	P			Y	M	D											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	
39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	
58	59	60	61	62	63														

Figure 7A.5 FS 457 - Interior piece scale return (Record Type P, 1st Header).

Position	Field Name	Description
1	Page	If more than one page is required, enter the page number right oriented and submit the tally sheet in sequential order.
3	Line	Pre-coded on the form.
5	Record type	Pre-coded on the form. The record type indicates the type of data that will follow on the line. For the first header the record type is P.
6	Scaler number	Enter the four character scaler licence number in this field.
10	Return number	Also called a tally or raft number. For each scaler, at the beginning of each year the first return number, 001, should be assigned to the first parcel the scaler scales, and run consecutively through to 999 regardless of the scale site at which they are employed. When the scaler reaches return number 999, they must restart with 001.
14	Scaling station	The three character code identifying the scale site where the timber is scaled. This must be a valid site in the HDBS.

Position	Field Name	Description
17	Scale date	Enter the date the timber is scaled in YY MM DD format. If the scaling spans more than one day, enter the day the scaling is completed. See Remarks section.
23	Number of pages this return	Enter the total number of pages that make up the return. The final page number should equal the number of pages in the return.
26	Log count all pages this return	Enter the total number of logs for all pages of the return.
31	Total volume this return	Enter the total volume of all pages of the return rounded to one decimal place.
38	Purpose of return	Leave blank.
39	Time charges	For ministry use. The field is in the format \$ nnn.nn, and is used to record the total charges for a ministry scaler's time based on an hourly rate. The hours are multiplied by the current rate and entered in this field with preceding zeros when necessary.
45	Expenses	For ministry use. The field is in the format \$nnn.nn, and is used to record any expenses, such as mileage, incurred by a ministry scaler when performing an original scale.
51	FRI	Forest region of invoice. Enter the code for the region to be invoiced.
		1 Vancouver 4 Prince George
		2 Prince Rupert 5 Nelson
		3 Kamloops 6 Cariboo
52	Payable by	Enter the HDBS name and address code of the party to be invoiced.
57	Account code	Code '0' (numeric) unless otherwise advised. This will post the invoice to the licensee's general account.

Position	Field Name	Description
58	Copy to	Enter the HDBS name and address code of the party to receive the second copy of the invoice if required.
63	-	Leave blank.

Record Type M (2nd Header)



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
PAGE	LINE	RECORD TYPE	MARK												NO. OF PIECES THIS PAGE												PAYABLE BY																																			
	00	M													00																																															
SCALED AT																		SCALER'S SIGNATURE																																												

Figure 7A.6 FS 457 - Interior piece scale return (Record Type M, 2nd Header).

Position	Field Name	Description
1	Page	Refers only to the page of the return. The final page number should equal the total number of pages in the return.
3	Line	Pre-coded on the form.
5	Record type	Pre-coded on the form. The record type indicates the type of data that will follow on the line. For line 00 the record type is M.
6	Mark	Enter the timber mark. Only one mark may be entered per page.
13-15	-	Leave blank.
16	Number of pieces this page	Enter the total piece count for the page. If more than one page is used for the return, enter the total piece count of all pages on the first header in positions 26-30, right oriented.

Position	Field Name	Description
20-42	-	This field is not edited and can be used to record remarks pertaining to the scale.
43	Payable by	Enter the name of the party to be invoiced.

Record Type L (Log Detail)



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
PAGE	LINE	EXPOSURE	SPE- CIES	LENGTH	TOP	BUTT	VOLUME (dm ³)		PAGE	LINE	EXPOSURE	SPE- CIES	LENGTH	TOP	BUTT	VOLUME (dm ³)		PAGE	LINE	EXPOSURE	SPE- CIES	LENGTH	TOP	BUTT	VOLUME (dm ³)		PAGE	LINE	EXPOSURE	SPE- CIES	LENGTH	TOP	BUTT	VOLUME (dm ³)		PAGE	LINE	EXPOSURE	SPE- CIES	LENGTH	TOP	BUTT	VOLUME (dm ³)		PAGE	LINE	EXPOSURE	SPE- CIES	LENGTH	TOP	BUTT	VOLUME (dm ³)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	01	L								34	L								67	L																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							

Figure 7A.7 FS 457 - Interior piece scale return (Record Type L, Log Detail).

Position	Field Name	Description
1	Page	Leave blank.
3	Line	Pre-coded on tally sheet.
5	Record type	Pre-coded on tally sheet. The record type indicates the type of data that will follow on the line. For the log detail the record number is L.
6	Species	Enter the species code for the log.
8	Length	Enter the net length recorded to the nearest 0.2 m with exact odd 0.1 m being rounded to the nearest lower even number. Where a forest officer permits the timber to be cut into two or more pieces before scaling, the nearest 0.1 m is to be recorded.
11	Top	Enter the inside bark diameter to the nearest radius class.
13	Butt	Enter the inside bark diameter to the nearest radius class.

Position	Field Name	Description
15	Grade	Enter the grade for the log.
16	Volume (dm ³)	Enter the volume of the log in cubic decimetres.

Logs are to be recorded by species and grade, and organized on the return into groups having the same species and grade to facilitate the preparation of the Summary of Scale.

The total page volumes are determined by adding up the piece volumes in the columns. Divide the sum by 1000 to express the volume in cubic metres. This volume is entered in the 'Total Volume this Page' field located in the lower right hand corner of the form. To calculate the total volume for the return, these page totals are added and the sum is rounded to one decimal place and entered in the header.

There are two additional fields located below the header records that are not identified by a record type, just a field name.

Position	Field Name	Description
1	Scaled at	Enter the name of the location where the timber is scaled.
10	Scaler's signature	The scaler must sign the return upon completion of the scale.

Upon completion of the return, the pieces and volumes by mark species and grade are taken from the tally sheet and transferred to the summary of scale (see FS 72). Volumes on the summary of scale are taken to one decimal point.

3. FS 416 Scale Return Unsegregated Timber

Unsegregated Timber - FS 416

BRITISH COLUMBIA		SCALE RETURN — UNSEGREGATED TIMBER										SCALING ORDER NUMBER		STUMPAGE INVOICE NUMBER	
SCALER NO.	RETURN NO.	SCALING STATION	DATE		MT. OF	LOG COUNT —	UNIT		HOURS CHARGED	EXPENSES	FEES	PAYABLE BY	NO.	SECOND COPY TO	
YEAR	MO.	DAY	PAGES	ALL PAGES											
COMPANY TIMBER IDENTITY — ALL PAGES														NO. OF SECTIONS	
CAMP BOOM NO.														NO. OF CHAINS	
PAGE NO.														SCALER'S SIGNATURE	
LINE															
OPERATION															
SETTING															
YARDER															
LOADER															
TRUCK															
MARK															
PAINT															
NO. OF PIECES															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															
SPECIES															
LENGTH															
TOP															
BUTT															
GRADE															
SORT															

Region : NE NELSON
 District : AR ARROW
 Scaled By:

Page 1 of 1
 Date of Scale: 94.07.13
 Time of Scale: 13:11
 Date Printed : 95.03.09

Signature: _____

Site Scaler Ret. G Log
 No. No. No. N Count Parcel ID Company
 5G5 861A 040 G 0021

Log#	Mark	Pt	S	SpG	Gross			Defects			Net		Srt	Rm		
					Len	Top	But	Volume	DTM	Len	Top	But			Volume	Volume
0001	WACRS			CE2	100	010	012	0.383	BF3	20	0	5	0.005	0.379		
0002	WACRS			CE2	150	010	019	1.086						1.086		
0003	WACRS			CE2	140	007	012	0.424	BF3	25	0	7	0.013	0.412		
0004	WACRS			CE2	110	006	012	0.311						0.311		
0005	WACRS			CE2	100	012	014	0.534						0.534		
0006	WACRS			CE2	038	008	014	0.564						0.564		
0007	WACRS			CE2	140	006	011	0.345						0.345		
0008	WACRS			CE4	100	015	021	1.046	HF1	100	1	14	0.309	0.732		
0009	WACRS			CE2	100	018	021	1.202						1.202		
0010	WACRS			CE2	150	006	013	0.483						0.483		
0011	WACRS			CE2	100	010	011	0.347						0.347		
0012	WACRS			CE2	100	005	010	0.196						0.196		
0013	WACRS			R Z	004	004	005	0.003						0.003		
0014	WACRS			CE2	100	008	014	0.408						0.408		
0015	WACRS			CE2	076	007	011	0.203						0.203		
0016	WACRS			CE4	100	010	012	0.383						0.383		
0017	WACRS			CE2	100	008	015	0.454						0.454		
0018	WACRS			CE2	058	008	012	0.190						0.190		
0019	WACRS			CE2	110	008	014	0.449						0.449		
0020	WACRS			CE2	110	005	010	0.216						0.216		
0021	WACRS			CE2	100	010	013	0.423	BF3	30	0	8	0.020	0.401		
PARCEL					2186	181	276	9.650		40	0	8	0.352	9.298		

DEFECT CODES

A Ring Count	G Goiter	O Conk	U Sweep
B Butt Rot	H Heart Rot	P Pocket Rot	V Crook
C Star Check	I Pitch Pockers	Q Ring Shake	W Water Shake
D Straight Check	K Knots	R Ring Rot	
E Sun Check	L Hole	S Sap Rot	
F Fire Damage	M Missing Wood	T Twist	

Figure 7A.9 Computer generated FS 416 or detailed log listing for unsegregated scale.

This form is only available in PDF format from the Internet.



Recording the FS 416

Record Type P (Header)

Record Type P (Header) is the first header record on the FS 416 and FS 417. It identifies the scaler of the timber and other information related to the scale.



	SCALER NO.	RETURN NO.	SCALING STATION	DATE			NO. OF PAGES	LOG COUNT — ALL PAGES		UNIT	ST	POST	HOURS CHARGED	EXPENSES	LIFE	FR	PAYABLE BY	ACTC	SECOND COPY TO	
0	0	0	0	P																
1	6	7	11	14	17		23	26	30		37	40	44		50	52		56		53

Figure 7A.10 FS 416 – Scale Return – Unsegregated Timber (Record Type P, Header).

Position	Field Name	Description
1		0000 Pre-coded on form.
5		Format, or type of record. Always "P" for this header.
6		Blank.
7	Scaler number	A four-character field for the scaler's number. A licensed scaler enters the licence number, an acting scaler the appointment number. Can be an alphanumeric series (e.g., A001 or 001A) or a numeric series (e.g., 9814). There can be only one scaler per load.
11	Return/Raft number	The sequential number each scaler assigns to scale returns for the current year.
14	Scaling station	The applicable three-digit Scaling Station Code for the scale site. Must not be left blank.
17	Date	The date of scale in the format YYMMDD.
23	No. of pages	The number of pages needed to record the measurements of all the logs in the truckload or bundle. Always fill unused positions to the left with zero (e.g., code 9 as 09). This figure is recorded only on the first page.
25	Log count all pages	The total number of logs contained on all pages of the tally. This figure is recorded only on the first page.

Position	Field Name	Description
30		Leave blank, unless volume report required only, then code PRINT.
37	Unit	Leave blank.
38	ST	Pre-coded as 'F'.
39	P of R	Pre-coded as 'R'.
40	Hours charges	Enter on the first page the number of hours charged for scaling all the logs recorded on the tally.
44	Expenses	Enter on the first page any applicable scaler expenses charged for scaling logs recorded on the tally.
50	L Fee	Not in use.
51	FRI	Forest Region Invoiced - enter your Region code here.
52	Payable by	The HDBS code denoting the company or individual responsible for paying the invoice; the mark holder.
57	ACTC	Leave blank: not used.
58	Second copy to	The HDBS code denoting the company or individual (if any) who gets a copy of the invoice.
63		Leave blank.

Record Type C (Header)

Header record C is the second header record on FS 416s and FS 417s. It contains information important to the company or markholder - information which applies to the timber listed on all the pages of the tally (same return number). For instance, the camp boom number would normally be the same for all pages for that tally.



		FORMAT		COMPANY TIMBER IDENTITY — ALL PAGES		NO. OF SECTIONS	
				CAMP BOOM NO.		NO. OF CHAINS	
0	0	0	1	C			

Figure 7A.11 FS 416 – Scale Return – Unsegregated Timber (Record Type C, Header).

Position	Field Name	Description
1		0001 Pre-coded on tally.
5	Format	Format, or type of record. Always "C" for this header.
6	Camp boom number	The company identification code for the truckload, boom, or bundle. The code should be both descriptive and sequential, and should be entered from left to right.
24	No. of chains	The number of chains, swifters, straps or doglines. This field can be left blank.
38	No. of sections	The number of sections in the boom. The space on the right is for decimal fractions of a section.

Record Type U (Header)

This is the second header record set aside for company information. It is often left completely blank.

[illegible]

Figure 7A.12 FS 416 – Scale Return – Unsegregated Timber (Record Type U, Header).

Position	Field Name	Description
1	Page no.	Enter 00 for the first page, 01 for the second page, etc. A tally may have a maximum of 99 pages, though it is unlikely a load will require more than one or two pages.
3	Line	Pre-coded on the tally as "01".
5	Format	Format, or type of record. Always "U" for this header.
6	Operation	Company description of the source of the timber. May be left blank.
16	Setting	Company setting identity. May be left blank.
21	Yarder	Company yarder identity. May be left blank.
26	Loader	Company loader identity. May be left blank.
31	Truck	Company truck identity. May be left blank.
36		Leave blank.

Log Detail

Log detail is recorded in the main body of the tally form. Two kinds of records are permitted in this section:

- M record, which contains data shared by all the logs recorded on this section of the tally (i.e., timber mark, paint code, whether or not the logs have been scaled before, and the number of logs included on this part of the tally). The last 36 characters of an M record are formatted as three groups of 12 characters each, providing room for details of three logs, and
- L record, which contains the information about each individual log. This information (species, length, top radius, butt radius, grade and company sort) is summarised for all logs by the pre-processing program, and is printed on an FS 72. It forms the basis for billing when it is submitted as a normal piece scale tally to HDBS.

Each tally form has room for one identity record (M record) and 24 detail lines (L records), with room for four logs on each line, resulting in detail records for 99 logs. If all of these records are used, this will take you down to line 25, where there is a break on the form. The lines below this break are for log data that must be segregated. It may be NMV, another timber mark or stock information of pieces scaled above. If it is stock, it will have an "S" in the S=SB4 column in the M record.

In a case where more than 99 pieces are to be recorded in one load with the same mark, line 26 must be used for an M record which applies to the timber described in the following L records. The number of pieces detailed below line 25 is totalled in the piece count section of line 26.

Log data may be filled in by column or by line. All logs in a detail section must bear the timber mark recorded in the M record.

Record Type M (Detail Line)

The contents of positions 6 to 17 distinguish M records from L records. In M records they contain information which applies to all the logs which follow on that section of the form.

The M record is the first record on a detail section and must be completed.



MARK		PAINT	S = SB4	NO. OF PIECES	SPECIES	LENGTH	TOP	BUTT	GRADE	SORT	SPECIES	LENGTH	TOP	BUTT	GRADE	SORT	SPECIES	LENGTH	TOP	BUTT	GRADE	SORT
01	M																					

Figure 7A.13 FS 416 – Scale Return – Unsegregated Timber (Record Type M, Detail Line).

Position	Field Name	Description
1	Page	This number is automatically duplicated from the header record(s).
3	Line	Pre-coded on the tally as 01, or 26 (bottom of tally).
5	Format	Format, or type of record. Always "M" for this record.
6	Mark	The timber mark for the timber being scaled. Should start in position 6. If no mark visible, enter NMV. (SB4 is never used as a timber mark.)
13	Paint	The applicable two-letter paint code for the timber. The code is the first two letters of the colour, except for BA for black, and GA for grey.
15	S = SB4	Contains an S if the logs have been scaled before. If this is scale billing, should be left blank.
16	No. of pieces	The number of logs recorded on this page of the tally between this line and the end of the page, or the next M record. Fill from the left with zero, if fewer than ten logs. Maximum = 99 for main section of tally; 35 for bottom of FS 416 and 87 for bottom of FS 417.
18 30 42	Species	Two-character species code.
20 32 44	Length	The length of the log, in metres.
23 35 47	Top	The top radius of the log, in rads.

Position	Field Name	Description
25 37 49	Butt	The butt radius of the log, in rads.
27 39 51	Grade	The grade of the log.
28 40 52	Sort	The company sort code, limited to 2-character combinations. Not keyed - used for company information only.

Record Type L (Detail Line)

Log data for unsegregated timber is slightly different from log data for segregated timber. On the FS 244 for segregated logs, the species/grade and timber mark for a segregation are entered once, and the measurements of all the logs that fall into that segregation follow directly on the tally. On the FS 416 and FS 417, data for the unsegregated logs is recorded as the logs are encountered during the scale, and so each log record must specify the species/grade and company sort. The L record on the FS 416 and FS 417 is set up to record this information.



		MARK	PAYT	NO. OF PIECES	SPECIES	LENGTH	TOP	BUTT	GRADE	SORT	SPECIES	LENGTH	TOP	BUTT	GRADE	SORT	SPECIES	LENGTH	TOP	BUTT	GRADE	SORT
	6				18						30						42					
01	M																					
02	L																					

Figure 7A.14 FS 416 – Scale Return – Unsegregated Timber (Record Type L, Detail Line).

Log data:

Length three digits, in metres, minimum = 020

Top measurement of radius, two digits, in rads, minimum = 04

Butt measurement of radius, two digits, in rads, minimum = 04

Position	Field Name	Description
1	Page	This number is automatically duplicated from the header record(s).
3	Line	Line numbers 02 to 25, and 27 to 34 on the FS 416. Line numbers 02 to 25, and 27 to 47 on the FS 417.
5	Format	Pre-coded as L for this record.
6 18 30 42	Species	Two-character species code.
8 20 32 44	Length	The length of the log, in metres.
11 23 35 47	Top	The top radius of the log, in rads.
13 25 37 49	Butt	The butt radius of the log, in rads.
15 27 39 51	Grade	The grade of the log.
16 28 40 52	Sort	The company sort code, limited to 2-character combinations. Not keyed.

There is a special format for lines which contain oversize log data. The first two characters record the species and must start in column 6. The next character is a dollar sign (\$). The dimensions are entered in the next nine character spaces: the first three characters are for the length, the next three for the top radius, and the last three for the butt radius. The dimensions which do not take up the three spaces allotted to them must be filled from the left with zeros. The rest of the record (grade, sort) follows the normal L record.

Example:

SP\$234080103JHB

Species = SP; Length = 234 dm; top radius = 80 cm; butt radius = 103 cm; Grade = J; sort = HB

An oversize log must be recorded on a line by itself. The next normal log must start on the next line. If there is more than one oversize log, they must each be recorded on a separate line, and normal logs start on the following line.

Region/District Procedures

Unsegregated scale can arrive in the region/district office in one of two ways:

- original FS 416s and FS 417s sent to the district office by the scaler, and
- computed tallies, accompanied by original FS 416s and FS 417s, from approved computing firms.

The region/district procedures for these two methods differ, although, in the end, both methods produce FS 72 summaries of scale, which are processed as regular piece scale tallies in Victoria.

General

Upon receipt in Victoria, unsegregated tallies are sent off-site to a data entry company where they are keyed, volumes summarized, and transmitted on FS 72 format through the EDI link to Billing Operations to be run through the piece scale billing program.

A logical batch of FS 416s and FS 417s must contain scale returns having the same:

- scaler number,
- scale site number,
- scale date (month and year),
- region,
- forest region of invoice code,

- payable by code, and
- second copy to code.

All scale returns in a batch must have the same month and year billing date. If returns in the same batch include dates of scaling for two or more months, an error will result.

Scalers must batch the tallies and submit them to the appropriate office (district, region, or computing firm).

District or region staff will prepare an FS 72 coversheet for the batch, using the highest return number and date of scale. A circled notation should specify the return numbers and scale date range (see Figure 7A.15 for an example).



SUMMARY OF SCALE

BRITISH
COLUMBIA

SUMMARY OF SCALE

STAMPAGE INVOICE NO.

TO BE COMPLETED BY THE SCALER TO SUMMARIZE A TALLY SHEET (FS 244) OR BY A CLERK TO CONSOLIDATE A RECORD OF PURCHASE..... (FS 222) AND FORWARDED FOR PROCESSING. SEE SECTION 7A.1 OF MANUAL.

SCALING ORDER NO.

PAGE	SEQ.	TYPE	SCALER'S NUMBER	RETURN NUMBER	PREDOMINANT MARK	NUMBER OF CHAINS	CAMP BOOM NUMBER
0	0	0	5622	1144			
1	2	4	5	12	19	39	

NO. OF SEC-TIONS	DATE OF SCALING	PAYABLE BY	SECOND COPY TO	EXPENSES	TIME CHARGE	SCALE
990224	YR. MO. DAY					
990224		03768	96580			

SCALER'S SIGNATURE

SEQ.	TYPE	SCALER'S LOG COUNT	SCALING STATION NUMBER	PLACE OF SCALING
0	0	1	899711	
1	2	4	12	15 19 22 31 41

VENDOR

PAYABLE BY

PLACE OF SCALING (cont.)
81 82 83 84 85 86 87 88 89 90

EXPENSES BREAKDOWN

SEQ.	TYPE	MARK	PAINT	NUMBER OF PIECES	OTHER DESC.	QUANTITY m ³	RATE
1	2	4	12	19	21 22	27 28 30	33 40
0	0	2					
0	0	3					
0	0	4					
0	0	5					
0	0	6					
0	0	7					
0	0	8					
0	0	9					
0	0	10					
0	0	11					
0	0	12					
0	0	13					
0	0	14					
0	0	15					
0	0	16					
0	0	17					
0	0	18					
0	0	19					
0	0	20					
0	0	21					
0	0	22					
0	0	23					
0	0	24					
0	0	25					
0	0	26					
0	0	27					
0	0	28					
0	0	29					
0	0	30					
0	0	31					
0	0	32					
0	0	33					
0	0	34					
0	0	35					

REMARKS

CLERICAL

KEYED BY

VERIFIED BY

FS 72 HVA 99/07 Please be advised that this information may be released under the Freedom of Information and Protection of Privacy Act.

Figure 7A.15 FS 72 cover page for batch of FS 416s.

4. FS 72 Summary of Scale (only available in electronic form from the Internet)

Summary of Scale or Monthly Scale Return

The FS 72 (Summary of scale) and the FS 287 (Monthly scale return) have identical data fields, and are therefore *interchangeable*. They can be used to summarize all piece scale returns. Some of the field names and the non-keyed areas of the forms carry different headings, but the edits on the fields are identical.

The FS 287 was designed for Special forest products returns and contains a list of valid Special forest product codes on it. It is used to summarize FS 222s (Record of purchase of special forest products) and FS 200s (Christmas tree returns). The FS 72 can be used to summarize these forms, as well as the FS 244 (Tally sheet scale return - small), the FS 36 (Tally sheet scale return - large), the FS 457 (Interior piece scale return), and the FS 416 (Scale return - unsegregated timber).

Record Type 0, Sequence Number: 00



BRITISH
COLUMBIA



SUMMARY OF SCALE

TO BE COMPLETED BY THE SCALER TO SUMMARIZE A TALLY SHEET (FS 244) OR BY A CLERK TO CONSOLIDATE A RECORD OF PURCHASE..... (FS 222) AND FORWARDED FOR PROCESSING. SEE SECTION 7A.1 OF MANUAL.																		
PAGE	SEQ.	TYPE	SCALER'S NUMBER	RETURN NUMBER	PREDOMINANT MARK	NUMBER OF CHAINS				CAMP BOOM NUMBER								
0	0	0	0															
1	2	4	5															
					NO. OF SEC-TIONS		DATE OF SCALING		PAYABLE BY		SECOND COPY TO		EXPENSES		TIME CHARGE		LAUNCH	
					YR.		MO.		DAY									
					51		54		60		65		70		75		80	

Figure 7A.16 FS 72 – Summary of Scale (Record Type 0, Sequence Number: 00).

Position	Field Name	Description
1 – 4	Sequence #	Precoded on form.
5 – 8	Scaler's Licence Number	Enter the four-character licence number.
9 – 11	Scaler's Return Number	Enter the three-digit return or tally number (this number should not be duplicated by the same scaler, to ensure each return has a unique identity).

Position	Field Name	Description
33 – 50	Camp Boom Number	Enter the load number, boom number, or other identify given to the parcel.
51 – 53	Number of Sections	If a boom is divided into sections, enter the number of sections to one decimal place, and with leading zeros if applicable.
54 – 59	Date of Scale	Enter the date the scaling was completed.
60 – 64	Payable by	Enter the five-digit name and address code for the party to receive the invoice. If unknown, leave blank.

Record Type 4



SEQ.	TYPE	MARK	PAINT	N.M.V.	NUMBER OF PIECES	SPECIES	GRADE	OTHER DESC.	QUANTITY m³	RATE	
										\$	¢
1	2	4	12	19	21	22	27	29	30	33	40
0	0	2									
0	0	3									
0	0	4									
0	0	5									
0	0	6									

Figure 7A.17 FS 72 - Summary of Scale (Record Type 4).

Position	Field Name	Description
12 – 18	Timber Mark	Enter the timber mark left oriented.
22 – 26	Number of Pieces	Enter the number of pieces for the species/grade and/or product segregation. If there is no piece count, enter 0 (zero) as this field must be populated.
27 – 28	Species	Enter the two-character species code.
29	Grade	Enter the grade (if any) that applies to the timber.
30 – 32	Other Description	This field can be used to enter other descriptions for the timber, such as B/S for boomsticks, or a special forest product code.

Position	Field Name	Description
33 – 39	Quantity	Enter the volume right oriented and to one decimal place. If there is no volume (i.e., the volume is <0.1, or it is a Christmas tree return), enter 0 (zero), as this field must be populated.
60 – 64	Payable by	Enter the five-digit name and address code for the party to receive the invoice. If unknown, leave blank.

Crossed Out Sequence Type

Information keyed on this line will be differentiated from detailed species/volume.

Position	Field Name	Description
1 – 3 22 – 26 33 – 39		The piece count and/or volumes should be totalled and written below the entries, when there is more than one line of data. The sequence number of the line where the totals are entered should be obliterated so the totals do not get keyed.

Summary of Scale - Remarks

[illegible]

Figure 7A.18 FS 72 – Summary of Scale (Remarks).

Position	Field Name	Description
A	Scaler's Signature	Completed summaries must be signed by the scaler performing the scale.
B	Payable by	Enter the name of the party who is responsible for payment of the invoice.
C	Remarks	Any special notations or remarks, such as beachcombed wood, topscale, or stock scale, should be noted in this field.

CHECKS
SUMMARY OF SCALE (F.S. 72)

Region : NE NELSON
District : AR ARROW
Scaled By: E. KUSY

Page 1 of 1
Date of Scale: 94.07.13
Time of Scale: 13:11
Date Printed : 95.03.09

Signature: _____

S & R # _____

Company :

SEQ# SCLR# RET# PRED.MARK NUM. OF CHAINS CAMP BOOM NUMBER
(1)0000 (5)861A (9)040 (12) (19)_____ (33)

SECT YMMDD PAY BY COPY TO EXPENSES TIME CHG
(51) 0 (54)940713 (60)_____ (65)_____ (70)_____ (75)_____

SEQ# FNF LOGS SITE# PLACE OF SCALING
(1)0011 (12)5__ (15)0021 (19)5G5 (22)POPLAR CREEK NEAR

SEQ#	MARK	PAINT	SB4	PIECES	SPGR	OTHER	QUANTITY	RATE
(1)---	(12)-----	(19)---	(21)---	(22)-----	(27)---	(30)---	(33)-----	(40)-----
0024	NACRS			18	CE		8.2	
0034	NACRS			2	CE4		1.1	
0044	NACRS			1	R Z		0.0	

TOTALS				21			9.3	

Figure 7A.19 Computer-generated FS 72 Summary of Scale.

5. FS 287 Monthly Scale Return

Monthly Scale Return - FS 287

Record Type 0





**BRITISH
COLUMBIA**



MONTHLY SCALE RETURN

PAGE	LINE	TYPE	SCALER'S NUMBER	TALLY OR RAFT NO.			
0	0	0	0				

1 2 4 5

12 19

33

DATE OF RETURN			PAYABLE BY	SECOND COPY TO			
YEAR	MO.	DAY					
51	54	60	65	70	75	80	

Figure 7A.20 FS 287 – Monthly Scale Return (Record Type 0).

Position	Field Name	Description
5 – 8	Scaler's Licence Number	Enter the four-character licence number.
9 – 11	Scaler's Return Number	Enter the three-digit return or tally number (this number should not be duplicated by the same scaler, to ensure each return has a unique identity).
33 – 50	Untitled	This field can be used to record any identification such as the FS 222 or FS 200 number. This information entered in this field is displayed on the invoice.
54 – 59	Date of Return	Enter the date the scaling was completed.
60 – 64	Payable by	Enter the five-digit name and address code for the party to receive the invoice. If the name and address code is unknown, leave this field blank.

Record Type 1



PAGE	LINE	TYPE	FRS	NSF	FRI	TOTAL PIECES	SCALING STATION NUMBER	PLACE OF SCALING	
0	0	1	1						
			12		15		19	22	
								31	41
PLACE OF SCALING (cont.)									
								51	62
								68	80

Figure 7A.21 FS 287 – Monthly Scale Return (Record Type 1).

Position	Field Name	Description
12	FRS (forest region scaled)	Enter the number of the region in which the timber is scaled.
15 – 18	Total Pieces	Enter the total number of pieces included in the return. If there is no piece count enter 0 (zero), as this field must be populated.
19 – 21	Scaling Station Number	Enter the three-character scale site number issued by the ministry.
22 – 62	Place of Scaling	Enter the name of the location where the timber is scaled.

Record Type 4



PAGE	LINE	TYPE	MARK		NUMBER OF PIECES	SPECIES	GRADE	PRODUCT CODE	QUANTITY (m)	RATE		
	1	2	4	12	19	21	22	27	29	30	33	40
0	0	2	4									
0	0	3	4									
0	0	4	4									
0	0	5	4									
0	0	6	4									
0	0	7	4									

Figure 7A.22 FS 287 – Monthly Scale Return (Record Type 4).

Position	Field Name	Description
12 – 18	Timber Mark	Enter the timber mark left oriented.
22 – 26	Number of Pieces	Enter the number of pieces for the species/grade or product segregation. If there is no piece count, enter 0 (zero), as this field must be populated.
27 – 28	Species	Enter the two-character species code.
29	Grade	Enter the grade (if any) that applies to the timber.
30 – 32	Product Code	Enter the special forest product code that applies to the timber. Leave blank for logs. Review codes listed on right side of the form.
33 – 39	Quantity	Enter the volume right oriented and to one decimal place. If there is no volume (e.g., Christmas trees) enter 0 (zero).

Remarks



			CHARGED ON STUMPAGE INVOICE NUMBER																																																																																	
VENDOR A																																																																																				
HOW DELIVERED B																																																																																				
CHARGES PAYABLE BY C																																																																																				
<p style="text-align: center; font-size: small;">SPECIAL FOREST PRODUCT CODES</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; font-size: x-small;">NAME</th> <th style="text-align: left; font-size: x-small;">GRADE</th> <th style="text-align: left; font-size: x-small;">CODE</th> </tr> </thead> <tbody> <tr><td>BUILDING LOGS</td><td></td><td>BL</td></tr> <tr><td>CAR STAKES</td><td></td><td>CS</td></tr> <tr><td>CHRISTMAS TREES > 5 m</td><td>1</td><td>XM</td></tr> <tr><td>3 - 5 m</td><td>2</td><td>XM</td></tr> <tr><td>< 3 m</td><td>3</td><td>XM</td></tr> <tr><td>CRUBBING</td><td></td><td>CR</td></tr> <tr><td>FENCE POSTS (round)</td><td></td><td>PR</td></tr> <tr><td>FENCE POSTS (split)</td><td></td><td></td></tr> <tr><td>PS</td><td></td><td></td></tr> <tr><td>FIREWOOD</td><td></td><td>FW</td></tr> <tr><td>GRAPE STAKES</td><td></td><td>GS</td></tr> <tr><td>HOP POLES</td><td></td><td>HP</td></tr> <tr><td>LAGGING SPLIT</td><td></td><td>LA</td></tr> <tr><td>MINING TIMBERS</td><td></td><td>MT</td></tr> <tr><td>ORCHARD PROPS</td><td></td><td>OP</td></tr> <tr><td>OTHER LOGS</td><td></td><td>OL</td></tr> <tr><td>PICKETS OR PALING</td><td></td><td>PI</td></tr> <tr><td>PILING</td><td></td><td>PP</td></tr> <tr><td>POLES</td><td></td><td>PO</td></tr> <tr><td>RAILS (round)</td><td></td><td>RR</td></tr> <tr><td>RAILS (split)</td><td></td><td>RS</td></tr> <tr><td>SHAKES</td><td></td><td>SK</td></tr> <tr><td>SHAKE BOLTS OR BLOCKS</td><td></td><td>SB</td></tr> <tr><td>SHINGLE BOLTS OR BLOCKS</td><td></td><td>LB</td></tr> <tr><td>STAKES AND STICKS</td><td></td><td>SS</td></tr> <tr><td colspan="3" style="font-size: x-small;">N.B.: LEAVE PRODUCT CODE BLANK WHEN REPORTING LOGS.</td></tr> </tbody> </table>			NAME	GRADE	CODE	BUILDING LOGS		BL	CAR STAKES		CS	CHRISTMAS TREES > 5 m	1	XM	3 - 5 m	2	XM	< 3 m	3	XM	CRUBBING		CR	FENCE POSTS (round)		PR	FENCE POSTS (split)			PS			FIREWOOD		FW	GRAPE STAKES		GS	HOP POLES		HP	LAGGING SPLIT		LA	MINING TIMBERS		MT	ORCHARD PROPS		OP	OTHER LOGS		OL	PICKETS OR PALING		PI	PILING		PP	POLES		PO	RAILS (round)		RR	RAILS (split)		RS	SHAKES		SK	SHAKE BOLTS OR BLOCKS		SB	SHINGLE BOLTS OR BLOCKS		LB	STAKES AND STICKS		SS	N.B.: LEAVE PRODUCT CODE BLANK WHEN REPORTING LOGS.			<p style="text-align: center; font-size: small;">COMPLETED FROM TALLY SHEETS OR TALLY BOOK PAGES NUMBERED:</p> <div style="text-align: center; border: 1px solid black; border-radius: 50%; padding: 10px; font-weight: bold; font-size: 2em;">D</div>
NAME	GRADE	CODE																																																																																		
BUILDING LOGS		BL																																																																																		
CAR STAKES		CS																																																																																		
CHRISTMAS TREES > 5 m	1	XM																																																																																		
3 - 5 m	2	XM																																																																																		
< 3 m	3	XM																																																																																		
CRUBBING		CR																																																																																		
FENCE POSTS (round)		PR																																																																																		
FENCE POSTS (split)																																																																																				
PS																																																																																				
FIREWOOD		FW																																																																																		
GRAPE STAKES		GS																																																																																		
HOP POLES		HP																																																																																		
LAGGING SPLIT		LA																																																																																		
MINING TIMBERS		MT																																																																																		
ORCHARD PROPS		OP																																																																																		
OTHER LOGS		OL																																																																																		
PICKETS OR PALING		PI																																																																																		
PILING		PP																																																																																		
POLES		PO																																																																																		
RAILS (round)		RR																																																																																		
RAILS (split)		RS																																																																																		
SHAKES		SK																																																																																		
SHAKE BOLTS OR BLOCKS		SB																																																																																		
SHINGLE BOLTS OR BLOCKS		LB																																																																																		
STAKES AND STICKS		SS																																																																																		
N.B.: LEAVE PRODUCT CODE BLANK WHEN REPORTING LOGS.																																																																																				
COMPLETED BY																																																																																				
SCALER'S SIGNATURE																																																																																				
CLERICAL																																																																																				
KEYED BY		VERIFIED BY																																																																																		

Figure 7A.23 FS 287 – Monthly Scale Return (Remarks).

Position	Field Name	Description
A	Vendor	The seller of the product.
B	How Delivered	The mode of transportation.
C	Scaler's Signature	Must be completed.
D	Compiled from Tally Sheets or Tally Book Pages Numbered	List the FS 222 returns that are included in the monthly return.

FS 287 MVA 99A07

Please be advised that this information may be released under the Freedom of Information and Protection of Privacy Act.

7A-47

This page is intentionally left blank.

6. FS 222 Record of Scale of Special Forest Products & Transportation Document

Record of Scale of Special Forest Products & Transportation Document - FS 222

Special forest products, excluding Christmas trees and those products best suited to the B.C. Metric Scale, are scaled on the form FS 222. As this is not a valid input document for the HDBS, it must be summarized on a Monthly return (FS 287) or a Summary of scale (FS 72).



RECORD OF PURCHASE OF SPECIAL FOREST PRODUCTS & TRANSPORTATION DOCUMENT

TIMBER MARK (B)		GEOGRAPHIC LOCATION OF TIMBER ORIGIN (C)		(A)	
CONTRACTOR (D)		BLOCK / LANDING / SETTING (E)	HAUL DISTANCE (F)		
CARRIER COMPANY NAME (G)		VEHICLE LICENSE NO. (H)			
TRANSPORT OPERATOR'S NAME (I)		TRANSPORT OPERATOR'S SIGNATURE (J)			
DATE OF TRANSPORT YY (K) MM (L) DD (L)	DESTINATION OF SPECIAL FOREST PRODUCTS (M)				
PURCHASER (N)	VENDOR OR AGENT'S SIGNATURE (O)				
SCALER'S LICENSE # (P)	PLACE OF SCALING (Q)				
VENDOR (R)	SCALER'S RETURN # (S)	SCALER'S SIGNATURE (T)			
DATE OF SCALING YY (U) MM (U) DD (U)	IF PREVIOUSLY SCALED PROVIDE ORIGINAL SCALER'S LICENCE # (V) RETURN # (V) DATE OF ORIGINAL SCALE (V)				
(W) DESCRIPTION	LENGTH OR # SQUARES (X)	WIDTH OR # BUNDLES (Y)	HEIGHT OR # PIECES (Z)	FAC TOR (aa)	METRES ³ (ab)

DISTRIBUTION: WHITE-MOF (copy of scale attached); CANARY-TRANSPORTER; PINK-VENDOR/CONTRACTOR; GREEN-REMAIN IN BOOKLET
FS 222 HVA 01/05 Please be advised that this information may be released under the Freedom of Information and Protection of Privacy Act.

Figure 7A.25 FS 222 – Record of Scale of Special Forest Products & Transportation Document.

Position	Field Name	Description
A	Serial Number	Must be a unique number.
B	Timber Mark	Only one timber mark per page.
C	Geographic Location of Timber Origin	
D	Contractor	
E	Block/Landing/Setting	
F	Haul Distance	
G	Carrier Company Name	
H	Vehicle License No.	
I	Transport Operator's Name	
J	Transport Operator's Signature	
K	Date of Transport	YY.MM.DD – 2 numeric digits each.
L	Time	
M	Destination of Special Forest Products	
N	Purchaser	
O	Vendor or Agent's Signature	

Position	Field Name	Description
P	Scaler's License #	
Q	Place of Scaling	Name of the site and site number assigned by the ministry.
R	Vendor	Name of person or company that sold the product.
S	Scaler's Return #	
T	Scaler's Signature	Must be signed by the scaler upon completion, and include the scaler's licence number.
U	Date of Scaling	Date when the scale was completed. YY.MM.DD – 2 numeric digits each
V	If Previously Scaled Provide Original Scaler's	Three (3) parts: Licence #, Return #, and Date of Original Scale.
W	Description	Enter the species and a full description of the special forest product including the size and number of pallets where applicable (see scaling special forest products, Chapter 8).
X	Length or # Squares	Enter the length to the nearest 0.2 m (2 cm).
Y	Width or # Bundles	Enter the width measured to the nearest .02 m (2 cm).
Z	Height or # Pieces	Enter the height measured to the nearest .02 m (2 cm).
aa	Factor	Enter the factor applied tot he volume of the special forest products (for stacked method).
ab	Metres ³	Enter the volume calculated to the nearest 0.1 m ³ .

7. FS 200 Christmas Tree Return

Christmas Tree Return - FS 200

Christmas trees are classified as a special forest product, but because they are scaled only using a piece and size count require a separate form. The FS 200 is the ministry form used in collecting return information on Christmas trees. Christmas trees must be scaled on the area of origin.

 **BRITISH COLUMBIA** 

61841 c

TREES MUST BE SCALED ON AREA OF ORIGIN. **CHRISTMAS-TREE RETURN**

1. DATE OF SCALING 94/11/16		PLACE 1234 MAIN STREET	
2. AREA OF ORIGIN C	C.T.P. NO. D	LOT NO. E	LAND DISTRICT F
3. STUMPAGE OWNER'S NAME H JOHN SMITH		ADDRESS I 432 GOVERNMENT AVE.	
4. CUTTER'S NAME J JACK BROWN		ADDRESS K 456 NEWTON ST.	
5. SCALED FOR L M. THOMSON			
6. CHARGES PAYABLE BY (Please print) M MARIE THOMSON			
ADDRESS 1145 BROADWAY			
7. TREES SCALED			
SIZE	MERCHANTABLE TREES	CULLS	COMMENTS (SPECIES, ETC.)
N LESS THAN 3 m	514		
3 m TO 5 m	24		
MORE THAN 5 m			
TOTALS	538		
8. CUTTER'S SIGNATURE O J. Brown		DATE Y M D 94/11/16	9. SCALER'S SIGNATURE P A. Scaler
10. NUMBER OF TRUCKLOADS THIS MANIFEST COVERS	TRUCKER'S SIGNATURE R. Jackson	TRUCK LICENCE NUMBER R	
11. DESTINATION OR SHIPPING POINT S MARIE'S NURSERY		12. DATE HAULED Y M D 94/11/16	13. IS CUTTING COMPLETED ON AREA? Yes ☐ No ☒
13. COMMENTS			

DEFINITIONS: WARE - DISTRICT MANAGER, CANARY - DISTRICT MANAGER, PINK - BUYER, GREEN - CARRIED BY TRUCKER, BLUE - LAND-OWNER OR CUTTER.
Scaled return forms must be left in the book with the word "scaled" written thereon.
PLEASE BE ADVISED THAT THIS INFORMATION MAY BE RELEASED UNDER THE FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY ACT.
FS 200 HVA 82/11

Figure 7A.26 FS 200 - Christmas tree return.

Position	Description
A	Date of scaling.
B – Place	Enter the name of the site where the Christmas trees were scaled.
C	Area of origin.
D	C.T.P. number Christmas tree permit number.
E	Lot number.
F	Land district.
G	Timber mark.
H	Stumpage owner's name.
I	Stumpage owner's address.
J	Cutter's name.
K	Cutter's address.
L – Scaled for	Enter the name or company that requested the scale.
M	Enter the name of the party to receive the invoice.
N	Enter the number of trees by height category.
O	Ensure the cutter signs and dates the return.
P	Ensure the scaler signs the return.
Q	Ensure the trucker signs the return.
R	Enter licence plate number of truck.
S	Destination.
T	Date hauled.

This page is intentionally left blank.

7A.2 Weight Scale Forms

For weight scaling, the forms required for submission are the Weight scale load slip (FS 488), Weight scale station daily load inventory (FS 482), the Weight scale sample tally (FS 239), the Weight scale monthly return (FS 493), and the Weight scale monthly return summary sheet (also reported on an FS 493). Most companies today are using hand held computers, random number generators, and systems that produce computer generated versions of these forms. All computer generated forms must be approved by the ministry, prior to their use.

A Weight scale load slip (see Figures 7A.27 and 7A.28) is generated for every truck load of logs arriving at the scale site. It records the gross weight upon arrival, and the tare weight prior to departure. The net weight is then calculated, and the sum of the net weight of all the loads for the day is entered on the weight scale monthly return.

The weight scale station daily load inventory is a list of all loads arriving at the scale station on a daily basis. It lists the load arrival number, stratum, timber mark, weight slip number, truck number, in and out times, as well as the gross, tare and net weight (see Figure 7A.16).

The Weight Scale Sample Tally

When a truck load is identified as a sample, it must be 100 percent piece scaled on a weight scale sample tally, or its electronically produced equivalent.

The sample tallies (see Figures 7A.33 to 7A.37) are submitted to the ministry and input into the Harvest Billing System (HBS), which establishes a volume to weight ratio for each species grade.

A weight scale monthly return (see Figures 7A.38 and 7A.39) must be completed at the end of each month for each population, stratum, and timber mark. It displays the total loads and weight for each day, as well as the monthly totals. This is the input document used to generate a scale and royalty invoice.

A weight scale summary sheet monthly scale return summarizes all the monthly returns for a population and must be submitted with them.

This page is intentionally left blank.

1. FS 488 Weight Scale Load Slip

Weigh Scale Load Slip - FS 488

The following fields are mandatory and must be filled in by the scaler. To view a computer generated version of this form see Figure 7A.28.



BRITISH COLUMBIA		WEIGH SCALE LOAD SLIP		NO. 474352 P	
WEIGHED AT (Place)		PACIFIC INLAND RESOURCES LTD.		(Scaling Station No.) 236	
TIME IN	07:25	GROSS WEIGHT	44780		
TIME OUT	07:43	TARE	13780		
DATE	09-13-94	NET WEIGHT	31000		
LOGS:	☐ Short ☐ Long	SPECIES	BALSAM	ARR VAL LOAD NO.	490
REMARKS		POPULATION / STRATUM / YEAR		2336/12/95	
TRUCKER	028	BLOCK NO.		BLOCK LOAD NO.	
CONTRACTOR	329	LOG MARK	44165		
DRIVER'S SIGNATURE	<i>[Signature]</i>	SCALER'S SIGNATURE	<i>[Signature]</i>		

Figure 7A.27 FS 488 - Weight scale load slip.

Position	Description
A	Place of scale.
B	Scale station number.
C	Enter the time the truck was weighed in at the station.
D	Enter the time the truck was weighed out.
E	Enter the date the truck was weighed.
F	Enter the gross weight (the total weight of the load and the truck).
G	Enter the tare weight (the weight of the unloaded truck).
H	Enter the net weight of the load (subtract the tare weight from the gross weight).
I	Enter the species in the load from the load description slip.

Position	Description
J	Enter the load arrival number. This is a consecutive number assigned to each load as it arrives at the scale station.
K	Enter the population, the stratum, and the year. The 'year' is the cyclic billing year end.
L	Enter the truck number.
M	Enter the contractor number.
N	Enter the timber mark on the load. There can be only one timber mark per load.
O	Ensure the truck driver has signed the load slip.
P	The load slip must be signed by the scaler.



PACIFIC INLAND RESOURCES LTD.
A DIVISION OF WEST FRASER MILLS LTD.

P.O. BOX 3130
SMITHERS, B.C.
V0J 2N0
PHONE: (604) 847-2656
SCALES: 847-3637

NO. 161137

WEIGHT SCALE LOAD SLIP

DRIVER'S SIGNATURE _____

SCALER'S SIGNATURE _____

SPECIES _____

Weighed at SMITHERS

Scaling Station No. 236

Time In 07:25
Time Out 07:43
Date Out 09-13-94

Gross 44780 kg
Tare 13780 kg
Net 31000 kg

Sample/Redtag	SAMPLE	Sample number	9	
Stratum	12	Yearly load no.	143	Year 95
Population	2336	Ticket Retrieve No.	672431	Type L
Timber Mark	44165	Arrival Load No.	490	Edited NO

Company Name PIR SCALE BASE
Trucker 028 HEA
Contractor 329 HEA
Bucker
Yarder

Loader
Yard No. S

Company Code A
Block No.
Skidder
Faller 490
Description MB

Remarks: _____

APPROVED IN LIEU OF FS488 - MINISTRY OF FORESTS

Figure 7A.28 Example of a computer-generated weight scale load slip.

This page is intentionally left blank.

2. FS 482 Weight Scale Daily Load Inventory (only available in electronic form from the Internet)

Recording the Weight Scale Daily Load Inventory - FS 482

For an example of a computer-generated daily load inventory see Figure 7A.30.

[illegible]

Figure 7A.29 FS 482 - Weight scale daily load inventory.

Position	Description
A	Enter the three digit site number assigned by the ministry.
B	Enter the name of location of the scale station.
C	Enter name of the company or operation.
D	Enter the page sequence you are working on. If there is more than one page for the day, enter the total pages in second line upon completion.
E	Enter the day the loads were weighed.
F	Enter the name/licence number of the weight-scaler.
G	Enter the monthly load arrival number, assigned sequentially throughout the month at the site.
H	Enter the load slip number or ticket retrieval number from the load slip (also called a load description slip or bush slip).
I	Enter the number of the stratum into which the load is designated.
J	Enter the block and load number where applicable.
K	Enter an S to indicate a sample load to be set aside for scaling.
L	Enter the timber mark on the load.
M	Enter the truck number.
N	Enter the times the truck was weighed upon arrival to, and departure from, at the scale site.
O	Enter the gross (truck and load), tare (truck only), and net (gross minus tare) weight in kilograms.
P	Enter the total number of loads and weights at the bottom of the page.

WEIGHT - SCALE STATION													Page: 1 of 2	
DAILY LOAD INVENTORY													Date of Weighing 09-13-94	
Location: SMITHERS													Date of Printing 09-13-94	
Operation PR SCALE BASE													Time of Printing 18:04	
													Weight Scaler	

Figure 7A.30 Computer-generated weight scale daily load inventory.

3. FS 484 Daily Report by Stratum (only available in electronic form from the Internet)

[illegible]

Figure 7A.31 FS 484 - Weight Scale Station, Daily Report for Stratum.

4. Computer Generated Daily Report by Stratum

Population No.: 6001
Scaling Year: 94

Daily Summary
For 10/03/94

Page: 1
Weigh Scale No. 619

Location: AINSWORTH LUMBER - CHASM DIV.
Report By Company By Stratum By Timber Mark

Company: A	Stratum	Timbermark	Loads	Net kg
Ainsworth Lumber	20	33444	4	136500
Chasm Div.		EU9111	4	108500
		EU9124	2	65750
	Stratum	Totals	10	310750
	22	EU9116	1	36370
		EU9124	2	66850
	Stratum	Totals	3	103220
Scale Base Totals			13	413970
	30	26228	2	57180
		39333	26	1026100
	Stratum	Totals	28	1083280
	31	ES8538	8	281080
		ES8545	4	136840
	Stratum	Totals	12	417920
Cruise Base Totals			40	1501200
	35	DWL604	10	281080
		DPG413	8	136840
	Stratum	Totals	18	417920
Prescaled Totals			18	417920
COMPANY TOTAL			71	2333090

Figure 7A.32 Computer generated daily report by stratum.

5. FS 239 Weight Scale Sample Tally

Weight Scale Sample Tally - FS 239

The computerized version of an FS 239 is called an FS 531. An example of an FS 531 can be viewed in Figure 7A.36.

Description	The FS 239 form is an 8.5 inch by 11 inch single sheet printed in green ink on white bond which is photocopied if copies of the form are needed for region or district control purposes.
Purpose	The scaler records individual log measurements for the length (in metres with one implied decimal), top (in rads), and butt (in rads) of each log in a sample load on the <i>Weight Scale Sample Tally</i> . A "rad" is a short form of radius unit which is a two-digit number where one rad equals two centimeters. There are three card types on the form: '0', '2', and '3'; each type has different coding requirements.
Process	The form is completed by the scaler and either sent to the district office or picked up by the District Scaling Supervisor at the scale site. After checking and ledgering, the form is sent directly to Revenue Branch headquarters. There, the form is keyed and then processed through the Weight Scale System. The processed form is attached to the <i>Sample Tally Edit Error Report</i> and mailed to either the regional office or the district office if the region has decentralized the administration of sample tallies.
General Rules	<p>Ensure that the Scaled At, and Prepared By areas of the form are completed to assist in coding administration.</p> <p>Numeric fields are always right-justified (zeros are put to the left of the characters).</p> <p>Alphabetic fields are always left-justified (blanks are put to the right of the data).</p> <p>A maximum of 400 records per tally is permitted.</p>

Record Type 0 (Header)



BRITISH COLUMBIA

WEIGH SCALE SAMPLE TALLY

METRIC SCALE RECORD

CARD		SCALER'S NUMBER	SCALER'S TALLY NUMBER	WEIGH SCALE STATION NUMBER	DATE OF SCALE			LOAD ARRIVAL NUMBER	WEIGH SCALE SLIP NUMBER	POPULATION	STRATUM	SAMPLE YEAR	BLOCK NUMBER	BLOCK LOAD NUMBER	NET WEIGHT	MARK	LOG COUNT	PAGES	
LINE	TYPE				YEAR	MO.	DAY												
0	1	0																	
1		4	8	11	14		20	24	31	35	37	39	42	45	51	56	60	64	67

Figure 7A.33 FS 239 - Weigh Scale Sample Tally (Record Type 0, Header).

Positions	Field Name	Description
4 - 7	Scaler's Number	Must be completed. Enter the four alphanumeric characters for the scaler's licence number. Where two or more scalers work together, the senior scaler's licence number is used.
8 - 10	Scaler's Tally Number	The three numbers used by each scaler to sequentially number tallies. Each year starts at 001.
11 - 13	Weight Scale Station Number	The three-character code for the Weight Scale from the HDBS Table 24.
14 - 19	Date of Scale	The date the scale was made. Enter the last two digits of the year, the number of the month, and the day of the month in YYMMDD format.
20 - 23	Load Arrival Number	The four numbers allocated to the loads in order of arrival at the scale site. The numbering may start at "0001" on a daily, weekly, or monthly basis depending on local agreements with the operator.
24 - 30	Weigh Scale Slip Number	Enter the seven characters from the <i>Weight Scale Load Slip (FS 488)</i> or approved equivalent. This is the Audit number.
31 - 34	Population	Enter the four-digit code for the population.
35 - 36	Stratum	Enter the two-digit stratum code number (Code '01' for Stratum 1).

Positions	Field Name	Description
37 – 38	Sample Year	Enter the year in which the sampling year expires. For example, if the sampling year expires in May 2000, enter '00'.
39 - 41	Block Number	The three numeric digits for the sample number or block number from the Sampling Plan. Some regions leave this field blank.
42 - 44	Block Load Number	Enter the three numeric digits for the load within the block selected as the sample. Some regions leave this field blank.
45 - 50	Net Weight	Enter the net weight of the sample load in kilograms - right oriented.
51 - 57	Mark	<p>Enter the six characters which describe the timber mark - left oriented. Special characters are used for symbols:</p> <p>(-) (dash) represents a bar</p> <p>(') (single quote) represents a crescent</p> <p>(:) (colon) represents a wavy line</p> <p>(>) (greater than sign) represents a triangle</p>
58	Scale Type	<p>Enter one of the following codes:</p> <p>F for a First scale (also known as firmwood scale). This produces an original <i>Sample Tally Report</i> and updates the Sample Statistical File</p> <p>C for a Checkscales which produces a checkscale printout but does not update the Sample Statistical File. With the implementation of CHECKS and the capability to perform checkscales on-site, these are seldom used.</p>

Positions	Field Name	Description
60 – 63	Log Count	Enter the total number of log entries made in the sample including the entries made on multiple pages.
64	Blank (Bypass Flag)	This position is left blank by the scaler and is used to bypass the computer edits in the Sample Tally program for: Weight, Volume, Sample Ratio, Tree Dimensions and Scale date later than expiry date of population/stratum/year.
65	M or I	Enter M for metric weight measured in kilograms
67	Page	Enter the total number of pages in the sample tally on the first page.

Record Type 2 (Detail Record)



CARD	SPECIES	GRADE	NUMBER OF PIECES	18	25	32	39	46	53	60
LINE	TYPE									
1	3	11								
02										

Figure 7A.34 FS 239 - Weigh Scale Sample Tally (Record Type 2, Detail Record).

Positions	Field Name	Description
3	Type (Card type)	Enter 2 for an identification record or detail record
11 – 12	Species (Log species code)	Enter the two alphabetic characters for species:
		AL - Alder LO - Lodgepole Pine
		AR - Arbutus MA - Maple
		AS - Aspen OA - Oak

Positions	Field Name	Description					
		BA	-	Balsam	SP	-	Spruce
		BI	-	Birch	WB		Whitebark Pine
		CE	-	Cedar	WH	-	White Pine
		CO	-	Cottonwood	UU	-	Yew
		CY	-	Cypress	RΔ Z	-	(R blank Z)
		FI	-	Fir			Reject
		HE	-	Hemlock			
		LA	-	Larch			
13	Grade	Enter the applicable grade code:					
		Δ	-	(blank) Ungraded			
		3	-	6, B - M, U, X, Y, and Z			
14 – 17	Number of Pieces	Enter the number of logs for this segregation, with leading zeros (e.g., 012 for 12). If a segregation overflows to another section, the piece count of the overflow should be recorded on the overflow identification line.					
18 – 66	Log data	Enter log data using seven numbers for each log in the format LLLTTBB where:					
		LLL	-	Length of log in decimetres. e.g. 102 for 10.2 m, 080 for 8 m			
		TT	-	Top of log in rads. e.g. 08 for 8 rads			
		BB	-	Butt of log in rads. e.g. 09 for 9 rads			

Positions	Field Name	Description
		There is no provision for oversize logs - the volumes must be calculated and entered using "V" or volume records on a Computed Sample Tally (FS 531) (see Section 3.4.1).



CARD	SPECIES	GRADE	NUMBER OF PIECES
LINE	TYPE		
1	3	11	18
02			25
			32
			39
			46
			53
			60

Figure 7A.35 FS 239 - Weigh Scale Sample Tally (Record Type 3, Continuation Records).

Positions	Field Name	Description
3	Type (Card Type)	Enter 3 if positions 11 - 17 contain log data rather than identification data
11 – 66	Log data	Enter log data as shown above.

This page is intentionally left blank.

6. FS 531 Weight Scale Computed Sample Tally

Computed Sample Tally – FS 531

Description	There are two formats for the <i>Computed Sample Tally</i> : a ministry form, and a computer printed facsimile. The FS 531 form and instructions are shown in the section on correcting a sample tally. The facsimile FS 531 format, described in this section, is produce by a handheld microcomputer and is printed on plain white stock with computer printed column headings.
Purpose	The <i>Computed Sample Tally</i> format uses computed volumes for sample loads and is used where a handheld microcomputer or computer has tabulated individual log measurements into volumes. There are two card types on the handheld output: card type 0 which is converted by the programs to H for header records, and card type 4 which is converted by the programs to V for volume records.
Process	The form is completed by the scaler and either sent to the district office or picked up by the District Scaling Supervisor at the scale site. In some regions, if a handheld is used, the facsimile FS 531 is accompanied by the facsimile <i>Sample Tally FS 239</i> to district office. After checking, the form package is sent to Billing Operations at Revenue Branch headquarters. There, the form is keyed and then processed through the Weight Scale System. The processed form is attached to the <i>Sample Tally Edit Error Report</i> and mailed to either the regional office or the district office (if the region has decentralized).
Rules	All handheld output must meet the standards defined by Revenue Branch.

COMPUTED WEIGHT SCALE SAMPLE (F.S. 531)

REGION: VANCOUVER
DISTRICT: CHILLIWACK
SCALED BY: _____

PAGE 01 OF 01
DATE: 05.05.96
TIME: 17:22

SIGNED: _____

SEQ#	SCALER#	TALLY#	WEIGHT SCALE#	DATE SCALED	LOAD ARRIVAL#	SLIP#	POP/STR/YR
COL 1-3	4-7	8-10	11-13	14-19	20-23	24-30	31-38
---	---	---	---	---	---	---	---
	6382	341	109	960505	141	19392	10421396

BLOCK#	BLOCK LOAD#	NET WEIGHT	MARK	ForC	SIGN	#LOGS	O/R	MorI	PAGES
39-41	42-44	45-50	51-57	58	59	60-63	64	65-66	67
---	---	---	---	---	---	---	---	---	---
4	16	42950	EA1085	F		0140	3	M	01

S P E C I E S - G R A D E S U M M A R Y

[-METRIC SCALE-]

COL	SEQ#	SPECIES	GR	NUMBER OF PIECES	SAMPLE VOLUME
1-3	11-12	13	14-16	17-21	
---	---	---	---	---	---
024	FI		006	3.76	
034	WH	5	006	2.21	
044	BA	3	021	4.98	
054	BA	5	005	0.84	
064	WH	3	004	1.60	
074	BA		082	35.20	
084	BA	6	010	1.34	
094	WH		001	0.20	
104	SP		001	0.34	
114	HE		002	0.30	
124	FI	3	001	0.11	
134	R	2	001	0.00	
14T	Total		140	50.88	

Figure 7A.36 FS 531 - Computer-generated weight scale sample tally.

Card Type 0 or H - Header Information		
Positions	Field Name	Description
4 - 67	All fields	Refer to the instructions for the <i>Sample Tally</i> (FS 239). They are identical.
Card Type 4 or V - Volume Information		
4 - 7	Scaler's Number	Must be completed. Enter the four alphanumeric characters for scaler's licence number. Where two or more scalers work together, the senior scaler's licence number is used.
8 - 10	Scaler's Tally Number	The three numbers used by each scaler to sequentially number tallies. Each year starts at 001.
11 - 12	Species	Refer to the instructions for the <i>Sample Tally</i> (FS 239).
13	Grade	Refer to the instructions for the <i>Sample Tally</i> (FS 239).
14 - 16	Number of Pieces	Enter the number of logs for this segregation (species/grade) with leading zeros (e.g., 012 for 12).
17 - 21	Volume	Enter the segregation's volume in cubic metres with five numeric digits with two decimal places implied (e.g., 12345 means 123.45 m ³).
18 - 80	Blank	Blank



FS 531 Weight Scale Computed Sample Tally

COMPUTED WEIGHT SCALE SAMPLE (FS. 531)

ABC LOGGING COMPANY

GREEN LAND DIVISION

REGION: SMITHERS

DISTRICT: BULKLEY

PAGE: 01 OF 01

DATE: 01.16.95

TIME: 17:22

SIGNED: A. Scaler

	SEQ#	SCALER#	TALLY#	WEIGHT SCALE#	DATE SCALED	LOAD ARRIVAL#	SLIP#	POP/STR/YR		
COL	1-3	4-7	8-10	11-13	14-19	20-23	24-30	31-38		
	---	---	---	---	---	---	---	---		
		1234	016	109	950116	141	19382	20101395		
		BLOCK	NET							
	BLOCK#	LOAD#	WEIGHT	MARK	F or C	SIGN	#LOGS	O/R	M or I	PAGES
	39 -41	42-44	45-50	51-57	58	59	60-63	64	65-66	67
	---	---	---	---	---	---	---	---	---	---
	14	16	42950	EA2089	F		0140		M	1

----- SPECIES - GRADE SUMMARY -----
 [-METRIC SCALE-]

	SEQ#	SPECIES	GR	NUMBER OF PIECES	SAMPLE VOLUME
COL	1-3	11-12	13	14-16	17-21
	---	---	---	---	---
	024	FI		006	3.76
	034	WH	5	006	2.21
	044	BA	3	021	4.98
	054	BA	5	005	0.84
	064	WH	3	004	1.60
	074	BA		082	35.20
	084	BA	6	010	1.34
	094	WH		001	0.20
	104	SP		001	0.34
	114	HE		002	0.30
	124	FI	3	001	0.11
	134	R	Z	001	0.00

 14T TOTAL 140 50.88

Figure 7A.37 FS 531 - Computer-generated weight scale sample tally.

This page is intentionally left blank.

7. FS 493 Weigh Scale Monthly Return

Weigh Scale Monthly Return - FS 493

Description	Most of the returns submitted to the ministry are the automated version produced by company computers is printed on 8.5 by 11 inch white bond. A few of the FS 493's are the older 6.75 by 8.5 inch, four-part, no-carbon-required stock in colours white, yellow, pink and blue.
Purpose	<p>The monthly return summarizes the total weight and number of loads for each population, stratum, year, and timber mark for the month of operation. The form lists the loads and weight for each day of operation. The detail lines are used to calculate the revised weights for split-rate months. Monthly return data is used by HDBS to produce <i>Stumpage Invoices</i> that are sent to the forest companies for payment.</p> <p>The form is also used as a summary sheet or control document for a batch of monthly returns for a particular population to ensure that all returns have been processed by HDBS.</p>
Process	The form can be completed by the scaler, or generated from data collected on a company's computer. The form is usually sent directly from the district to Revenue headquarters with a copy sent to regional Revenue. Regional Revenue files their copy in the Outstanding Monthly Return binder. At Revenue Branch in Victoria, the form is keyed and processed through the Weight Scale billing programs. When the invoice is generated, the original monthly return is attached and returned to the regional office.
General Rules	<p>Make corrections in red ink only, on all copies of the form,</p> <p>do not use "white out",</p> <p>use block capital letters,</p> <p>underline the letter "S" to avoid keypunchers mistaking it for a "5", and</p> <p>use "I" not "i", "O" not "o", "Z" not "z".</p>



WEIGH SCALE MONTHLY RETURN

FOREST REGION (A)										(F) DAY		(G) LOADS		WEIGHT (H)										BILLED UNDER STUMPAGE INVOICE NO.	
FOREST DISTRICT (B)										1															
VERIFIED BY (C)										2															
SCALER'S LICENSE / PERMIT NO. (D)										3															
REMARKS (E)										4															
										5															
										6															
										7															
										8															
										9															
										1 0															
										1 1															
										1 2															
										1 3															
										1 4															
										1 5															
										1 6															
										1 7															
										1 8															
										1 9															
										2 0															
										2 1															
										2 2															
										2 3															
2 4																									
2 5																									
2 6																									
2 7																									
2 8																									
2 9																									
3 0																									
3 1																									
RECORD		POPULATION		STRATUM		SAMPLING YEAR		MARK		MONTH ENDING			TOTAL NO. OF LOADS FOR MONTH		TOTAL WEIGHT FOR MONTH		WEIGH SCALE NO.								
SEQ.	TYPE									YEAR	MONTH	DAY													
1		3		7		9		11		18	20	22	24		28		37								
A	0																								

FS 493 HVA 00/04

Figure 7.38 FS 493 – Weigh Scale Monthly Return.

Regular Return Format (not a Summary Sheet)

Positions	Field Name	Description
A	Forest region	Region where the scale was made.
B	Forest district	District where the scale was made.
C	Verified by	Signature of the scaler verifying the scale.
D	Scaler licence number	Enter the four alphanumeric characters for the scaler's licence number.
E	Remarks	Special notations concerning the monthly return or its processing required - this field is rarely used.
F	Day	Day of the month on which the scale was made.
G	Loads	Number of loads for the day for this pop/str/yr/mark.
H	Weight	Total weight in kilograms for the day for this pop/str/yr/mark.
1	Seq.	Preprinted as "A".
2	Type	Preprinted as "0".
3 - 6	Population	Enter the four-digit code for the population. The number takes the format RPPP where R is the one digit for region and PPP is the sequentially assigned population number within the region.
7 - 8	Stratum	Enter the two-digit stratum number (Code 01 for Stratum 1).
9 - 10	Sampling Year	Enter the two digit cyclic year.
11 - 17	Mark	Enter up to six characters for the timber mark. Special characters are used for symbols: (-)(dash) represents a bar (')(single quote) represents a crescent (:)(colon) represents a wavy line (tilda) (>)(greater than sign) represents a triangle.

Positions	Field Name	Description
18 - 23	Month Ending	Enter the Year, Month, and last day of the Month in the format YYMMDD in numeric characters.
24 - 27	Total Number of Loads for Month	Enter the total number of loads weighed for this mark during the month. Enter the number right-justified.
28 - 36	Total Weight for Month	Total the individual daily weights (in kilograms) and enter the number right-justified.
37 - 39	Weigh Scale Number	Enter the three character code for the Weight Scale Station from the HDBS Table 24.

Summary Sheet Format (not a regular Return)

The "Summary Sheet" contains the total number of loads and the total weight for all loads within a population for a month. That is, the individual stratum and mark totals are added to obtain a grand total for the whole population. The billing program checks this total against its derived total to determine if any monthly returns have been lost or have load or weight discrepancies.

Weight Scale Monthly Return

Page 87 of 88

Nelson Forest Region
31/10/96 Month of October for Mill # 01

17:38

Audit No.:

Billed under:
S&R Invoice no:Forest Region: ^(A)NelsonForest District: ^(B)ArrowVerified by: ^(C)SignatureScaler's Licence/Permit no.: ^(D)6530Remarks: ^(E)

Day	Loads	Weight
^(F) 1	^(G) 48	^(H) 1360310
2	49	1372940
3	48	1369480
4	43	1229070
5	28	784050
6		
7	54	1530880
8	58	1664320
9	69	1955830
10	56	1557320
11	50	1392770
12		
13		
14		
15	57	1566050
16	39	1067420
17	33	909750
18	27	744300
19		
20		
21	39	1044860
22	29	798330
23	41	1110030
24	36	983950
25	32	905530
26		
27		
28	44	1233510
29	31	853450
30	38	1071970
31	49	1341440

Record						Mo. End			Loads	Net weight	Scale Number
Seq	Typ	Pop	Str	Year	Mark	Yr	Mo	Da			
1	2	3-6	7-8	9-10	11-17	18	20	22	24-27	28-36	37-39
1	0	5021	SS	97	Summary	96	10	31	998	27847560	502

Figure 7A.39 Weight Scale Monthly Return (FS 493).

Positions	Field Name	Description
A	Forest Region	Enter the forest region.
B	Forest District	Enter the forest region.
C	Verified by	Must be signed.

Positions	Field Name	Description
D	Scaler's Licence/Permit No.	Enter the scaler's licence number.
E	Remarks	
F	Day	
G	Loads	
H	Weight	

This page is intentionally left blank.

7A.3 Stumpage Invoices

A scale return, for a truck load, a boom, a monthly production, or any other identifiable parcel of timber must be entered into the ministry billing system to produce a stumpage invoice .

Invoices are the means by which the ministry bills the clients for stumpage and or royalty charges due on the timber. In addition, the volumes from the invoices make up the harvest history, which is used for cut control purposes. For this reason all timber must be scaled and reported to the ministry regardless of whether there are any charges owing.

A stumpage invoice displays the calculated volume for each mark by species and grade. The volume is then multiplied by the applicable stumpage to determine the charges due the ministry. The invoices are payable upon receipt. In addition, each client will receive a statement of account at regular intervals identifying the invoices issued and any payments received. If unpaid by the due date, interest is applied at a prescribed rate.

The ministry issues two types of  invoices to provide for the different scaling methods used in the province. An example of a weight scale invoice  is shown in Figure 7A.40, and an example of a piece scale invoice  is shown in Figure 7A.43.

Stumpage invoices are sometimes issued for alternate types of billing. For further information see the HBS Administration Manuals, piece scale billing: regions and districts and weight scale billing: regions and districts.

This page is intentionally left blank.

1. FS 433 Weight Scale Stumpage Invoice and Scale Summary



Payable on receipt. This amount will appear on your next Statement of Account. If you do not pay your account in full, then interest will be charged at prescribed rate on the unpaid Statement balance as at the due date specified on the Statement of Account. Please quote customer account and invoice number with your payment. Make cheque payable to the Minister of Finance and Corporate Relations, and forward to any Ministry of Finance office, Attention: Accounting Section. All charges on this invoice are GST exempt unless otherwise indicated.

NOTICE: This invoice or a copy of this invoice is being sent to you to notify you that if this invoice is not paid by the licensee (or a party on behalf of the licensee) then the Ministry may seek payment from you pursuant to Sections 141 and 149 of the Forces Act. Provincial GST registration number: R197864736

Page FOUR 7/96

Provincial GST registration number: R107004720

7A-96

Header information contains fields that describe where the invoice is directed, and certain other reference fields (e.g., invoice number and date).

Positions	Field Name	Description		
A	Date of issue	Date of processing the invoice in Victoria.		
B	Invoice number	The format of the invoice number is: <i>wcnnnnn</i> where "w" is the first letter		
		<ul style="list-style-type: none">• <i>c</i> is a letter denoting the region the invoice belongs to (determined by the timber mark)• <i>nnnnn</i> is the next sequential number within the series of letters belonging to the region.		
		Each region has a group of identifying letters. When all the numbers for one letter have been used up, the next letter in the region's group is used.		
		Region	Assigned letters	Currently at
		Cariboo	C D E F	D
		P. George	G H I J	H
		Kamloops	K L M 3	M
		Nelson	N P Q 5	Q
		P. Rupert	R S T U	R
		Vancouver	V W X Z 1 2	V
C	Forest region	The region to which the timber mark belongs. See the section on Out-of-region timber if this is not the region that scaled the timber.		
D	Forest district	The district to which the timber mark belongs.		
E	Scaling station	The station where the timber was scaled.		

Positions	Field Name	Description
F	Invoice to	The HDBS version of the client number and the client location code of the party responsible for the payment of the invoice. See Section 4.2 on "Who to Bill", in the <i>Billing Management</i> manual.
G	Cycle code	Numerical code between 1 and 4 which identifies payment due date.
H	Copy to	Currently not used.
I	Name code	The HDBS version of the client number and location code of the party who has been designated as the recipient of the second copy. See Section 4.2 on "Who to Bill" in the <i>Billing Management</i> manual. May be the same as the HDBS Payable by: code.
J	Names and addresses of recipients of the invoice	These are based on the Invoice to: and Name code: fields.

Identification Information

This section gives details of the source of the timber (Population/stratum/year/mark, licence number) and the kind of charge (stumpage or royalty). It also shows the year-to-date figures, both previous and new, and the dates for which the rate is valid.

Positions	Field Name	Description
K	Population Stratum Year	Coded on the monthly return. See section 1.1 <i>Setting up the Population and Stratum</i> for an explanation of how these values are derived.
L	Mark	The timber mark from which the timber was harvested, on the monthly return.
M	Number of Loads	The number of loads shown on the monthly return.
N	Licence no.	The licence number associated with the mark.

Positions	Field Name	Description	
O	Permit no.	The cutting permit number associated with the mark.	
P	Scaling station	The number referring to the location of the weigh scale that weighed the timber.	
Q	Scale return no.	N/A (piece scale only).	
R	Kind of charge	Whether the timber is from a stumpage or no charge mark.	
S	Previous invoice	Previous invoice number for this Population/Stratum/Year/Mark. If blank, this is the first invoice issued for the cyclic year.	
T	YTD (kg) 1 - 4 Period ending	These are used to identify the month in which the scale was made, adjusted or cancelled.	
		1.	Period ending : If one rate applies to the whole month during which the scale was made, this date is usually the last day of the month. If two rates apply during this month, this is the last date on which the first rate is valid. If the weight changed, the Period Ending or scale date remains the same.
		2.	Period ending : If two rates apply during the month of scale, this is the last day of the month during which the scale was made. If the weight changed, the Period Ending or scale date remains the same.
		3. & 4.	Period ending : These are used if the original invoice had a split rate, and this invoice is to adjust the weight, or if both the rate and weight are being adjusted on this invoice.
U	This period (kg)	The mass (weight) that applies to the dates in Period ending.	

Positions	Field Name	Description
V	Year to date (kg)	The mass (weight) for the year-to-date for the Population/Stratum/Year/Mark.

Charges Information

This section shows the breakdown by species/grade of the new weight reported for the month, and the charges that apply.

Positions	Field Name	Description
W	Species/grade	Any species/grade which has been appraised for the mark, or which has appeared in samples for the Population/stratum/year (from the Sample Statistical File).
X	Weight ref	The number of the PERIOD ENDING associated with the species/grade.
Y	Rate	The rate that applies to the species/grade. It is obtained from the mark file, or may be manually entered on the return (pre-rating). If neither of these sources produce a rate, the rate is obtained through Default Rating Logic (see Section 2.4.3, <i>Billing Management Manual</i>). The rate in this column refers to the number of the PERIOD ENDING (see above, Identification information).

Positions	Field Name	Description
Z	Weight x Rate YTD	<p>For each species/grade, this is the accumulated weight multiplied by the rate applicable at the time of billing for the species/grade. This is for <i>all</i> weight for the Population/stratum/year/mark, including the weight for this period. The weight used in this calculation should be the same as the Year-to-date (kg) figure above.</p> <p>In order to duplicate this figure you must know all the rates for the particular species/grade which have been applied to each new weight during the current billing year, or know that the rate printed on the invoice has remained constant since the beginning of the current billing year.</p>
aa	Ratio	The ratio of volume (m ³) to mass (kg) established for the species/grade from the Sample Statistical File.
ab	Volume Total YTD	The product of Year-to-date (kg) times the Ratio/1 000, to arrive at a figure in metric tonnes.
ac	Volume Additional	New (current) Year-to-date volume minus the previous Year-to-date volume.
ad	Charges Total YTD	<p>The new Year-to-Date value, derived from the formula:</p> $\frac{\text{YTD (Kg x Rate) x Ratio}}{1\,000}$
ae	Charges Additional	The new (current) YTD value minus the previous YTD value. Note that this can be a negative figure if ratios are dropping resulting in adjustment to over-billing on previous invoices.
af	Total scale	The sum of the ratio, total YTD volume and the total YTD charges.
ag	Notations	Any explanation related to the processing of the invoice.

Invoice Notations Generated by Transaction Type

After an adjustment by FS 535, one of the following automatic notations is printed on the invoice:

Transaction	Notation
ADJUST	THIS INVOICE ADJUSTS INVOICE NUMBER WCNNNNNN
CANCEL	THIS INVOICE CANCELS INVOICE NUMBER WCNNNNNN
CORRECT AUTOCOR (M2)	THIS INVOICE CORRECTS RATES ON INVOICE NO WCNNNNNN BOTH INVOICES ARE NOW PAYABLE
EXACAN (M1)	THIS INVOICE EXACTLY CANCELS INVOICE NUMBER WCNNNNN
FINAL	THIS INVOICE BILLS FOR VOLUME AND VALUE USING FINAL RATIOS
MERGE	THIS INVOICE USES NEW RATIOS RESULTING FROM AMALGAMATION
NIL	THIS INVOICE BILLS FOR VOLUME AND VALUE USING LATEST RATIOS
FINAL, MERGE, NIL	RATES SHOWN ARE NOT USED IN DOLLAR VALUE CALCULATION
REPLACE	THIS INVOICE REPLACES INVOICE NUMBER WCNNNNNN
	When a date is coded in the rate date field the following notation results: THIS INVOICE USES RATE EFFECTIVE ON YYMMDD

Wording at Bottom of Invoice

This wording explains some legal and financial aspects of an invoice and related payments.

Payment on receipt. This amount will appear on your next Statement of Account. If you do not pay your account in full, then interest will be charged at a prescribed rate on the unpaid Statement balance as at the due date specified on the Statement of Account. Please quote customer account and invoice number with your payment. Make cheque payable to the Minister of Finance and Corporate Relations, and forward to any Ministry of Forests office, attention Accounting Section. All charges on this invoice are GST exempt unless otherwise indicated.

NOTICE:

This invoice or a copy of this invoice is being sent to you to notify you that if this invoice is not paid by the licensee (or a party on behalf of the licensee), then the Ministry may seek payment from you pursuant to Sections 130 and 131 of the *Forest Act*.

Cyclic Billing Calculation Examples

Initial Invoice

The easiest invoice to understand is the first invoice of the billing year, as the volumes and charges can be derived from figures on the invoice.

 BRITISH COLUMBIA WEIGHT SCALE		Ministry of Forests	 STUMPAGE INVOICE AND SCALE SUMMARY	FACSIMILE	
FOREST REGION: _____		FOREST DISTRICT: _____		SCALING STATION: _____	
INVOICE TO: _____		CYCLE CODE: _____		COPY TO: _____	
DATE OF ISSUE: _____ YEAR MONTH DAY		INVOICE NUMBER: WR88787		PAGE OF: 1 1	

IDENTIFICATION				TIMBER MEASURED		THIS PERIOD (kg)	YEAR TO DATE (kg)
POPULATION:	LICENCE NO.:	PERMIT NO.:	SCALING STATION:	1 PERIOD ENDING:	1996-07-31	711120	711120
STRATUM:	SCALE RETURN NO.:	KIND OF CHARGE: Stumpage		2 PERIOD ENDING:		(B)	(C)
YEAR:				3 PERIOD ENDING:			
MARK:				4 PERIOD ENDING:			
NUMBER OF LOADS:							

SPECIES	GRADE	WEIGHT kg	RATE \$	WEIGHT X RATE Y.T.D. kg \$/m³	RATIO m³/TONNE	VOLUME		CHARGES	
						TOTAL Y.T.D.	ADDITIONAL	TOTAL Y.T.D.	ADDITIONAL
Balsam	4	42	38	30137266	0.06593	46.9	46.9	1986	95
Balsam	6	0	25	177780	0.00379	2.7	2.7	0	67
Balsam	6	0	25	177780	0.02399	17.1	17.1	4	26
Lodge-Pine	4	42	38	30137266	1.18292	841.0	841.0	35649	97
Lodge-Pine	3	0	25	177780	0.00634	4.5	4.5	1	13
Lodge-Pine	4	0	25	177780	0.02975	21.2	21.2	5	29
Lodge-Pine	6	0	25	177780	0.00124	0.9	0.9	0	22
Rejects	Z	0	00	0	0.00357	2.5	2.5	0	00
Spruce	4	42	38	30137266	0.00387	2.8	2.8	116	63
Spruce	6	0	25	177780	0.00036	0.3	0.3	0	06
Other Spec	6	42	38	30137266	0.00400	0.9	0.0	0	00
* Total Scale						939.9	939.9	\$37,765.18	
** Total Fees								\$0.00	

Payable on receipt. This amount will appear on your next Statement of Account. If you do not pay your account in full, then interest will be charged at a rate of 12% per annum on the unpaid balance as at the due date specified on the Statement of Account. Please note: customer account and invoice number with your payment. Make cheque payable to the Minister of Finance and Corporate Services, and forward to any Ministry of Forests office.

NOTICE: This invoice or a copy of this invoice is being sent to you to notify you that if this invoice is not paid by the licensee (or a party on behalf of the licensee), then the Ministry may seek payment from you pursuant to Sections 109 and 110 of the Forest Act. Provincial BCT registration number: 818764758

Form F8000 82/92

Figure 7A.41 Example of Initial Invoice.

Position	Field Name	Description
A	Invoice Number	Shows that this invoice is from Prince Rupert Forest Region.
B C	This Period and Year to Date (kg)	The figures are the same, showing that this is the first billing for the current year (also, Previous Invoice Field is blank).
D	Rate	Applies to the species/grade.
E	Weight X Rate Y.T.D.	The product of the total weight (B) times the rate per cubic meter (D). This calculation is performed for each species/grade combination. For fir sawlogs, this is $\$42.38 \times 711120 = 30137266$.
F	Ratio	Because the figures of timber harvested are collected in kilograms, they must be converted by a ratio of cubic meters per metric tonne to provide a volume measurement of cubic meters. This ratio is established by the sampling of random loads compiled on the Sample Statistical File by Pop/Str/Yr. The Ratio is used in calculations (G) and (I) below.
G	Volume – Total Y.T.D.	The Total YTD Volume is the product of the YTD weight times the ratio/1 000. On the example invoice, the YTD weight of 711120 (C) is multiplied by the ratio 0.06503 (F) and divided by 1000 (to convert kg to metric tonnes) which, for balsam sawlogs, gives 46.9 m3.
H	Volume – Additional	The Additional volume is the same as the YTD volume, as this is the first invoice of the billing year.
I	Charges – Total Y.T.D.	The Total YTD charges are the Weight x rate YTD (E) times the ratio (F), divided by 1 000 (to convert kg to metric tonnes). For balsam sawlogs, this is $30137266 \times 0.06593 / 1000 = 1986.95$.

Position	Field Name	Description
J	Charges - Additional	The Additional charges are the same as the YTD charges, as this is the first invoice of the billing year.

Later Invoices

Later invoices are not quite as straightforward as an initial invoice, as some of the volumes and charges cannot be derived from the figures shown on the invoice (although they can be calculated from all previously issued invoices for the current year). These figures may be dependent on changes in ratios and rates in past months which are not reported on the current invoice.

The following invoice was issued the following month for the same population/stratum/year/mark as the initial invoice. In order to follow the calculations, both the original and second invoice must be referred to.

BRITISH COLUMBIA WEIGHT SCALE		Ministry of Forests 	STUMPAGE INVOICE AND SCALE SUMMARY	FACSIMILE								
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">DATE OF ISSUE</td> <td style="width: 30%;">INVOICE NUMBER</td> <td style="width: 20%;">PAGE</td> <td style="width: 20%;">OF</td> </tr> <tr> <td>YEAR MONTH DAY</td> <td>WR89381</td> <td>1</td> <td>1</td> </tr> </table>			DATE OF ISSUE	INVOICE NUMBER	PAGE	OF	YEAR MONTH DAY	WR89381	1	1
DATE OF ISSUE	INVOICE NUMBER	PAGE	OF									
YEAR MONTH DAY	WR89381	1	1									
FOREST REGION		FOREST DISTRICT		SCALING STATION								
INVOICE TO:		CYCLE CODE:	COPY TO:	HAVE CODE:								

IDENTIFICATION				TIMBER MEASURED		THIS PERIOD (kg)		YEAR TO DATE (kg)	
POPULATION:		LICENCE NO.:		8 PREVIOUS INVOICE: (A) WR88787				711120	
STRATUM:		PERMIT NO.:		1 PERIOD ENDING: 1996-08-31		4848360		5559480	
YEAR:		SCALING STATION:		2 PERIOD ENDING:		(B)		(C)	
MARK:		SCALE RETURN NO.:		3 PERIOD ENDING:					
NUMBER OF LOADS:		KIND OF CHARGE: Stumpage		4 PERIOD ENDING:					

SPECIES	GRADE	WEIGHT MEAS.	RATE		WEIGHT X RATE V.T.D.	RATIO	VOLUME		CHARGES			
			B	C			TOTAL V.T.D.	ADDITIONAL	TOTAL V.T.D.	ADDITIONAL		
(D)			(E)	(F)	(G)	(H)	(I)	(J)	(K)			
Balsam	1	1	42	38	235610763	0.10420	579.3	532.4	24550	64	22563	69
Balsam	3	1	0	25	1389870	0.00210	11.7	11.7	2	92	2	92
Balsam	4	1	0	25	1389870	0.01575	87.6	84.9	21	89	21	22
Balsam	5	1	0	25	1389870	0.00132	7.3	7.3	1	83	1	83
Balsam	6	1	0	25	1389870	0.01234	68.6	51.5	17	15	12	89
Lodge-Pine	1	1	42	38	235610763	1.12219	6238.8	5307.8	264400	04	228750	07
Lodge-Pine	3	1	0	25	1389870	0.00527	29.3	24.8	7	32	6	19
Lodge-Pine	4	1	0	25	1389870	0.04225	234.9	213.7	58	72	53	43
Lodge-Pine	6	1	0	25	1389870	0.00153	8.5	7.6	2	13	1	91
Rejects	Z	1	0	00	0	0.00189	10.5	8.0	0	00	0	00
Spruce	1	1	42	38	235610763	0.02449	136.2	133.4	5770	11	5653	48
Spruce	6	1	0	25	1389870	0.0015	0.8	0.5	0	21	0	15
Other Spec	1	1	42	38	235610763	0.00090	0.0	0.0	0	00	0	00
* Total Scale						33348	7413.5	6473.6			\$257,067	78
** Total Fees											\$0	00

PAY THIS AMOUNT **\$257,067.78**

Payable on receipt. This amount will appear on your next Statement of Account. If you do not pay your account in full, then interest will be charged at 8% per annum on the unpaid balance as at the due date specified on the Statement of Account. Please remit outside account and invoice number with your payment. Also check payable to the Minister of Finance and Corporate Relations, and forward to my Ministry of Forests office, attention Accounting Section. All charges on this invoice are GST exempt unless otherwise indicated.

NOTICE: This invoice or a copy of this invoice is being sent to you to notify you that if this invoice is not paid by the licensee (or a party on behalf of the licensee), then the Ministry may seek payment from you pursuant to Sections 110 and 111 of the Forest Act. Provincial GST registration number: 8187864756

Form F808M 05/97

Figure 7A.42 Later Invoice.

Position	Field Name	Description
A	Previous Invoice	Issued over the same population/stratum/year/mark. Period ending - month of scale of loads submitted for billing.
B C	This Period (kg) and Year to Date (kg)	These show the increase in the YTD weight with the addition of the new weight. The top weight at (C) is the previous invoice YTD weight. The bottom weight at (C) is the previous YTD weight plus this period's weight, $711120 + 4848360 = 5559480$ kg.
D	Species	The number of species/grades combinations has increased over the number on the initial invoice. This is a result of more accurate sampling over the last few months, with volumes of the new species/grades being sampled.
E	Rate	In this case, the rates have not changed since the first billing.
F	Weight X Rate Y.T.D.	These figures represent the sum of weight times the rate for the species/grade (either 42.38 or 0.25) plus the previous YTD weight times rates. In this case for BA - $(4848360 \times 42.38) + 30137266 = 235610763$.
G	Ratio	This has become more refined since new samples were scaled. Note that the ratio for balsam sawlogs (0.10420) is higher than the ratio on the initial invoice.
H	Volume – Total Y.T.D.	The Total YTD volume for balsam sawlogs of 579.3 is the product of the YTD weight (C) and the Ratio (G), divided by 1 000 (to convert kg into metric tonnes).
I	Volume – Additional	The Additional volume for balsam sawlogs is 532.4. This figure is derived by subtracting the YTD volume on the previous invoice from the current YTD volume ($579.3 - 46.9 = 532.4$).

Position	Field Name	Description
J	Charges – Total Y.T.D.	The Total YTD Charges of \$24 550.64 is the YTD weight x rate times ratio/1 000 for balsam sawlogs (F x G / 1000) $235\,610\,763 \times 0.10\,420 = \$24\,550.64$ ddddddd1000
K	Charges – Additional	The Additional charges for balsam sawlogs is \$22,563.69. This figure is derived by subtracting the YTD charges on the previous invoice from the current YTD charges ($24\,550.64 - 1\,986.95 = \$22\,563.69$).

This page is intentionally left blank.

2. FS 37 - Piece Scale Stumpage Invoice and Scale Summary

Description of a Piece Scale Stumpage Invoice and Scale Summary

Up to five copies of the Piece Scale Invoice are printed (depending on the region requirements) as a report from every run of the billing system.

The invoice can be divided into two logical sections:

1. Header information.
2. Charge information.

The elements shown on the following page are described in the tables, which follow the invoice.

 BRITISH COLUMBIA PIECE SCALE		Ministry of Forests	 STUMPAGE INVOICE AND SCALE SUMMARY	Copy			
SCALED AT VALE MOUNT		STATION: 4S3		DATE OF SCALING 97 09 25	DATE OF TIMBER 97 12 15	INVOICE NUMBER PG17891	PAGE OF 1
SCALED BY VALE MOUNT		REGION: PRINCE GEORGE DISTRICT: ROBSON VALLEY		SCALE'S LENGTH IN 7939			
SCALE'S NAME VALE MOUNT		NO. OF CHAINS FR04		SCALE'S MARK NO. PS-8911		COPY NUMBER 002	
INVOICE TO: 30540		CYCLE CODE: 3		COPY TO: 02778			

01

02

	(R)	(S)	(T)	(U)	(V)	(W)	(X)	(Y)	(Z)
	MARKS ON TIMBER	IN. OF PIECE	DESCRIPTION OF TIMBER	GRADE	SCALE MEASURE CUBIC METRES		RATE		AMOUNT
							B	C	
	W0201C	M	30 CEDAR	ON	17.1		1544		26402
	W0201C	M	1 CEDAR	ON	.4		002		010
	W0201C	M	1 CEDAR	ON	.4		002		010
	W0201C	M	1 CEDAR	ON	.4		002		010
	W0201C	M	1 CEDAR	ON	.4		002		010
	* SPECIES	M	36 CEDAR	ON	20.3		002		003
			SUBTOTAL						26483
	W0201C	M	2 REJECTS	Z			000		000
	* SPECIES	M	2 REJECTS						000
	W0201C	M	2 SPRUCE		.2	S	1544		309
	* SPECIES	M	2 SPRUCE		.2				309
	** MARK	M	40 W0201C		20.5				26792
	*** INVOICE		40 ***TOTALS***		20.5				
			(DG) TOTAL STUMPAGE			S			26792
			(EE) TOTAL OF ALL CHARGES						26792
			(FF) SUMMARY OF SPECIES AND GRADE LOG VOLUMES						
			30 CEDAR		17.1				
			1 CEDAR		.4				
			1 CEDAR		.4				
			1 CEDAR		.4				
			1 CEDAR		.4				
			2 REJECTS		.1				
			2 SPRUCE		.2				
			40		20.5				
			(GG) SUMMARY OF GRADE LOG VOLUMES						
			32 CEDAR		17.3				
			2 CEDAR		.4				
			2 CEDAR		.4				
			3 CEDAR		2.3				
			40		20.5				
	(HH) CEDAR SAW LOG SHOULD BE GRADE 3 *** THIS INVOICE CANCELS INVOICE NUMBER PG 17436								

Payable on receipt. This amount will appear on your next Statement of Account. If you do not pay your account in full, then interest will be charged at a prescribed rate on the unpaid balance as at the due date specified on the Statement of Account. Please quote customer account and invoice number with your payment. Make cheques payable to the Minister of Finance and Corporate Relations, and forward to any Ministry of Forests office, otherwise Accounting Section. All charges on this invoice are GST exempt unless otherwise indicated.

NOTICE: This invoice or a copy of this invoice is being sent to you to notify you that if this invoice is not paid by the licensee (or a party on behalf of the licensee), then the Ministry may seek payment from you pursuant to Sections 130 and 131 of the Forest Act. Provincial GST registration number: R16786-4736

Figure 7A.43 Piece Scale – Stumpage Invoice and Scale Summary (page 1 of 2).

EXPLANATION OF SYMBOLS

KIND OF SCALE: M - Metric
E - Pieces

GRADE: COAST TIMBER GRADE CODES

CODE	GRADE DESCRIPTION	CODE	GRADE DESCRIPTION
B	No. 2 Peeler Fir	K	No. 1 Shingle Cedar
C	No. 3 Peeler Fir	K	No. 2 Sawlog Cypress (stainfree)
D	No. 1 Lumber	L	No. 2 Shingle Cedar
D	No. 1 Premium Spruce	L	No. 3 Sawlog Cypress (stainfree)
E	No. 2 Premium Spruce	M	No. 3 Shingle Cedar
F	No. 1 Lumber Spruce	M	No. 4 Sawlog Cypress (stainfree)
F	No. 2 Lumber	U	No. 5 Utility
G	No. 2 Lumber Spruce	X	No. 6 Utility
H	No. 2 Sawlog	Y	No. 7 Wood Chipper
I	No. 3 Sawlog	Z	Firmwood Reject
J	No. 4 Sawlog		

INTERIOR TIMBER GRADE CODES

CODE	GRADE DESCRIPTION	CODE	GRADE DESCRIPTION
	Sawlog	5	Dead and Dry Lumber Reject
3	Dead and Dry Sawlog	6	Undersized Log Grade
4	Lumber Reject	Z	Firmwood Reject

RATE: Unless otherwise specified in descriptive notations, rate is based as follows:

M - Per cubic metres
E - Per piece

KIND OF CHARGE: Unless otherwise specified in descriptive notations, rate is based as follows:

E - Scaling expenses
S - Stumpage and Waste
T - Time charge
X - Fee in lieu of manufacture

FOR INFORMATION CONTACT:

REGION	ADDRESS	PHONE NUMBER
Vancouver	2100 Labieux Road, Nanaimo, B.C., V9T 6E9	(250) 751-7001
Prince Rupert	Bag 5000, 3726 Alfred Ave., Smithers, B.C., V0J 2N0	(250) 847-7500
Kamloops	515 Columbia St., Kamloops, B.C., V2C 2T7	(250) 828-4131
Prince George	1011 - 4th Ave., Prince George, B.C., V2L 3H9	(250) 565-6100
Nelson	518 Lake St., Nelson, B.C., V1L 4C6	(250) 354-6200
Cariboo	640 Borland St., Williams Lake, B.C., V2G 4T1	(250) 398-4345

Please be advised that this invoice and information may be released under the *Freedom of Information and Protection of Privacy Act*.

Form 708072 04/11

Figure 7A.44 Piece Scale – Stumpage Invoice and Scale Summary (page 2 of 2).

Header Information

Header information contains fields that describe where the invoice is to be sent and certain other reference fields (e.g., invoice number and date). Generally speaking, this section tells the reader whether the invoice has reached the correct destination. Field names in brackets do not appear on the invoice, though the information in them does.

Position	Field Name	Description		
A	Date of Scaling	The date on which the scale took place, in the form YYMMDD.		
B	Date of issue	Date of processing the invoice in Victoria		
C	Invoice number	<p>The format of the invoice number is: Pcnnnnn</p> <p>where "P" is the first letter (signifying Piece Scale)</p> <p>c is a letter denoting the region the invoice belongs to (determined by the timber mark)</p> <p>nnnnn is the next sequential number within the series of numbers belonging to the region.</p> <p>Each region has a group of identifying letters. When all the numbers for one letter have been used up, the next letter in the region's group is used.</p>		
		Region	Assigned letters	Currently at
		Cariboo	C D E F	C
		Prince George	G H I J	G
		Kamloops	K L M 3	L
		Nelson	N P Q 5	N
		Prince Rupert	R S T U	R
		Vancouver	V W X Y Z 1 2	Z
D	Page number	The page number of the sheet of the invoice.		

Position	Field Name	Description
E	(Forest region)	The region to which the timber mark belongs. See the section on Out-of-region timber in the Billing Management Manual if this is not the region that scaled the timber.
F	(Forest district)	The district to which the timber mark belongs.
G	Scaled at	The station where the timber was scaled.
H	Scaler's licence no.	A valid four-character scaler's licence number from Table 15 Scalers Name file.
I	Raft number	The number referring to the series of scales performed this year by the scaler. Can be in the range 000 to 999. If 999 was reached before the end of the year, and the scaler is still scaling, start again at 000.
J	Scaler's name	The name attached to the scaler's licence number in Table 15 Scalers Name file.
K	No. of chains	The number of chains, swifters, dog lines, straps, etc. used on the boom, or the permit number if an export invoice.
L	No. of sections	The number of sections within a boom which were scaled and recorded on the tally.
M	Campboom no.	The number assigned to the boom by the owner. May also be used by Regional Revenue to record regional information.
N	Invoice to	The HDBS version of the client number and the client location code of the party responsible for the payment of the invoice.
O	Cycle code	Code from 1-4 which indicates the monthly billing period.

Position	Field Name	Description
P	Copy to	The HDBS version of the client number and location code of the party who has been designated as the recipient of the second copy.
Q1 & Q2	Names and addresses of recipients of the invoice	These are based on the 'Invoice to: ' and 'Copy to:' fields.

Charges Information

This section shows the breakdown by species/grade of the volume reported, and the charges that apply.

Position	Field Name	Description
R	Marks on timber	The timber marks for each log segregation as shown on the tally.
S	Kind of Scale	'M' for Metric, or 'E' for Each as with Christmas trees.
T	No. of pieces	Number of logs for this segregation and timber mark (blank for Special Forest Products).
U	Description of timber	The species which was scaled.
V	Grade	The grade assigned to the species.
W	Scale measure cubic metres	The volume of the wood for each species/grade/mark combination, expressed in cubic metres.
X	Kind of charge	One of: R Royalty (prior to April 1, 1995) C Cruise S Stumpage E Scaling expenses T Time charges

Position	Field Name	Description
		X Export fee in lieu (not processed through HDBS since May, 1997) P Purchase (stumpage reservation)
Y	Rate	The rate that applies to the species/grade. It is obtained from the mark file, or a manual entry on the tally (pre-rating). If neither of these sources produce a rate, the rate is obtained through Default Rating Logic.
Z	Amount	The rate times the volume for timber described on the invoice.
AA	Subtotals	Subtotals of species (pieces, volume and charges) by timber mark
BB	Subtotals	Subtotals by mark (pieces, volume and charges)
CC	Invoice Totals	Total pieces and volume on invoice
DD	Total Stumpage	The total of charges associated with the timber described on the invoice.
EE	Total of all charges	The total stumpage associated with the timber described on the invoice. Scaler Expenses and time charges are now usually billed through GBS.
FF	Summary of species and grade log volumes	Summary of all the logs appearing on the invoice. Some invoices may be several pages long, and this will give a summary of species/grade without the differentiation by mark.
GG	Summary of Grade Log Volumes	Summary of all the logs appearing on the invoice sorted by grade without differentiation by species or mark.
HH	Notation	An explanation related to the processing of the invoice.

7A.4 Administrative Documents

Other documentation is required to ensure controlled timber transport and a complete and accurate scale. As scaling and timber transport occur under a diversity of operating conditions, documentation requirements may vary to reflect these varying conditions.

Load Description Slips

Load description slips are documents that accompany timber in transport from the cut block or initial load out area to the place of scale, and provides a description of timber being transported, its origin, and its destination. It can also be used for scaled timber in which case it must identify the place where the timber was scaled. A forest officer can use this to monitor the movement of timber while in transport. The ministry load slip is called an FS 649, and is illustrated in Figure 7A.45.

Load Destination Notice

Load destination notices (FS 1146s) are similar to the Load description slip, but are large pieces of sturdy paper that are physically attached to the load. They provide a forest officer with clearly visual description of the timber being transported and location where it is being transported. This may enable the forest officer to monitor timber movement without having to stop the vehicle in transport. It is often used for timber crossing district or regional boundaries. An example of the load destination notice is shown in Figure 7A.46.

These documents are included in this manual to reflect the type of administrative documentation which may be required through the scaler and/or scale site authorization - or other directive. Please ensure you are familiar with the specific requirements as set by the ministry.

Water Transport Record

The water transport record is similar to the load description slip used when transporting by truck. The record identifies the place of loading, the destination, the estimated arrival and scale dates, the tug boat operator, and the barge name. It must be accompanied by a bundle addendum, and must be signed by a responsible company official. An example of a water transport record is provide in Figure 7A.47.

Bundle Addendum

Bundle addenda list each bundle included on a barge and provides details such as bundle numbers, piece counts, timber marks. An example of a bundle addendum is provided in Figure 7A.48.

Raft Tags

Raft tags are tags attached to the parcel by the scaler, to show the parcel has been scaled. The tag provides the parcel number, scaler number, timber mark, piece count, and scaler return number. The ministry form is called an FS 308 and is displayed in Figure 7A.49.

Scaler Diaries or Scaler Site Diaries

Scaler diaries are documents that list all the timber that a scaler has scaled for a specified time period. It includes details such as timber marks, piece counts, load numbers, and is signed by the scaler upon completion. The diaries are used to ensure the ministry receives all the scale returns completed by the scaler. An example of a scaler diary is shown in Figure 7A.50.

Incoming Site Ledgers and Outgoing Site Ledgers

Site ledgers are documents that record every parcel or load of timber that is received at, or transported from a scale site. It can also be used as a 'nil' report. It lists the load number, the timber mark, the number of pieces, and must be signed by the scale site operator. An example of an incoming scale site ledger is provided in Figure 7A.51, and an example of an outgoing scale site ledger is provided in Figure 7A.52.

Site Activity Report

Site activity reports list all the scaler's working at a specific scale site for a specified time period, which assists the ministry in determining which scaler's should be submitting scale returns. This is especially important in areas where scaler's work at various scale sites. It is also submitted when no scaling activity is occurring, therefore, the ministry would not anticipate the receipt of any scale returns from the site for that time period. It must be signed by a responsible company representative. An example of a site activity report is shown in Figure 7A.53.

Load Listing

The load listing is a computer generated list of all loads that make up an FS 72, Summary of scale. It is supplied by the computing service and will assist the ministry in identifying any missing documentation. An example of a load listing is shown in Figure 7A.54.

Load Summary Report

A load summary report is a summary of each individual load within a summary package (i.e., all the loads that make up the summary). It is supplied by the computing service and enables the ministry to audit individual loads for accuracy and completeness. An example of a load summary is shown in Figure 7A.55.

1. FS 649 Load Description Slip

Load Description Slips - FS 649

The ministry may require the use of load description slips, to accompany timber in transport, as part of the scale site authorization. The FS 649 is the ministry form used for this purpose, and may be used for both scaled and non-scaled timber. Alternate industry load slips may be approved by the ministry providing they meet ministry requirements. As the FS 649 is designed for truck transportation, an alternate form may be required when transporting timber by water. An example of a suitable description slip for water transportation is provided under Figure 7A.47.

BRITISH
COLUMBIA

NO.

LOAD DESCRIPTION SLIP

FOR CARRIERS OF TIMBER AND SPECIAL FOREST PRODUCTS

DATE Y A M D		TIME	TIMBER MARK / BRAND B	GEOGRAPHIC LOCATION OF TIMBER'S ORIGIN K
DESTINATION OF TIMBER C			TENURE NO. OR LEGAL DESCRIPTION L	
CONTRACTOR D			CUT BLOCK/LANDING/SETTING NO. M	
CARRIER IDENTIFICATION (NAME) E			CARRIER LICENCE NO. N	
LANDING SUPERVISOR'S COMMENTS F			DESCRIPTION OF TIMBER AND LOAD ☐ FIR ☐ BIRCH ☐ CEDAR ☐ ASPEN ☐ HEMLOCK ☐ LARCH ☐ BALSAM ☐ OFF HIGHWAY ☐ SPRUCE ☐ HIGHWAY ☐ PINE, White ☐ SHORT ☐ Lodgepole ☐ LONG ☐ Yellow ☐ SPECIAL FOREST PROD. ☐ COTTONWOOD TYPE: _____	
LANDING SUPERVISOR'S SIGNATURE G				
TRANSPORT OPERATOR'S NAME H				
TRANSPORT OPERATOR'S SIGNATURE I				
RECEIVER'S SIGNATURE J			HAUL DISTANCE P km	
CERTIFICATION OF PREVIOUSLY-SCALED TIMBER STATUS Q ☐ I CERTIFY THAT THE TIMBER BEING TRANSPORTED HAS BEEN SCALED.				
SIGNATURE OF SCALER OR AUTHORIZED DESIGNATE R			LICENCE NO. (if scaler) S	

Please be advised that this information may be released under the *Freedom of Information and Protection of Privacy Act*.**NOTE: SHADED AREAS MUST BE COMPLETED.**

DISTRIBUTION: WHITE - Forest Service; CANARY - Trucker; PINK - Contractor; GREEN - Remains in book

FS 649 HVA 2001/11

Figure 7A.45 FS 649 – Load Description Slip.

Position	Field Name	Description
A	Date	Enter the date the timber is being transported from the cutblock.
B	Timber Mark	Enter the timber mark that is applied to the timber.
C	Destination	Enter the scale site where the timber is being transported for scaling.
D	Contractor	Enter the contractor's name (not monitory).
E	Carrier Identification	Enter the truck driver's name.
F	Landing Supervisors Comments	Not monitory.
G	Landing Supervisors Signature	Landing supervisor's signature must be obtained prior to departure (not monitory).
H	Transport Operator's Name	Name of driver.
I	Transport Operator's Signature	Must be obtained before delivery of the timber.
J	Receiver's Signature	Must be obtained at the time of delivery to the scale site or mill (not monitory).
K	Geographic Location of Timber's Origin	Enter the location name.
L	Tenure No. or Legal Description	Enter where applicable.
M	Cut Block/Landing/Setting No.	Enter where applicable.
N	Carrier Licence No.	Enter the appropriate licence number.
O	Description of Timber and Load	Check the appropriate species box, and special forest products if applicable. If the special forest products box is marked, enter the product code(s) on the 'type' lines listed below the box.

Position	Field Name	Description
P	Haul Distance	The distance in km from cutblock to scale site.
Q	Certification of Previously-scaled Timber Status	Check this box if the timber has been scaled. Proof of scale may be required by a forest officer.
R	Signature of Scaler or Authorized Designate	Signature of scaler.
S	Licence No.	Enter the Scaler's Licence Number.

As local site conditions and approved scaling methods vary, distribution, retention, and submission of the loads slips may differ from site to site. Ensure you are familiar with the requirements as set out in the scale site authorization. Contact your local Forest Service office if clarification is required.



LOAD DESTINATION NOTICE

DATE OF HAUL YYYY - MM - DD		<i>Use permanent ink when completing. This form is to be used only once, and must be left on the load at destination.</i>		NO.	
DELIVERED FROM		FOREST DISTRICT		FOREST REGION	
PRODUCER		NAME			
SCALED BY		NAME			SCALER'S NO.
☐ CHECK (✓) BOX IF NOT SCALED					YYYY - MM - DD
TIMBER MARKS					
LOAD DESCRIPTION SLIP or INVOICE NO. (IF SCALED)					
DELIVERED TO		BUYER'S NAME			
LOCATION		ADDRESS			

NOTE: THIS COMPLETED NOTICE IS TO BE FIRMLY AFFIXED TO ALL VEHICLES CARRYING TIMBER OR SPECIAL FOREST PRODUCTS - ONE NOTICE ON THE LEFT SIDE OF LOAD, AND ONE NOTICE AT THE REAR OF THE LOAD, IN A CONSPICUOUS PLACE. PLEASE BE ADVISED THAT THIS INFORMATION MAY BE RELEASED UNDER THE FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY ACT.

FS 1146 I/VA 99/07

REGIONAL MANAGER

Figure 7A.46 FS 1146 - Load Destination Notice.

2. Water Transport Record

Province of
British Columbia

Ministry of
Forests

**UNSCALED TIMBER TRANSPORT RECORD
FOR WATER TRANSPORTATION OF TIMBER**

Applicant:		T.S.L. No.	
Place of Loading:		Transport Date:	
Destination:		Estimated Arrival Date:	
Towing Company:			
Barge Name:		Tug Name:	
Barge Load Number:			
Number of Bundles:		SB4:	
Date Timber is Required to be Scaled:		Site Where Timber was Scaled:	
Boom Numbers:			
Volume Estimate:		Insured Value:	
Insurance Expiry Date:		Insurance Policy Number:	
Received By:		Date Received:	

Shaded areas to be completed for previously scaled timber only.

Signature

Position

Figure 7A.47 Example of a water transport record.

[illegible]

7A-129

This page is intentionally left blank.

3. FS 308 Scaler's Raft Tag

Scaler's Raft Tag - FS 308

A scaler may be required to tag a parcel of timber with a Scaler's raft tag (FS 308), as part of the authorization to scale, to identify it as scaled timber.

The diagram shows a rectangular tag with a black border. On the left and right sides, there are large black triangles pointing towards the center, labeled "SCALER'S" and "RAFT" respectively. At the top center, there are logos for "BRITISH COLUMBIA" and "Ministry of Forests". The tag is divided into several sections:

- PARCEL NUMBER:** A section at the top with a handwritten entry "ABC - 95 - 067". It is labeled with a circled "A" on the left.
- SCALER NUMBER:** A section below the parcel number with a handwritten entry "123A". It is labeled with a circled "B" on the left.
- RETURN NUMBER:** A section to the right of the scaler number with a handwritten entry "016". It is labeled with a circled "D" on the right.
- TIMBER MARK:** A section below the scaler number with a handwritten entry "T0123A". It is labeled with a circled "C" on the left.
- PIECES:** A section to the right of the timber mark with a handwritten entry "23". It is labeled with a circled "E" on the right.

At the bottom left of the tag, there is small text: "FS 308 HYA 99/05" and "GP 4500031987".

Figure 7A.49 FS 308 – Scaler's Raft tag.

A	Parcel number. The load number, boom number, or other identification assigned to the parcel.
B	Scaler number. Enter the four character scaler licence number.
C	Return number. Also called a return or tally number. For each scaler, at the beginning of each year the first raft number, 001, should be assigned to the first parcel the scaler scales, and run consecutively through to 999 regardless of the scale site at which they are employed. When the scaler reaches raft number 999, they must restart with 001.
D	Timber mark. Enter the timber mark that is applied to the logs.
E	Pieces. Enter the total piece count for the scaled parcel.

4. Scaler's Diary

Page ____ of ____

SCALER SITE DIARY

SCALER LICENCE _____ SITE _____
 SITE OPERATOR _____
 LOCATION _____
 MONTH _____ YEAR _____

SCALING PERIOD 1st - 15th ☐ 16th-Month End ☐
 OTHER _____
 From _____ To _____ Inclusive
 COMMENTS _____

	Day	Return	Parcel Number (Load, Boom, etc.)	Timber Mark	Piece Count	Timber Transport Permit #	SB4 or Replaced	Other
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

TOTAL LOADS _____ TOTAL PIECES _____

TOTALS EXCLUDING SB4 AND REPLACEMENTS;

NAME (PRINT) _____

PIECE LOADS _____ PIECE COUNT _____

SCALER SIGNATURE _____

WORK TELEPHONE # _____

Figure 7A.50 Example of a scaler diary.

5. Site Ledgers

INCOMING LOADS SITE DIARY

Unscaled Timber Received?

☐ **YES** Provide load details below

Month/Year: _____/_____

☐ NO

Scaled Timber Received?

☐ **YES** Provide load details below

Scaling Site No: _____

☐ NO

Timber Shipped Out?

☐ YES Provide load details on an Outgoing Site Diary

Site Name: _____

☐ NO[illegible]

This Diary must be:

- kept current and available on site for inspection by a Forest Officer
- submitted to the Ministry of Forests District Office as directed in the Scaling Site Authorization

This certifies that the above information is a true statement of site activity.

Operator's Signature

Date Signed yy/mm/dd

Version: December 15, 1994

Figure 7A.51 Example of an incoming site ledger.

OUTGOING LOADS SITE DIARY

Scaling Site No: _____ Scaling Site Name: _____ Month/Year: _____

[illegible]

This Diary must be:

- submitted in conjunction with an "Incoming Site Diary"
- kept current and available on site for inspection by a Forest Officer

This certifies that the above information is a true statement of site activity.

Operator's Signature

Date Signed yy/mm/dd

Version December 15, 1994

Figure 7A.52 Example of an outgoing site ledger.

SITE ACTIVITY REPORT

Site Operator _____

Billing Period for S&R

Scale Site _____

YEAR 19__ MONTH _____

Location _____

From _____ To _____

Scaler Name	Scaler Number	Last Return Used

Total Number of Scalers Active on this site for this billing period is _____.
(if none enter (0) and send)

If '0' entered above, estimated date scaling will commence _____.

 SIGNING AUTHORITY FOR THIS SCALE SITE

 PRINT NAME

Figure 7A.53 Example of a scale site activity report.

6. Load Reports

ABC LOGGING COMPANY LTD.
Printed 93:11:30

Load Listing for FS 72 - Mainland Division

<u>LOAD</u>	<u>SCALER</u>	<u>RET#</u>	<u>DATE</u>	<u>MARK</u>	<u>PIECES</u>	<u>VOLUME</u>
149305	1234	943	931129	45123	23	28.0
149306	1234	944	931129	EA2036	29	30.3
149307	1234	945	931129	EADSC	17	14.3
149310	1234	946	931129	45123	15	46.0
149312	1234	947	931129	EA2036	59	45.2
149313	1234	948	931129	EA2036	33	49.0
149315	1234	949	931129	EA2036	30	70.1
149317	1234	950	931129	45123	42	44.6
149318	1234	951	931129	EA2036	53	44.9
149319	1234	952	931129	EADSC	29	62.3
149320	1234	953	931129	45123	42	38.7

Scaler Totals: 11 Loads					372	473.4

Figure 7A.54 Example of a load listing report.

ABC LOGGING COMPANY LTD.

Printed 93.11.30

Load Summary for FS 72 - Mainland Division

LOAD#	SCALER	RET#	DATE	MARK	SPECIES	GRADE	PIECES	VOLUME
149305	1234	943	931129	45123	BA	H	2	5.1
				45123	BA	J	6	4.9
				45123	FI	C	1	2.5
				45123	FI	H	2	3.8
				45123	FI	I	1	2.8
				45123	FI	J	2	2.0
				45123	FI	U	1	1.4
				45123	HE	J	8	5.5
				Load Total			23	28.0
149306	1234	944	931129	EA2036	BA	J	2	1.1
				EA2036	BA	I	1	1.5
				EA2036	BA	J	11	9.4
				EA2036	CE	J	1	0.4
				EA2036	HE	J	13	12.0
				Load Total			29	30.3
149307	1234	945	931129	EADSC	BA	J	2	1.1
				EADSC	CY	H	1	2.0
				EADSC	CY	J	2	0.6
				EADSC	CY	K	1	1.2
				EADSC	CY	M	3	3.4
				EADSC	FI	J	1	0.6
				EADSC	HE	H	1	1.0
				EADSC	HE	J	6	4.4
				Load Total			17	14.3
Scaler Totals: 3 Loads							69	72.6

Figure 7A.55 Example of a load summary report.

This page is intentionally left blank.

Appendix 7B Scale Data Computation and Documentation Standards

1. Standard for compiling log and segregation volumes.
2. Standard for Weight Scale calculations.
3. HBS Source Document Requirements:
 - a. FS 72 - Summary of Scale, and
 - b. FS 531 - Computed Weight Scale Sample.

**Ministry of Forests
Revenue Branch**

**Version 1.1
July 1, 1999**

7B.1 Standard for Compiling Log and Segregation Volumes

7B.1.1 Calculation Standard

Steps to Compute Log Volumes		Units	Decimal	Maximum Value	Source	Example
1.	Top Radius Squared	cm ²	0	999 999		5 184
	= Top Radius	cm	0	999	Tally	72
	* Top Radius	cm	0	999	Tally	72
2.	Top Area	cm ²	1	9 999 999.9		16 286
	= 3.141592		6	9.999 999	pi	3.141 592
	* Top Radius Squared	cm ²	0	999 999	Step 1	5 184
3.	Top Area	m ²	5	99.999 99		1.628 6
	= Top Area / 10000	cm ²	1	9 999 999.9	Step 2	162 86
4.	Butt Radius Squared	cm ²	0	999 999		6 241
	= Butt Radius	cm	0	999	Tally	79
	* Butt Radius	cm	0	999	Tally	79
5.	Butt Area	cm ²	1	9 999 999.9		19 607
	= 3.141592		6	9.999 999	pi	3.141 592
	* Butt Radius Squared	cm ²	0	999 999	Step 4	6 241
6.	Butt Area	m ²	5	99.999 99		1.960 7
	= Butt Area / 10000	cm ²	1	9 999 999.9	Step 5	19 607
7.	Total Area	m ²	5	99.999 99		3.598 3
	= Top Area	m ²	5	99.999 99	Step 3	1.628 6
	+ Butt Area	m ²	5	99.999 99	Step 6	1.960 7
8.	Average Area	m ²	5	99.999 99		1.794 65
	= Total Area / 2	m ²	5	99.999 99	Step 7	3.589 3
9.	Length	m	1	99.9		6.2
	= Length / 10	dm	0	999	Tally	62
10.	Log Volume	m ³	3	999.999		11.127
	= Average Area	m ²	5	999.999 99	Step 8	1.794 65
	* Length	m	1	99.9	Step 9	6.2
11.	Log Volume Sum	m ³	3	99 999.999		11.127
	= Sum of Log Volumes (all logs)	m ³	3	999.999	Step 10	11.127
12.	Segregation Volume (Piece Scale)	m ³	1	99 999.9		11.1
	= Log Volume Sum	m ³	3	99 999.999	Step 11	11.127
13.	Segregation Volume (Weight Scale)	m ³	2	99 999.99		11.13
	= Log Volume Sum	m ³	3	99 999.999	Step 11	11.127

7B.1.2 Calculation Conventions

Rule:

Use only single-operation calculations, except in compound additions and subtractions where all operands have the same number of decimal places.

7B.1.2.1 Multiplication

Compute each product to a number of decimal places equal to the sum of the number of decimal places specified for the two operands, then round to the number of decimal places specified for the product. For example, the calculation to compute the product, to two decimal places, of two numbers, one with no decimal places, and the other with three decimal places, would be done as follows:

$$\begin{array}{rcll} \text{e.g.,} & 262 & & \\ & \times & .234 & \\ & = & 61.308 & = 61.31 \text{ rounded to two decimal places} \end{array}$$

7B.1.2.2 Division

Compute each quotient to a number of decimal places equal to the number of decimal places specified for the quotient plus one, then round to the number of decimal places specified for the quotient. For example, the calculation to compute the quotient, to two decimal places, of two numbers, each with zero decimal places, would be done as follows:

$$\begin{array}{rcll} \text{e.g.,} & 62.616 & = & 62.62 \text{ rounded to two decimal places} \\ & 234309 \overline{)14671518} & & \end{array}$$

7B.1.2.3 Addition

Compute each sum to a number of decimal places equal to the larger of the number of decimal places specified for the two operands, then round to the number of decimal places specified for the sum. For example, the calculation to compute the sum, to two decimal places, of two numbers, each with four decimal places, would be done as follows:

$$\begin{array}{rcll} \text{e.g.,} & 13.5837 & & \\ & + & 11.6489 & \\ & = & 25.2326 & = 25.23 \text{ rounded to two decimal places} \end{array}$$

7B.1.2.4 Subtraction

Compute each difference to a number of decimal places equal to the larger of the number of decimal places specified for the two operands, then round to the number of decimal places specified for the difference. For example, the calculation to compute the difference, to two decimal places, of two numbers, one with five decimal places, and the other with three decimal places, would be done as follows:

$$\begin{array}{rclcl} \text{e.g.,} & & 12.69999 & & \\ & - & \underline{9.375} & & \\ & = & 3.32499 & = & 3.32 \text{ rounded to two decimal places} \end{array}$$

7B.1.2.5 Rounding

Determine the rightmost digit to be retained (e.g., 12.3449).

Determine the leftmost digit to be dropped (e.g., 12.3449).

If the leftmost digit to be dropped is less than five, then the rightmost digit retained is unchanged (e.g., 12.3449 rounded to 2 decimal places is 12.34).

If the leftmost digit to be dropped is five or greater, then the rightmost digit retained is incremented by one (e.g., 12.3450 rounded to 2 decimal places is 12.35).

**Ministry of Forests
Valuation Branch**

**Version 1.0
July 5, 1990**

7B.2 Standard for Weight Scale Calculations

7B.2.1 Calculation Standard

Calculation Steps for Each Species		Units	Decimal	Maximum Value	Source	Example
1.	Ratio = Sample-Volume / Sample-Weight	m ³ /kg m ³ kg	8 2 0	9(01).9(08) 9(07).9(02) 9(09)	SSF SSF	0.00099119
2.	Monthly-Weight-X-Rate = Monthly-Weight * Species-Rate	kg\$/m ³ kg \$	0 0 2	9(12) 9(09) 9(03).9(02)	Return Mark	128138 51255 2.50
3.	New-Accumulated-Weight = Old-Accumulated-Weight + Monthly-Weight	kg kg kg	0 0 0	9(09) 9(09) 9(09)	CBF Return	25422540 25371285 51255
4.	New-Accumulated-Weight-X-Rate = Old-Accumulated-Weight-X-Rate + Monthly-Weight-X-Rate	kg\$m ³ kg\$m ³ kg\$m ³	0 0 0	9(12) 9(12) 9(12)	CBF Step 2	3291564 3163426 128138
5.	New-Accumulated-Volume = Ratio * New-Accumulated-Weight	m ³ m ³ /kg kg	1 8 0	9(07).9(01) 9(01).9(08) 9(09)	Step 1 Step 3	25198.6 0.00099119 25422540
6.	New-Accumulated-Value = Ratio * New-Accumulated-Weight-X-Rate	\$ m ³ /kg kg\$m ³	2 8 0	9(08).9(02) 9(01).9(08) 9(12)	Step 1 Step 4	3262.57 0.00099119 3291564
7.	Display-Ratio = Ratio * 1000	m ³ /tonne m ³ /kg kg/tonne	5 8 0	9(01).9(05) 9(01).9(08)	Step 1	0.99119 0.00099119 1000

7B.2.2 Calculation Conventions

Rule:

Use only single-operation calculations, except in compound additions and subtractions where all operands have the same number of decimal places.

7B.2.2.1 Multiplication

Compute each product to a number of decimal places equal to the sum of the number of decimal places specified for the two operands, then round to the number of decimal places specified for the product.

For example, the calculation to compute the product, to two decimal places, of two numbers, one with no decimal places, and the other with three decimal places, would be done as follows:

$$\begin{array}{rcll} \text{e.g.,} & 2.62 & & \\ & - & .234 & \\ & = & 61.308 & = 61.31 \text{ rounded to two decimal places} \end{array}$$

7B.2.2.2 Division

Compute each quotient to a number of decimal places equal to the number of decimal places specified for the quotient plus one, then round to the number of decimal places specified for the quotient.

For example, the calculation to compute the quotient, to two decimal places, of two numbers, each with zero decimal places, would be done as follows:

$$\begin{array}{rcll} \text{e.g.,} & 62.616 & = & 62.62 \text{ rounded to two decimal places} \\ & 234309 \overline{)14671518} & & \end{array}$$

7B.2.2.3 Addition

Compute each sum to a number of decimal places equal to the larger of the number of decimal places specified for the two operands, then round to the number of decimal places specified for the sum.

For example, the calculation to compute the sum, to two decimal places, of two numbers, each with four decimal places, would be done as follows:

$$\begin{array}{rcll} \text{e.g.,} & 13.5837 & & \\ & + & 11.6489 & \\ & = & 25.2326 & = 25.23 \text{ rounded to two decimal places} \end{array}$$

7B.2.2.4 Subtraction

Compute each difference to a number of decimal places equal to the larger of the number of decimal places specified for the two operands, then round to the number of decimal places specified for the difference.

For example, the calculation to compute the difference, to two decimal places, of two numbers, one with five decimal places, and the other with three decimal places, would be done as follows:

$$\begin{array}{rclcl} \text{e.g.,} & 12.69999 & & & \\ & - & \underline{9.375} & & \\ & = & 3.32499 & = & 3.32 \text{ rounded to two decimal places} \end{array}$$

7B.2.2.5 Rounding

Determine the rightmost digit to be retained (e.g., 12.3449).

Determine the leftmost digit to be dropped (e.g., 12.3449).

If the leftmost digit to be dropped is less than five, then the rightmost digit retained is unchanged. (e.g., 12.3449 rounded to two decimal places is 12.34).

If the leftmost digit to be dropped is five or greater, then the rightmost digit retained is incremental by one (e.g., 12.3450 rounded to two decimal places is 12.35).

7B.3 Source Document Requirements

1. FS 72 - Summary of Scale.
2. FS 531 - Computed Weight Scale Sample.

7B.3.1 Harvest Data Base System - Source Document Requirements

Appendices 6A and 6B of the "Field Data Capture Standard for Scaling" outline the required formats of the Summary of Scale (FS 72) and the Computed Weight Scale Sample (FS 531) reports which are to be forwarded to Victoria for computer processing.

Some handheld units may be programmed to produce these reports directly out of the Handheld unit, other units may be set up to produce only the log listing on site, and pass the information into a Host computer to produce the above reports.

Regardless of the approach taken, any FS 72/FS 531 replica report forwarded to Victoria for data processing must meet the requirements specified below.

7B.3.1.1 General Requirements

The Summary of Scale (FS 72) and the Computed Weight Scale Sample (FS 531) will be the medium for passing information from Handheld units to the Harvest Data Base System. Currently the process will rely on the formatted paper reports, and ultimately the transfer will be electronic with paper backup.

The FS 72 and FS 531 reports must meet the needs of:

- Key-Entry,
- Data Control and Billing,
- Audit, and
- Administration.

Consequently the following general characteristics must be present:

1. The reports must show certain administration and ownership information.
2. The reports must have a standard title and must reference the form in order to identify what the document is (i.e., refers to ministry form number and name).
3. The reports must have standard layout, so that information can be easily and efficiently located in ledgering, keying and correction activities.
4. The field names must be standard in order to ensure that key-entry can be efficiently handled.
5. The print must be clear and legible with adequate spacing to help all aspects of data processing, audit, and administration.
6. The reports must clearly show what scale information has been summarized to ensure that audit and administration is straight forward.

7B.4 Specific Requirements - Computed - Summary of Scale (FS 72)

See attachments #1 and #2 for visual reference of the following requirements.

7B.4.1 Administration and Ownership Identification

The report name "Summary of Scale (FS 72)" is to appear in the top centre area of each page of the report. See 2 c. below.

The Company Name and Place of Scaling fields are also to appear in the top centre area of each page of the report.

The Forest Region, Forest District, and Scaler (Name or Signature) fields are to appear at the top left hand side of the report.

The "Page ____ of ____", Date, and Time fields are to be presented at the top right hand side of the report.

Provision is to be made for the "S and R Number ____" at the very top right of the report to record the invoice number. Refer to Sections 2 and 3 below for detailed requirements.

7B.4.2 Title

- a. The Company Name is to be shown at the top-centre of the report.
- b. The report name "Summary of Scale (FS 72)" is to be printed either above or below the company name, and the Place of Scaling is to be printed below the company name.
- c. The form # (FS 72) must be printed at the top of the report, preferably in the report name (see 2b). If not in the name, place it at the top left side of the report.

7B.4.3 Standard Layout

- a. The title and report name are to be in the top-centre of the report.
- b. The "Forest Region", "Forest District", and "Scaled By" are to appear in order at the top left hand side of the report. Note - the "FS 72" may be placed above "Forest Region" if it is not placed in the report title (see 2c above).
- c. The "S and R Number ____" must be at the top right hand side of the report to assure a ready reference to filed documents.
- d. The "Page ____ of ____", "Date" (95/01/01, or 95:01:01), and "Time (HH:MM or HH/MM)" are to appear in vertical order on the right hand side at the top of the report.
- e. There must be sufficient spacing between the report heading and each record to ensure legibility. Leave at least one line between the report heading, and the first record layout, one space between the first record and the second record (continuation of the first record type), and two spaces between the header records and the detail records (type four detail records). Nothing is to be printed in between records, as it will confuse key-entry.

Remarks may be shown at the top right hand side in the report heading as required, below the page, date, and time information.

- f. Standard field headings are required and these will be addressed in Section 3 below.

g. The general lay out for data to be keyed is as follows:

- There will be a standard field name (either the full name, or acceptable abbreviation). See Section 3 below.
- The column number will either be shown in brackets followed by the keyed information (the keyed information may be optionally highlighted by having underscores under the full length of the data to be keyed).

e.g., CAMPBOOM NUMBER

(33)ZZZ-95-01

Optional ↗

or the field name will be printed, then the column numbers, followed by the keyed data.

e.g., CAMPBOOM NUMBER

33-50

ZZZ-85-01

The former format is more space efficient.

Detail records (type 4) will follow single spaced.

h. Size of paper is to be governed as follows:

The Summary of Scale may be presented on 8 1/2 x 15" standard stock tab computer paper. See attachment #1 for the preferred example layout.

Alternatively, the Summary of Scale may be presented on 8 1/2 x 11". See attachment #2 for an example of this layout.

Attachment #3 shows the second data presentation option shown in g. above.

As it is critical that we enforce a standard layout to ensure key entry and data control/correction efficiency, the fields must be presented as shown on the attachments. The field order and line breaks must be as shown to ensure consistent location of information.

7B.4.4 Standard Field Names and Formats - Summary of Scale (FS 72)

<u>Position</u>	<u>Length</u>	<u>Format</u>	<u>Field Name</u>	<u>Permissible Abbreviations</u>	<u>Comments</u>
		<u>Top Print Line</u>			
1	1	N	Page Number	Seq #	0 (For multi-page tallies, increment by one - Max. 9)
2-3	2	N	Line Number	Seq #	0
4	1	N	Card Type	Seq #	0
5	4	A/N	Scalers Licence Number	Scaler, Scaler #	
9	3	N	Raft #	Raft, Raft #, Return #, Ret. #	Print the last return # of the returns being summarized
12	7	A/N	Predominant Mark	PRED, MARK	
19	14	A/N	Number of Chains	# OF CHAINS	Optional
33	18	A/N	Camp Boom Number	Camp Boom #	
51	c	A/N	Number of Sections	Sections, Sec., Sect	Only applies to boomscaling, pos 53 may be "7"
		<u>Second Print Line</u>			
54	6	N	Date of Scaling	YYMMDD	Space 1 line, INDENT PAST SEQ # FIELD print the last date of scale for all returns being summarized
60	5	N	Payable By Code	PAY BY	
65	5	N	Copy to Code	COPY TO, COPY	
70	5	N	Scalers Expenses	EXPENSES	
75	5	N	Time Charges	TIME CHG	Leave data as blank

Figure 7B.1 FS 72 - Header Record (Record Type 0).

<u>Position</u>	<u>Length</u>	<u>Format</u>	<u>Field Name</u>	<u>Permissible Abbreviations</u>	<u>Comments</u>
			<u>Third Print Line</u>		
1	1	N	Page Number	Seq #	0
2-3	2	N	Line #	SEQ #	01
4	1	N	Card Type	SEQ #	1
12	3	A/N	Forest Region Scaled, No Scaling Fees, Forest Region Invoiced	FNF	Position 12 is mandatory, 13, 14 are left blank unless all volume is SB4, or mark from other region, then position 14.
15	4	N	Scalers Log Count	LOG COUNT, LOGS	If count larger than 9999, enter right most digits e.g., 10003 is 0003.
19	3	A/N	Scaling Station Number	STN#	Use the field name.
22	40	A/N	Place of Scaling		
			<u>Summary Records (Record Type 4)</u>		
			<u>Fourth Print Line</u>		
			(Double Space from 3rd print line) (Single Space the data lines)		
1	1	N	Page #	SEQ #	0
2-3	2	N	Line #	SEQ #	02
4	1	N	Card Type	SEQ #	4
12	7	A/N	* Timber Mark	MARK	Special Characters ' , - ; : permitted
19	2	A	* Paint Colour Code	PAINT	
21	1	A	* Scaled Before Code	SB4	'S' if logs have been scaled before
22	5	N	Number of Pieces	# of Pieces, Pieces	"Number of Pieces" is preferred
27	3	A/N	Species, Grade	SPGR	Position 27-28 is species, Position 29 is Grade
30	3	A	Other Description	OTHER	"B/S" for boomsticks, "S/W" for Swifters, Product codes, Blank for sawlogs.
33	7	N	Quantity	QUANTITY	Print the decimal point for legibility. To nearest decimetre
40	5	N	Rate	RATE	Leave blank
* Print the Mark, Paint, and SB4 Code on each detail line.					

Figure 7B.2 FS 72 - Place of Scale Record (Record Type 1).

<u>Position</u>	<u>Length</u> <u>Total Print Line</u>	<u>Format</u> <u>Total Print Line</u>	<u>Field Name</u> (Double Space from 2nd print line)	<u>Permissible</u> <u>Abbreviations</u>	<u>Comments</u>
1	4	N	Sequence Number	N/A	Do not print the seq # now
5		A	Totals	N/A	Print "Totals" under "Mark" field
22	5	N	N/A	N/A	Print total piece count under record type 4 "pieces"
33	7	N	N/A	N/A	Print total volume under record type 4 "quantity"
Notation Records (Record Type '5') (Insert 1 blank line after type 'T' record)					
<u>First Notation Print Line</u>					
1	1	N	Page #	N/A	0
2-3	2	N	Line #		
4	1	N	Card Type		5
5	72	A/N	N/A		Print "Includes Volumes from Returns _____", "_____, ..., _____". This will list all return #'s included in the summary. Print as many additional lines as necessary to list all return numbers. Increment the line # for each record. Do not print field headings.
<u>Last Notation Print Line</u>					
1	1	N	Page #	N/A	0 Line # incremented by 1 from last record.
2-3	2	N	Line #		Print "Scaled YYMMDD - YYMMDD". Shows range of scale dates for all returns included in the summary. Do not print field headings.
4	1	N	Card Type		5

Figure 7B.3 FS 72 - Totals Record (Record Type 'T') (Insert one blank line after last type '4' record and the 'T' record).

Summary of Scale - Volume Calculations

Log volumes in the handheld units are calculated to three decimal places for each log. For the purposes of presenting a summary of scale to the ministry, volumes will be computed and presented to the nearest 1/10 of a cubic metre for each type 4 record as follows.

- a. Determine the volume for each segregation (i.e., type 4 record) by aggregating volumes by:
 - i. Timber Mark
 - ii. Paint Colour
 - iii. SB4 indicator
 - iv. Other description
 - v. Species
 - vi. Grade

For each change of any of the above sort levels, a type 4 summary line will be printed on the summary of scale report. Note that boomstick and swifter volumes (other description) are also shown on a separate summary line.

- b. Add the volumes for all logs within each segregation as described above, and round as follows:

0.445 rounds to 0.4

0.444 rounds to 0.4

0.454 rounds to 0.5

0.455 rounds to 0.5

In other words a '5' in the 2nd decimal place is rounded up, a '4' is rounded down.

7B.4.5 Clarify and Legibility

The print will be dark, clear, and of a size that is easily read for key entry. The minimum character size is 16 characters to the inch horizontally and 10 lines to the inch vertically.

7B.4.6 Identification of Summarized Information

The summary of scale is to include volumes scaled at one scale site for one scaler number over a time period that does not span the last day of a calendar month. Each return number for the scaler number is to be listed on the summary of scale according to the notation record layouts in 4. above. The range of scale dates is to be printed on the summary of scale as described in the notation record layouts in 4. above.

These notations will serve as an audit trail and administrative check on what volumes and source documents are being summarized.

FS 72

SUMMARY OF SCALE

REGION: COMPANY NAME

DISTRICT: PLACE OF SCALING

SCALED BY: TIME:

SEQ#

SCALER#

RETURN #

PRED.MARK

OF CHAINS

CAMP BOOM NUMBER

SECTIONS

0000

9479

066

(1)----

(5)----

(9)---

(12)-----

(19)-----

YMMDD

PAY BY

COPY TO

EXPENSES

TIME CHG

950508

01278

17303

(54)-----

(60)-----

(65)-----

(70)-----

(75)-----

SEQ#

FNF

LOGS

STN#

PLACE OF SCALING

0000

2

438

265

LOG BOOM BAY

(1)----

(12)----

(15)----

(19)----

(22)-----

SEQ#

MARK

PAINT

SB4

PIECES

SPGR

OTHER

QUANTITY

RATE

(1)----

(12)-----

(19)---

(21)---

(22)-----

(27)---

(30)---

(33)-----

(40)-----

0024

1/63G

23

SP

46.0

0034

1/63N

32

HE

17.4

0044

1/63N

63

SP

76.8

0054

1/63T

44

SP

56.6

0064

1/643

65

BA

56.4

0074

1/643

93

HE

65.9

0084

1/643

11

SP

12.4

0094

1/65AC

5

HE

6.7

0104

1/65AC

21

SP

50.2

0114

1/65Y

1

BA

1.4

0124

1/65Y

62

HE

61.1

0134

1/65Y

13

SP

28.8

TOTALS

433

479.7

0145

INCLUDES VOLUMES FROM RETURNS :

058

059

060

061

062

063

064

0155

065

066

0165

SCALED :

950508

-

950508

ATTACHMENT #1

Figure 7B.4 Identification of Summarized Information (Attachment #1).

REGION: _____		COMPANY NAME _____		S & R # _____	
DISTRICT: _____		PLACE OF SCALING _____		PAGE _____ OF _____	
SCALED BY: _____		SUMMARY OF SCALE (FS 72)		DATE _____	
				TIME _____	

SEQUENCE NUMBER	SCALER #	RET#	PRED MARK	# OF CHAINS	CAMP BOOM NUMBER	SECT
COL 1-4	5-8	9-11	12-18	19-32	33-50	51-53
0000	9958	007				
			YMMDD	PAY BY	COPY TO	EXPENSES
			COL 54-59	60-64	65-69	70-74
			941010	01278		
						PH-105-85
						75-79

SEQUENCE NUMBER	FN#	LOGS	STN#	PLACE OF SCALING
COL 1-4	12-14	15-18	19-21	22-61
0011	1	0043	123	SCALING BAY

SEQUENCE NUMBER	MARK	PAINT	SB4	PIECES	SPGR	OTHER	QUANTITY	RATE
COL 1-4	12-18	19-20	21	22-26	27-29	30-32	33-39	40-44
0024	L98205	WH		1	HEH		3.3	
0034	L98205			1	HEJ		0.7	
0044	L98205			2	HEI		3.7	
0054	L98205			11	HEJ		5.7	
0064	L98205			1	CEH		5.2	
0074	L98205			3	CEJ		1.3	
0084	L98205			1	CEX		0.6	
0094	L98205			1	SPJ		0.5	
0104	L98205			1	SPC		3.0	
0114	L98205			8	CEH		44.4	
0124	L98205	WH	S	7	CEI		14.1	
0134	L98205			3	CEJ		5.6	
0144	L98205			1	CEM		2.7	
0154	L98205			2	CEX		2.0	
TOTALS							43	92.8

0165 INCLUDES VOLUMES FROM RETURNS 007
0175 SCALED: 94/10/10-94/10/10

ATTACHMENT #3

Figure 7B.6 Identification of Summarized Information (Attachment #3).

7B.5 Specific Requirements - Computer Weight Scale Sample CFS531

7B.5.1 Administration and Ownership Identification

The report name "Computed Weight Scale Sample (FS 531)" is to appear in the top centre area of each page of the report. See 2 c. below.

The Company Name and Place of Scaling fields are also to appear in the top centre area of each page of the report.

The Forest Region, Forest District, and Scale (Name or Signature) fields are to appear in at the top left hand side of the report.

The "Page ____ of ____", Date and Time fields are to be presented at the top right hand side of the report. Refer to Sections 2 and 3 below for detailed requirements.

7B.5.2 Title

See attachments #3, #4 and #5 for a visual reference of the following requirements:

- a. The Company Name is to be shown at the top centre of the report.
- b. The report name "Computed Weight Scale Sample (FS 531)" be printed either above or below the company name, and the Place of Scaling is to be printed below the Company Name.
- c. The form # (FS 531) must be printed at the top of the report, preferably in the report name (see 2b). If not in the name, place it at the top left side of the report.

7B.5.3 Standard Layout

- a. The title and report name are to be in the top-centre of the report.
- b. The "Forest Region", "Forest District", and "Scaled By" are to appear in vertical order at the top left hand side of the report. Note - the "FS 531" may be the first field if it is not placed in the report title (see 2c above).
- c. The 'Page ____ of ____', "Date" (94/10/01, or 94:10:01), and "Time (HH:MM or HH/MM)" are to appear in vertical order on the right hand side of the top of the report.

- d. There must be sufficient spacing between the report heading and each record to ensure legibility. Leave at least one line between the Report heading, and the 1st record layout, one space between the first record and the second record (continuation of the 1st record type), and two spaces between the header record and the detail records (type 4 detail records). Nothing is to be printed in between record descriptions, as it will confuse key-entry. Remarks may be shown at the top right hand side in the report heading if required, but these should be below the page date and time information.
- e. Standard field headings are required and these will be addressed in Section 3 below.
- f. The general lay out of the data to be keyed is as follows:
- There will be a standard field name (see Section 3 below)
 - The column number will either be shown in brackets followed by the keyed information (the keyed information may be optionally highlighted by having underscores under the full length of the data to be keyed).

e.g., MARK

(51)12345

(optional dotted lines)

or the field name will be printed, then the column numbers, followed by the keyed data.

e.g., MARK

51-57

12345

The former format is more space efficient.

Type 4 detail records will be single spaced.

- g. Size of paper is to be governed as follows:

Preferably, the Computed Weight Scale Sample should be presented on 8 1/2 x 11" paper. See Attachment #3 and #4 for the preferred example layouts.

Example #4 shows the one line header approach. Example #5 shows the split header approach for printers which cannot print all of the information on one line.

Alternatively, the Computed Weight Scale Sample could be presented on 8 1/2 x 15" stock tab computer paper. See Attachment #6 for an example. This alternative is not recommended as standard sample tallies are 8 1/2 x 11" format for ease of storage. However, stock tab computer paper will be accepted.

7B.5.4 Standard Field Names and Formats - Computed Weight Scale Sample (FS 531)

<u>Position</u>	<u>Length</u> <u>Top Print Line</u>	<u>Format</u>	<u>Field Name</u>	<u>Permissible</u> <u>Abbreviations</u>	<u>Comments</u>
1	3	N	Sequence Number	Seq #	Position 1-2 - line No., Position 3 - Record Type '0'
4	4	A/N	Scalers Number	Scaler, Scaler Number, Scaler #	
8	3	N	Scalers Tally Number	Tally #	
11	3	A/N	Weight Scale Station #	STN #, STATION, Weight Scale Number	
14	6	N	Date of Scale	YYMMDD, DATE SCALED	Print in YYMMDD Format
20	4	N	Load Arrival Number	LOAD ARRIVAL, LOAD ARR #	
24	7	A/N	Weight Scale Slip Number	SLIP #	
31	4	N	Population	POP	
35	2	N	Stratum	STRAT	
37	2	N	Sample Year	YY	
39	3	N	Block Number	BLOCK #	
42	3	N	Block Load Number	BLK LOAD #	
45	6	N	Net Weight	WEIGHT	
51	7	A/N	Mark	MARK	

Figure 7B.7 FS 531 - Header Record (Record Type 0) (Page 1 of 3).

58	1	A	F or C		Data must be 'F' or 'C'
59	1	A	SIGN	SIGN	Leave data area blank - unless adding check scale to SSF.
60	4	N	LOG COUNT	LOGS	Is this information for industry scaler only? If not, then 't' or cancelling then " ____".
64	1	A	EDIT BYPASS	O/R	Leave data area blank
65	1	A	METRIC WEIGHT	M or I	Print an 'M'
66	1	A	METRIC VOLUME		Print an 'M'
67	1	N	Number of Pages	Pages ____	Print the # of pages for the tally.
Summary Records (Record Type 4) - Double Space from previous print line					
<u>Position</u>	<u>Length</u>	<u>Format</u>	<u>Field Name</u>	<u>Permissible Abbreviations</u>	<u>Comments</u>
1	3	N	Sequence Number	Seq #	Position 1-2 - line No., Position 3 - Record Type '4'
11	2	A	Species		
13	1	A/N	Grade		
14	3	N	Number of Pieces		
17	5	N	Sample Volume (M ³)	SAMPLE VOLUME	Volume is recorded to 2 decimal places, i.e., 743.12 m ³ is keyed as "743.12" with a decimal at two positions from the right.

Figure 7B.7 FS 531 - Header Record (Record Type 0) (Page 2 of 3).

Totals Record (Record Type 'T') - Double Space from previous print line

<u>Position</u>	<u>Length</u>	<u>Format</u>	<u>Field Name</u>	<u>Permissible Abbreviations</u>	<u>Comments</u>
	<u>Summary Print Lines</u>				
1	3	N	Sequence Number	N/A	Increment line # from previous # by 1, record type 'T' (optional)
11	6	A	Totals		Print "Totals" under "Species" on Type 4 record
14	4	N	N/A		Print total piece count under Number of Pieces
17	6	N	N/A		Print total volume under Sample Volume. Do not print field headings.

Figure 7B.7 FS 531 - Header Record (Record Type 0) (Page 3 of 3).

7B.5.4.1 Computed Weight Scale Sample

Volumes in the handheld units are calculated to three decimal places for each log. In presenting the Computed Sample, volumes will be computed and presented to the nearest 1/100th of a cubic metre for each type '4' record as follows:

- a. Determine the volume for each segregation (type '4' record) by summing volumes by:

- i. Species
- ii. Grade

For each change in species and for grade, a type '4' volume summary line will be printed.

- b. Add the volumes for all logs within each segregation (described above) and round as follows:

0.445 rounds to 0.45
0.444 rounds to 0.44
0.454 rounds to 0.45
0.455 rounds to 0.46

The rule is a '5' in the 3rd decimal place is rounded up, a '4' is rounded down.

7B.5.5 Clarity and Legibility

The print will be dark, clear and of a size that is easily read for key entry. The minimum character size is 16 characters to the inch horizontally and 10 lines to the inch vertically.

7B.5.6 Identification of Summarized Information

Identified by the Scaler # and Scaler Tally Numbers.

FS 531
 REGION: _____
 DISTRICT: _____
 SIGNED: _____
 SCALER: JOHN SCALER

COMPUTED WEIGHT SCALE SAMPLE

(COMPANY NAME)
 (ADDRESS)
 (CITY)
 (POSTAL CODE)

PAGE 1 of 1
 DATE: _____
 TIME: _____

SEQ. NO.	SCA- LER NO.	TALLY NO.	WEIGHT SCALE NO.	DATE SCALED	LOAD VAL NO.	WEIGHT SLIP NO.	POPULATION STRATUM YEAR	BLOCK CK NO.	NET LOAD NO.	MARK C N	LOGS R I	S F I O M / OR R I
1-3	4-7	8-10	11-13	14-19	20-23	24-30	31-38	39-41	42-44	45-50	51-57	58 59 60-63 64 65 66
---	---	---	---	---	---	---	---	---	---	---	---	---
010	9070	407	140	940604	0505	0171370	10200294	030	019	03760	37/2	F 19 M M

SEQ. NO.	SPECIES	GRADE	NUMBER OF PIECES	SAMPLE VOLUME (m ³)
1-3	11-12	13	14-16	17-21
---	---	---	---	---
024	SP		7	6.12
034	LO		5	4.26
044	WH		6	5.17
054	R	Z	1	0.40
TOTALS			19	15.95

ATTACHMENT #4

Figure 7B.8 Identification of Summarized Information (Attachment #4).

FS 531
 REGION: _____
 DISTRICT: _____
 SCALED BY: _____

COMPANY NAME
 PLACE OF SCALING
 COMPUTED WEIGHT SCALE SAMPLE

PAGE 1 of 1
 DATE: _____
 TIME: _____

SEQ#	SCALER	TALLY#	STN#	YVMDD	ARR#	SLIP#	POP#	BLK	BLK	LOAD#
(1) 010	(4) 9292	(8) 139	(11) 540	(14) 941010	(20) 0116	(24) 154016N	(31) 50100295	(39)	(42)	

WEIGHT	MARK	F/C	SIGN	LOGS	EDIT	BYPASS	WT.	VOL.	PAGES
(45) 040260	(51) 13/17	(58)	(59)	(60) 0077	(64)	(65) M	(66) M	(67) 1	

SEQ#	SPECIES	GRADE	NUMBER OF PIECES	SAMPLE VOLUME (M ³)
(1) ---	BA	(13) -	(14) ---	(17) ---
024	CE		1	0.38
034	FI		6	2.18
044	LA		40	28.58
054	L0		8	5.36
064	SP		11	4.31
074	WH		1	0.30
084			10	0.80
10T	TOTALS		77	41.91

ATTACHMENT #5

Figure 7B.9 Identification of Summarized Information (Attachment #5).

FS 531

REGION: _____

DISTRICT: _____

SIGNED: _____

SCALER: _____

COMPUTED WEIGHT SCALE SAMPLE

(COMPANY NAME)

(ADDRESS)

(CITY)

(POSTAL CODE)

JOHN SCALER

PAGE _____ OF _____

DATE: _____

TIME: _____

LOAD WEIGHT POPU-
ARRI- SCALE LATION BLO- BLOCK
VAL SLIP STRATUM CK LOAD NET
NO. NO. YEAR NO. NO. WEIGHT MARK C N LOGS R I

SEQ. NO.	SCA- LER NO.	WEIGHT TALLY NO.	SCALE DATE NO.	VAL NO.	SLIP NO.	STRATUM YEAR	CK NO.	LOAD NO.	NET NO.	WEIGHT MARK	C	N	LOGS	R	I	E	S
COLL-3	4-7	8-10	11-13	14-19	20-23	24-30	31-38	39-41	42-44	45-50	51-57	58	59	60-63	64	65	66
010	9070	407	140	940604	0505	0171370	10200294	030	019	03760	37/2	F	19	M	M	1	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>NUMBER OF SAMPLE PIECES</p> <p>11-12 13 14-16 17-21</p> </div> <div style="width: 45%;"> <p>SPECIES GRADE</p> <p>11-12 13 14-16 17-21</p> </div> </div>																	
024																	
034																	
044																	
054																	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>TOTALS</p> <p>19 15.95</p> </div> <div style="width: 45%;"> <p>TOTALS</p> <p>19 15.95</p> </div> </div>																	

ATTACHMENT #6

Figure 7B.10 Identification of Summarized Information (Attachment #6).

8.3.3 Floral and Greenery Products

Product Code: None

Description: The forest contains a huge inventory of plant species, providing many opportunities for craftspersons to design, manufacture and market decorative products such as wreaths and floral arrangements. These products can be grouped into five different categories:

- greenery
- conifer boughs
- essential oils
- basketry fillers
- fresh or dried flowers

Salal, cedar boughs and various ferns are the most prominent of the decorative vegetations at this time.

Dimensions: These products are usually not measured by weight.

Scale
Method(s): Cedar foliage harvest is recorded by weight according to agreements between harvesters and district managers. Most other products do not yet require recording. If trees are removed or damaged, the logs must be scaled and reported in the same manner as any other commercial timber.

8.3.4 Wild Berries and Fruit

Product Code: None

Description: At present, little information is available about the commercial harvest of wild berries and fruits. All regions in the province report extensive personal use of local fruits and berries, and is considered to have high recreational value. Thirty-four species are collected on a personal basis and seven species are harvested commercially. The most well known of such plants are the wild blueberry, wild blackberry and wild strawberry. Other popular berries include cranberries, huckleberries, salmonberries and thimbleberries.

8.3.5 Herb and Vegetable Products

Product Code: None

Description: Many plant species in British Columbia's forests have market potential for use as vegetables or food seasoning. There are about twenty-three plants used for these products and there is an increasing interest in their use as food products, both commercial and personally. Although such wild herbs and vegetables not only add variety to diets but also can provide food substitutes for people with acute allergies, there is little information on this industry.

8.3.6 Landscaping Products

Product Code: None

Description: Use of native plants for landscaping is an increasing part of the botanical forest product industry. Entire trees, shrubs or herbs may be collected for personal landscaping or for commercial sale to nurseries and garden centres. Landscaping with native species is a preferred alternative to using cultivated species because these plants are naturally adapted to local conditions.

About fifty-three native plant species used for landscaping in British Columbia have been identified, both for individual use and for commercial harvesting supplying nurseries and garden centres.

Scale Method(s): As the industry evolves, methods of determining volumes will be established according to agreements between the harvesters and District Managers.

8.5.5 Document Handling for Special Forest Products

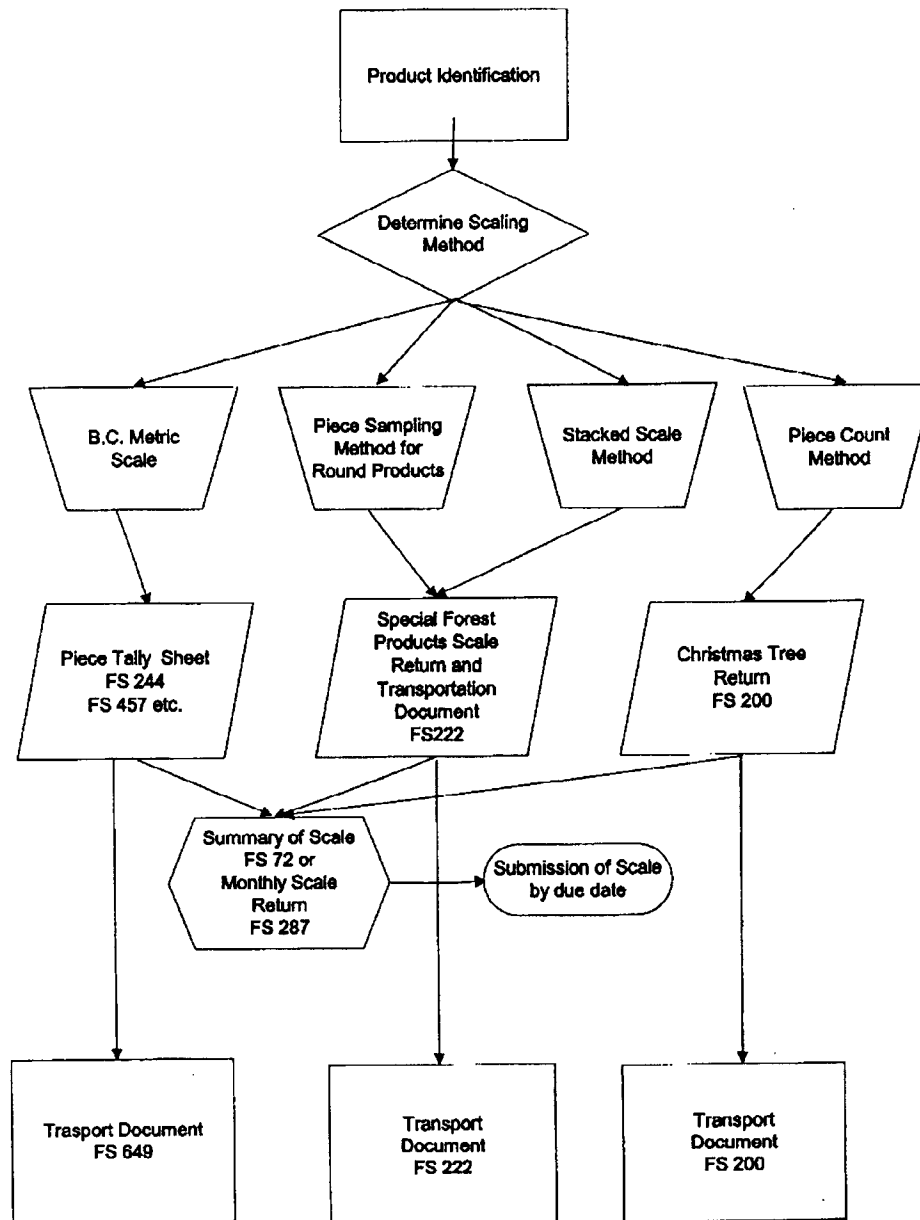


Figure 8.1 Flow diagram outlining selection of scaling methods and forms.

8.6 Special Forest Product Scaling Methods

When choosing a method of scaling Special Forest Products, the scaler (in consultation with a Forest Service scaling representative), must decide on a method to use to suit the product and the site conditions. Although method(s) are recommended in the product descriptions section for each product, it may be more practical to choose another method. Some guidelines are:

The Piece Sampling method is best for:

- uneven piles,
- product lengths exceeding 5 m,
- well sorted size classes,
- large numbers of smaller pieces, and
- round products, for example, round fence posts.

The Stacked method is best for:

- even piles,
- product lengths of 5 m or less,
- difficult to sort size classes,
- large numbers of very small pieces, and
- irregular shapes, for example, shake and shingle blocks.

The Piece Count is used only for Christmas trees.

The B.C. Metric Piece Scale is used for poles, pilings, and building logs, and where:

- material is not piled into units for sampling or stacked methods,
- material is not sorted into size, species and quality class, and
- another scaling method has not been authorized.

In consultation with the operator and scaler, the Forest Service will authorize the use of a method most accurate and practical for the site. Once a method is determined, it must be applied consistently, and may not be changed without a change to the scale site and scaler authorizations.

In determining the volume for 100 round fence posts 12 cm in diameter and 2.4 m long, five sample posts were measured.

Post Number	Length	Top	Butt	Volume (dm ³)
1	2.4	6	7	$14 + 18 = 32$
2	2.4	6	6	$14 + 14 = 28$
3	2.4	6	7	$14 + 18 = 32$
4	2.4	7	7	$18 + 18 = 36$
5	2.4	6	6	<u>$14 + 14 = 28$</u>

Total volume of five posts: 0.156 m^3

Average volume per post (factor): $0.156 \text{ m}^3 \div 5 = 0.0312 \text{ m}^3$

Total volume of 100 posts: $0.0312 \times 100 = 3.1 \text{ m}^3$

6. The measurements are recorded on the FS 222 in the following manner (Figure 8.3);

On the FS 222, clearly indicate the factor used. Refer to Chapter 7 for more details on completing this form.



SPECIAL FOREST PRODUCTS SCALE RETURN AND TRANSPORTATION DOCUMENT

TIMBER MARK 33969		GEOGRAPHIC LOCATION OF TIMBER ORIGIN East Side			
CONTRACTOR Mel Smith		BLOCK / LANDING / SETTING 1 1		HAUL DISTANCE 38 km.	
CARRIER COMPANY NAME Ted's Trucking		VEHICLE LICENSE NO. 6251TX			
TRANSPORT OPERATOR'S NAME Ted Jones		TRANSPORT OPERATOR'S SIGNATURE Theodore Jones			
DATE OF TRANSPORT YY MM DD 02 01 30		TIME 06:30 am.		DESTINATION OF SPECIAL FOREST PRODUCTS Acerville Wood Products	
PURCHASER Acerville Wood Products		VENDOR OR AGENT'S SIGNATURE Malbert Smith Esq.			
SCALER'S LICENSE # 429D		PLACE OF SCALING 33969 - Block 1, Ldg 1			
VENDOR Mel Smith		SCALER'S RETURN # 021		SCALER'S SIGNATURE J. Scaler	
DATE OF SCALING YY MM DD 02 01 29		IF PREVIOUSLY SCALED PROVIDE ORIGINAL SCALER'S LICENCE # RETURN # DATE OF ORIGINAL SCALE			
DESCRIPTION	LENGTH OR # SQUARES	WIDTH OR # BUNDLES	HEIGHT OR # PIECES	FAC TOR	METRES ³
Ld fence posts (PR)			100	.0312	3.1

DISTRIBUTION: WHITE - MOF (copy of scale attached); CANARY - TRANSPORTER; PINK - VENDOR/CONTRACTOR; GREEN - REMAIN IN BOOKLET
FS 222 HVA 01/05 Please be advised that this information may be released under the Freedom of Information and Protection of Privacy Act.

Figure 8.3 Completed FS 222 for 100 round fence posts.

7. At the end of the month of scaling, a Summary of Scale (FS 72) or a Monthly Scale Return (FS 287) is completed and submitted to the appropriate Forest Service district office on or before the prescribed submission time (Figure 8.4).

BRITISH COLUMBIA **MONTHLY SCALE RETURN** **07639**

CHARGED ON STAMPAGE INVOICE NUMBER

SCALER'S TALLY OR GRAFT NO. **429059**

DATE OF RETURN **950228** PAYABLE BY **HARRY BOWKS** SECOND COPY TO

VENUE **TRUCK** HOW DELIVERED

CHARGES PAYABLE BY **ALCERVILLE WOOD PRODUCTS**

PLACE OF SCALING (OWN) **YARD**

PLACE OF SCALING (HIRE)

MARK **33969** NUMBER OF PIECES **0010040** PRODUCT CODE **PR 0000031** QUANTITY (M) **0000031** RATE

SPECIAL FOREST PRODUCT CODES

NAME	GRADE	CODE
BUILDING LOGS		BL
CAR STAKES		CS
CHWTHAD TRICES - 5 m	1	XU
2 - 5 m	2	XU
< 3 m	3	XU
CRIBBING		CR
FFW/F POETS (round)		PR
FENCE POSTS (spt)		PS
FIREWOOD		FW
GRAPE STAKES		GS
HOP POLES		HP
LACING SPLIT		LA
MIXING TIMBERS		MT
ORCHARD PROPS		OP
OTHER LOGS		OL
POCKETS OR PALING		PI
PLANK		PP
POLED		PO
RAILS (round)		RR
RAILS (spt)		RS
SHAKES		SK
SHAKE BOLTS OR BLOCKS		SB
SHINGLE BOLTS OR BLOCKS		LS
STAKES AND STICKS		SS

COMPILED FROM TALLY SHEETS OR TALLY BOOK PAGES (NUMBER)

COMPILED BY **J. Scallan**

SCALER'S SIGNATURE **J. Scallan**

CLERICAL

KEYED BY

VERIFIED BY

FS 287 HVA 9907 Please be advised that this information may be released under the Freedom of Information and Protection of Privacy Act.

Figure 8.4 Completed FS 287 - Monthly scale return summarizing the FS 222 in Figure 8.3.

5. The measurements will be recorded on the FS 222 in the following manner:

On the FS 222, clearly indicate the factor used.



BRITISH
COLUMBIA



**SPECIAL FOREST PRODUCTS
SCALE RETURN AND
TRANSPORTATION DOCUMENT**

TIMBER MARK WL211B		GEOGRAPHIC LOCATION OF TIMBER ORIGIN Westside			
CONTRACTOR Tom Brown		BLOCK / LANDING / SETTING 2 1 -		HAUL DISTANCE 26 km	
CARRIER COMPANY NAME Ted's Trucking		VEHICLE LICENSE NO. 6251TX			
TRANSPORT OPERATOR'S NAME Ted Smith		TRANSPORT OPERATOR'S SIGNATURE <i>T. Smith</i>			
DATE OF TRANSPORT YY MM DD 02 01 31		TIME 10:15		DESTINATION OF SPECIAL FOREST PRODUCTS Epic Tonewoods Inc.	
PURCHASER Epic Tonewoods		VENDOR OR AGENT'S SIGNATURE <i>Thomas Brown</i>			
SCALER'S LICENSE # J. Scaler 0326		PLACE OF SCALING WL211B Landing			
VENDOR Tom Brown		SCALER'S RETURN # 311		SCALER'S SIGNATURE <i>J. Scaler</i>	
DATE OF SCALING YY MM DD 02 01 28		IF PREVIOUSLY SCALED PROVIDE ORIGINAL SCALER'S LICENCE # RETURN # DATE OF ORIGINAL SCALE			
DESCRIPTION	LENGTH OR # SQUARES	WIDTH OR # BUNDLES	HEIGHT OR # PIECES	FAC TOR	METRES ³
Cedar Shake Blocks	4.92	2.44	3.24	0.8	31.1

DISTRIBUTION: WHITE-MOF (copy of scale attached); CANARY-TRANSPORTER; PINK-VENDOR/CONTRACTOR; GREEN-REMAIN IN BOOKLET
FS 222 HVA 01/05 Please be advised that this information may be released under the Freedom of Information and Protection of Privacy Act.

Figure 8.7 A completed FS 222 - with split product.

5. The measurements will be recorded on the FS 222 in the following manner:

On the FS 222, clearly indicate the factor used.

BRITISH
COLUMBIASPECIAL FOREST PRODUCTS
SCALE RETURN AND
TRANSPORTATION DOCUMENT

TIMBER MARK WL211B		GEOGRAPHIC LOCATION OF TIMBER ORIGIN Westside			
CONTRACTOR Tom Brown		BLOCK / LANDING / SETTING 2 1 -		HAUL DISTANCE 26 km	
CARRIER COMPANY NAME Ted's Trucking		VEHICLE LICENSE NO. 6251TX			
TRANSPORT OPERATOR'S NAME Ted Smith		TRANSPORT OPERATOR'S SIGNATURE <i>Ted Smith</i>			
DATE OF TRANSPORT YY MM DD 02 01 31		TIME 10:15		DESTINATION OF SPECIAL FOREST PRODUCTS Epic Tonewoods Inc.	
PURCHASER Epic Tonewoods		VENDOR OR AGENT'S SIGNATURE <i>Thomas H. Brown</i>			
SCALER'S LICENSE # J. Scaler 0326		PLACE OF SCALING WL211B Landing			
VENDOR Tom Brown		SCALER'S RETURN # 311		SCALER'S SIGNATURE <i>J. Scaler</i>	
DATE OF SCALING YY MM DD 02 01 28		IF PREVIOUSLY SCALED PROVIDE ORIGINAL SCALER'S			
LICENCE #		RETURN #		DATE OF ORIGINAL SCALE	
DESCRIPTION		LENGTH OR # SQUARES	WIDTH OR # BUNDLES	HEIGHT OR # PIECES	FAC TOR
Cedar Shake Blocks		4.92	2.44	3.24	0.8

DISTRIBUTION: WHITE - MOF (copy of scale attached); CANARY - TRANSPORTER; PINK - VENDOR/CONTRACTOR; GREEN - REMAIN IN BOOKLET
FS 222 HVA 01/05 Please be advised that this information may be released under the Freedom of Information and Protection of Privacy Act.

Figure 8.7 A completed FS 222 - with split product.

6. At the end of the month of scaling, a Summary of Scale (FS 72) (Figure 8.8) or a Monthly Scale Return (FS 287) is completed and submitted to the appropriate Forest Service district office on or before the prescribed submission time.

BRITISH COLUMBIA

SUMMARY OF SCALE

STAMPAGE INVOICE NO.

TO BE COMPLETED BY THE SCALER TO SUMMARIZE A TALLY SHEET (FS 244) OR BY A CLERK TO CONSOLIDATE A RECORD OF PURCHASE (FS 222) AND FORWARDED FOR PROCESSING. SEE SECTION 7A.1 OF MANUAL.

SCALING ORDER NO.

PAGE	SEQ.	TYPE	SCALER'S NUMBER	RETURN NUMBER	PREDOMINANT MARK	NUMBER OF CHAINS	CAMP ROOM NUMBER
0	0	0	0	0	6110018		TOM BROWN

NO. OF SEC-TIONS	DATE OF SCALING	PAYABLE BY	SECOND COPY TO	EXPENSES	TIME CHARGE	SCALE
51	YR. MO. DAY					
52	950328					

SCALER'S SIGNATURE
J. Scale

SEQ.	TYPE	SCALER'S LOG COUNT	SCALING STATION NUMBER	PLACE OF SCALING
0	0	1	6	000064 Westside Cedar Yard

VENDOR
Tom Brown

PLACE OF SCALING (cont.)

PAYABLE BY
Westside Cedar

SEQ.	TYPE	MARK	PAINT	NUMBER OF PIECES	SPICE	OTHER DESC.	QUANTITY m ³	RATE				
1	2	4	12	19	21	22	27	29	30	39	40	
0	0	2	4	12	19	21	22	27	29	30	39	40
0	0	3	4	12	19	21	22	27	29	30	39	40
0	0	4	4	12	19	21	22	27	29	30	39	40
0	0	5	4	12	19	21	22	27	29	30	39	40
0	0	6	4	12	19	21	22	27	29	30	39	40
0	0	7	4	12	19	21	22	27	29	30	39	40
0	0	8	4	12	19	21	22	27	29	30	39	40
0	0	9	4	12	19	21	22	27	29	30	39	40
0	0	10	4	12	19	21	22	27	29	30	39	40
0	0	11	4	12	19	21	22	27	29	30	39	40
0	0	12	4	12	19	21	22	27	29	30	39	40
0	0	13	4	12	19	21	22	27	29	30	39	40
0	0	14	4	12	19	21	22	27	29	30	39	40
0	0	15	4	12	19	21	22	27	29	30	39	40
0	0	16	4	12	19	21	22	27	29	30	39	40
0	0	17	4	12	19	21	22	27	29	30	39	40
0	0	18	4	12	19	21	22	27	29	30	39	40
0	0	19	4	12	19	21	22	27	29	30	39	40
0	0	20	4	12	19	21	22	27	29	30	39	40
0	0	21	4	12	19	21	22	27	29	30	39	40
0	0	22	4	12	19	21	22	27	29	30	39	40
0	0	23	4	12	19	21	22	27	29	30	39	40
0	0	24	4	12	19	21	22	27	29	30	39	40
0	0	25	4	12	19	21	22	27	29	30	39	40
0	0	26	4	12	19	21	22	27	29	30	39	40
0	0	27	4	12	19	21	22	27	29	30	39	40
0	0	28	4	12	19	21	22	27	29	30	39	40
0	0	29	4	12	19	21	22	27	29	30	39	40
0	0	30	4	12	19	21	22	27	29	30	39	40
0	0	31	4	12	19	21	22	27	29	30	39	40
0	0	32	4	12	19	21	22	27	29	30	39	40
0	0	33	4	12	19	21	22	27	29	30	39	40
0	0	3										

Figure 8.8 A completed FS 72 - summary of information from the FS 222 in Figure 8.7.

8.6.3 Christmas Tree Piece Count Method

The Christmas Tree Piece Count method is used for Christmas tree scaling.

Method

1. The Christmas trees are sorted by species and height category. The height categories are:

Height Category	
Over 5 m	1
3 to 5 m	2
Under 3 m	3

2. A piece count is taken for each species and grade.
3. The piece count is recorded on the FS 200, Christmas-Tree Return, as per the example in Figure 8.9.

The height category (i.e., 1, 2, or 3) is recorded under the grade field on the tally sheet.


BRITISH COLUMBIA

 Ministry
of Forests


C

TREES MUST BE SCALED ON AREA OF ORIGIN.

CHRISTMAS-TREE RETURN

1. DATE OF SCALING Y M D 95 02 14		PLACE 14 km - HWY 16E - McBride		
2. AREA OF ORIGIN	C.T.P. NO.	LOT NO.	LAND DISTRICT 5	TIMBER MARK D67122
3. STUMPAGE OWNER'S NAME Tom Brown		ADDRESS Box 219 - Chambers, B.C.		
4. CUTTER'S NAME Tom Brown		ADDRESS Box 219 - Chambers, B.C.		
5. SCALED FOR Tom Brown				
6. CHARGES PAYABLE BY (Please print)		(First name) Thomas		(Last name) Brown
ADDRESS Box 219, Clinton, B.C.				
7. TREES SCALED				
SIZE	MERCHANTABLE TREES	CULLS	COMMENTS (SPECIES, ETC.)	
LESS THAN 3 m	350			
3 m TO 5 m				
MORE THAN 5 m				
TOTALS	350			
8. CUTTER'S SIGNATURE Tom Brown		DATE Y M D 95 02 14	9. SCALER'S SIGNATURE J. Scaler	
10. NUMBER OF TRUCKLOADS THIS MANIFEST COVERS 1	TRUCKER'S SIGNATURE Art Handwerker		TRUCK LICENCE NUMBER 62-22-TT	
11. DESTINATION OR SHIPPING POINT Vancouver, B.C.		12. DATE HAULED Y M D 95 02 14	IS CUTTING COMPLETED ON AREA? ☐ Yes ☒ No	
13. COMMENTS				

DISTRIBUTION: WHITE - DISTRICT MANAGER, CANARY - DISTRICT MANAGER, PINK - BUYER, GREEN - CARRIED BY TRUCKER, BLUE - LAND-OWNER OR CUTTER

Spoiled return forms must be left in the book with the word "cancelled" written thereon.

PLEASE BE ADVISED THAT THIS INFORMATION MAY BE RELEASED UNDER THE FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY ACT.

FS 200 HVA 95/11

Figure 8.9 A completed FS 200 - Christmas tree return.

4. At the end of the month of scaling, a Summary of Scale (FS 72) or a Monthly Scale Return (FS 287) is completed and submitted to the appropriate Forest Service district office on or before the prescribed submission time (Figure 8.10).

 **BRITISH COLUMBIA**  **MONTHLY SCALE RETURN**

CHARGE/INVOICE/INVOICE NUMBER

SCALER'S NUMBER: 6117059

DATE OF RETURN: YEAR: 94, MO: 03, DAY: 28

PAYABLE BY: SECOND COPY TO:

VENDOR: Tom Brown

HOW DELIVERED: TRUCK

CHARGES PAYABLE BY: Tom Brown

PLACE OF SCALING: 0350AAA3 LOCAL AREA HANDSCALES

PLACE OF SCALING (cont): McBride

LINE	TYPE	MARK	NUMBER OF PIECES	SPECIES	PRODUCT CODE	QUANTITY (m)	RATE
0 0 2 4		067122	350	F13XM	010		
0 0 3 4							
0 0 4 4							
0 0 5 4							
0 0 6 4							
0 0 7 4							
0 0 8 4							
0 0 9 4							
0 1 0 4							
0 1 1 4							
0 1 2 4							
0 1 3 4							
0 1 4 4							
0 1 5 4							
0 1 6 4							
0 1 7 4							
0 1 8 4							
0 1 9 4							
0 2 0 4							
0 2 1 4							
0 2 2 4							
0 2 3 4							
0 2 4 4							
0 2 5 4							
0 2 6 4							
0 2 7 4							
0 2 8 4							
0 2 9 4							
0 3 0 4							
0 3 1 4							
0 3 2 4							
0 3 3							
0 3 4							
0 3 5							

SPECIAL FOREST PRODUCT CODES

NAME	GRADE	CFR
BUILDING LOGS	BL	
CAR STAKES	CS	
CHRISTMAS TREES > 5m	1 XM	
3-5m	2 XM	
< 3m	3 XM	
CHRISTMAS	CR	
FENCE POSTS (round)	FR	
FENCE POSTS (square)	FS	
FIREWOOD	FW	
GRAPES	GR	
HOP POLES	HP	
LACING BRUSH	LA	
MIXING TIMBERS	MT	
ORCHARD PROPS	OP	
OTHER LINES	OL	
PICKETS OR PALING	PI	
PLUMS	PP	
POLES	PO	
RAILS (round)	RS	
RAILS (square)	RS	
SHAKES	SK	
SHAKE BOLTS OR BLOCKS	SB	
SHINGLE BOLTS OR BLOCKS	LS	
STAKES AND STICKS	SS	

COMPILED FROM TALLY SHEETS OR TALLY BOOK PAGES NUMBERED: 40624

COMPILED BY: J. Scoble

SCALER'S SIGNATURE: J. Scoble

CLERICAL:

KEYED BY: VERIFIED BY:

FS 287 HVA 9907 Please be advised that this information may be released under the Freedom of Information and Protection of Privacy Act.

Figure 8.10 A completed FS 287 - Monthly scale return which summarizes the information on the FS 200 in Figure 8.9.

The constant C_L can be approximated iteratively; that is, C_L can be found once C_{L-1} has been found. C_2 may be found empirically. C_1 is undefined.

Let $C_L^{(j)}$ denote the j -th approximation to C_L . Then, the initial value of C_L ,

$$C_L^{(1)} = \left\{ \left(\frac{n-1}{n} \right)^2 \cdot C_{L-1} \right\}$$

can be used to obtain successive approximations to C_L :

$$C_L^{(j)} = \left\{ \frac{(L-1) \cdot C_L^{(j-1)} + (B_L^{(j-1)} - B_{L-1}^{(j-1)}) \cdot P_L^{(j-1)}}{L} \right\}$$

where $B_L^{(j-1)}$ and $P_L^{(j-1)}$ are obtained from $C_L^{(j-1)}$.

9A.14.2 Deciding to Split a Stratum

Stratification almost always reduces the variance, even when it is not necessary to stratify the population. However, reduction in variance is greater when stratification is applied to a population that requires it rather than when it is applied to a population that does not require it. This principle is exploited by the splitting algorithm through the use of Critical Values.

Critical values are used to ensure that the population being stratified produces genuine decreases in variance and not decreases due to the above principle only. That is, critical values are used to ensure that a stratum does indeed require stratification. The statistic that is compared to the critical values is the ratio of the following population estimates: the variance under stratification, and the variance without stratification (more detail below).

However, note that this method will tend to over-estimate the benefits of stratification since the recommended strata (which are inferred from the observed data) have no overlaps, while in practice they are likely to contain overlaps.

To decide whether a stratum should be split, calculate three variances, one for each of the following scenarios:

- two sub-strata are created,
- three sub-strata are created, and
- four sub-strata are created.

The scenario whose variance reduction is greatest, when compared to its corresponding critical value, is recommended. If no scenario has a variance less than its corresponding critical value, then splitting is not recommended.

The following critical values are based upon the assumption that load ratios are normally distributed, and are calculated as the ratio of the following: variance of the population total when stratification (as per the Dalenius-Ekman technique described previously) is applied; and in the denominator, the variance of the population total when no stratification is applied.

Number of strata created	Ratio of expected variances	Critical value
2	0.3633802	$0.90 * 0.3633802$
3	0.1824846	$0.90 * 0.1824846$
4	0.1092403	$0.90 * 0.1092403$

For example, the first ratio indicates that when a normally distributed population is stratified into two strata, the population-level variance is reduced to about 36% of its non-stratified level. (This is an approximation since the ratio of expected values will not be exactly the same as the expected value of the ratios.) Therefore, when a population is stratified into two strata and this stratification produces a greater than 64% reduction in variance (i.e., ratio is less than 36%), we may infer that the population should indeed be stratified.

Since the reduction in variance is random, we have selected (arbitrarily) some lower limits to account for this random variation. Our experience with ministry populations suggests that critical values should be set at about 90% of the expected variance though, ideally, this figure should be estimated via empirical analysis so that α and β can be set rigorously.

9A.15 Amalgamation of Strata

The combined algorithm operates as follows: if a stratum is relatively homogeneous, it undergoes the amalgamation test; if it is relatively heterogeneous, it undergoes the splitting test. A stratum is not considered for both splitting and amalgamation. Heterogeneity is defined as any stratum with an infinite population variance of 9.0 or greater.

The ministry's first responsibility is to ensure all prospective persons who will transport timber are clearly aware of ministry requirements.

In processing the application for mark site designation, the ministry must ensure:

- tenures/timber marks are correct and in good standing,
- owner or licensee has given any agents written consent for acting on their behalf,
- sites designated for scaling are authorized and have suitable resources to conduct an accurate scale, and
- other district offices are notified if designated scale sites lie outside the district in which the timber originates.

Applications meeting ministry requirements will receive formal approval in the form of a letter (see Figure 11.2 for an example).

This approval will specify timber marks and the scale site(s) to which the marks have been designated for scaling. Where an application requests more than one scaling location and one or more scale sites are deemed unacceptable, the letter will be restricted to the acceptable scale sites. The scale site designation letter may contain other conditions concerning the scaling or transport of the timber.

To enable tracking of timber movement and scaling mark site, designations are entered on the ministry's Scale Administration and Control System (SCS). This system is also of assistance in assessing compliance with mark/site designations.


**BRITISH
COLUMBIA**
**Ministry of
Forests**

TIMBER MARK / SCALE SITE DESIGNATION

 Timber Mark..... ED1235
 File Number..... 21550-20

Pursuant to the Forest Act and its appurtenant regulations I hereby designate the above noted timber mark held by

WELDWOOD OF CANADA LIMITED, of
 100 MILE HOUSE OPERATIONS
 BOX 97
 100 MILE HOUSE, B.C.
 V0K2E0

to be scaled at the following sites:

Site Nmbr	Site Name	Loads	Pop.	Stratum	Term Start
	Site Location	Volume			Term End
604	WELDWOOD, 100 ML. HOUSE				1991-11-01
	WELDWOOD, 100 ML. HOUSE				1995-10-31
614	WELDWOOD WMS LK DIV.				1991-11-01
	WELDWOOD WMS LK DIV.				1995-10-31

The following conditions apply:

1. Direct Transportation

Timber must be transported directly from the harvesting location to the designated scale site. Transporting anywhere else is an offense.

2. Designation Precedence

This designation supercedes all previous designations for this timber mark.

3. Contact Person for Changes

To change this designation contact the undersigned.

Page 1 of 2

Figure 11.2 Example of a mark site designation - page 1.

Ministry of
Forests

 **BRITISH
COLUMBIA**

TIMBER MARK / SCALE SITE DESIGNATION

Timber Mark..... ED1235
File Number..... 21550-20

4. No Harvesting Authority

This letter does not give any authorization to harvest timber.

Issued At Williams Lake Forest District
925 North 2nd Avenue
WILLIAMS LAKE, BC
V2G4P7

On this 6th day of March, 1995

By

Bryan McNaughton
District Manager
Williams Lake Forest District

Page 2 of 2

Figure 11.2 Example of a mark site designation - page 2.

11.2.2 Scaler and Scale Site Operator's Responsibilities

Scalers and Site Operators are responsible for ensuring that all timber marks received at a scale site have been approved by the ministry for scaling at that site. The approval may be in either of the following forms:

- letter that the vendor presents to the receiving site (usually with the first load delivered), or
- list of designated timber marks, which the district scaling supervisor issues to the scale site operator on a regular basis.

If any timber is delivered to a scale site without the required documentation, it is the responsibility of both the scaler and the scale site operator to ensure that district scaling staff are informed immediately. While specific conditions may vary from district to district, the scalers authorization and the scale site authorization should set instructions on how to process timber that has not been designated to be scaled at a given scale site. Scale site authorizations are discussed in the next section. Additional conditions may also be included in the mark/site designation letters. The district scaling supervisor or check scaler should be contacted if any conditions are not clear.

11.3 Scale Site Authorization

The *Forest Act* and Ministry Scaling Policy, require owners and/or operators of a scale site to acquire a written scale site authorizations from the ministry prior to commencing any scaling at that site. Failure to comply with this requirement is an offence under the *Forest Act*. The *Forest Act* also empowers the ministry to attach conditions to the scale site authorization to ensure a complete and accurate scale.

Scale site authorization helps ensure:

- timber is scaled in an orderly and systematic manner,
- data are correctly captured and submitted to the ministry, and
- all ministry requirements are clearly defined and understood by all persons on the scale site.

11.3.1 Responsibilities

11.3.1.1 Applicants Responsibilities

The owner and/or operator of the proposed operation must apply to the district manager for a scale site authorization. The application must be in writing and include:

- applicant's full name (individual, company, etc.),
- applicant's client number,
- applicant's address and phone number,
- description of the proposed site's location (may need a map or sketch),
- proposed products to be scaled and scaling method,
- period of operation,
- expected volume to be scaled (in total if a short-term site, or annually if a longer-term site), and
- if the plan is to install a weigh scale, the application must include a sketch of the scale's location in relation to the scale site yard, a description of the scale house accommodation, the type and size of the weigh scale to be installed, and the proposed computer hardware and software.

Figure 11.3 shows an example application for a scale site authorization.

The applicant may be required to sign a statement confirming the authorization has been read and conditions understood, before it will be issued.



BRITISH COLUMBIA

**Ministry of
Forests**



SCALE SITE APPLICATION

Scale Site Detail

Site Owner Name _____
 Land Owner _____
 Scale Site Name _____
 Scale Site Location _____
(Attach a map showing area, scaling bays for last loads, and location of scale document copies)

Size (Perimeter) _____ Surface Type _____
 Site Contact _____ Phone _____ Alt. _____
 Site Supervisor _____
 Site Operator _____

Site Owner Mailing Address Information

Site Operation Detail

Timber Handling Logs ☐ Special Forest Products ☐ Mixed ☐
 SB4 in (Y/N) _____ SB4 out (Y/N) _____

Timber Mark(s) _____

Scalers Name _____	Licence No. _____
Scalers Name _____	Licence No. _____
Scalers Name _____	Licence No. _____
Scalers Name _____	Licence No. _____
Scalers Name _____	Licence No. _____
Scalers Name _____	Licence No. _____

Operating Time: Daily _____ Weekly _____ Yearly _____

Other Comments _____

Owner Signature _____

Figure 11.3 An example of an application for a scale site authorization.

Once a scale site authorization document has been issued, it is the responsibility of the scale site owner/operator as well as all scalers working on the site, to be fully familiar with the conditions and requirements of the authorization. If any matter needs clarification, contact the district scaling supervisor or the check scaler.

11.3.1.2 Ministry Responsibilities

The ministry will:

- review the application and ensure it is complete before proceeding,
- conduct an examination of the proposed scale site and facilities,
- issue a scale site authorization document, if satisfied a complete and accurate scale can be conducted on that site,
- prior to commencement of operations, discuss all conditions of the authorization with the applicant to ensure they are understood,
- register the site on SCS,
- conduct regular site inspections to ensure site conditions are being complied with, and
- manage the authorization document through amendments, additions, and replacements upon expiry.

A scale site authorization will be denied if the ministry has reasonable grounds to believe the applicant will not comply with provisions under Parts 5, 6, 7, 9, 10 or 11 of the *Forest Act*, the regulations, or with the conditions to be included in the scale site authorization.

**BRITISH
COLUMBIA****Ministry of
Forests**

SCALE SITE AUTHORIZATION

Authorization Num..... 102561
Authorization Date..... June 04, 1991
Scale Site Num..... 410

In accordance with the requirements of B.C. Regulation 563/78(Scaling),

LAKELAND MILLS LTD., of
BOX 1358
PRINCE GEORGE, B.C.
V2L4V4

is herein authorized to operate a Weight Scaling Site, located at

C.N.R. INDUSTRIAL SITE

This authorization is in effect from the authorization date and expires December 31, 2000. Written application for extension must be received by the District Manager before that date.

The following conditions apply:

1. **COMPLIANCE WITH FOREST ACT**

All scaling shall be conducted in accordance with Part 6 of the Forest act, the Scaling Regulation, the Forest Service Scaling Manual and Ministry policies and procedures.

2. **FAILURE TO COMPLY WITH CONDITION**

This authorization may be suspended or cancelled by the District Manager for failure to comply with these conditions.

Page 1 of 2

Figure 11.4 An example of a scale site authorization - page 1.

Ministry of
Forests

 **BRITISH
COLUMBIA**

SCALE SITE AUTHORIZATION

Authorization Num..... 102561
Authorization Date..... June 04, 1991
Scale Site Num..... 410

Issued At Prince George Forest District
 2000 SOUTH OSPIKA BLVD.
 PRINCE GEORGE, BC
 V2N4W5

On this 6th day of March, 1995

By

District Manager

Page 2 of 2

Figure 11.4 An example of a scale site authorization - page 2.

11.3.2 Content of a Scale Site Authorization

The *Forest Act* empowers the ministry (usually through the district scaling supervisor) to set conditions that will "...ensure a complete and accurate scale." The ministry also has the authority to "...attach, remove, or alter a condition at any time." As such, the ministry has considerable latitude in setting and enforcing conditions that support a reliable scale.

Conditions common to scale site authorization include:

- conditions that provide clear direction on how to process all loads arriving at the site, including how to handle loads that have not been designated to the site and/or fail to meet other requirements such as timber marking,
- a clear statement on when scale returns (in the approved format) are to be completed and received by the ministry,
- conditions that support:
 - an accurate and complete scale,
 - orderly capture reporting and submission of scale data,
 - retention of scale information,
 - check scaling and site monitoring, and
- effective dates (terms are not to exceed five years).

Most site authorization clauses are in a standard format on the SCS. Where these clauses do not satisfy the specific requirements of a given site, custom clauses may be drafted by the system user. A number of considerations govern the issuance of custom clauses.

Custom clauses must be:

- reasonable (can the site holder/operator comply without undue hardship?),
- enforceable (can an inspecting officer effectively evaluate compliance?),
- legal (do they conform with legislation in the *Forest Act* and *Regulations*?),
- equitable (do they conform with ministry policy and procedure?),
- compatible (do they conflict with any other clause(s) in the authorization?), and
- coherent (are they written clearly and concisely? Are they readily understood?).

Section 11.6.4 of this manual describes scale site inspections. During the inspection process, scale site authorizations should routinely be reviewed to ensure the clauses are sufficient to ensure ministry needs. While there is considerable latitude in administering scale site clauses, any changes to the authorization document require that:

- an entire new scale site authorization document be issued, clearly stating that it "cancels and replaces the previous one dated _____",
- the changes must be discussed in detail with the site holder/operator, and
- the applicant should sign the statement confirming the new authorization has been read and understood.

Scale site authorizations should not be allowed to lapse.

Section 11.6.4.3 describes actions that may be considered where scale site inspections reveal non-compliance with conditions in the authorization.

11.3.4 Site Registration

All scale sites must be registered on SCS and be given both a site location and name. A unique, three character alpha-numeric identifier code will be assigned on SCS at the time the registration data are entered. The first digit of the identifier code normally refers to the region where the site is located:

1 + 7	=	Vancouver Forest Region
2	=	Prince Rupert Forest Region
3	=	Kamloops Forest Region
4	=	Prince George Forest Region
5	=	Nelson Forest Region
6	=	Cariboo Forest Region

The district scaling supervisors are generally responsible for ensuring that all sites in their jurisdiction are registered on SCS.

11.4 The Training, Examination and Licencing of Scalers

The objective underlying the examination and licencing of scalers is to assure government, industry, and all other parties having an interest in the scale that scaling is conducted by qualified and competent scalers. Scaling licences may be issued by the Chief Forester following successful completion of a practical and a written examination conducted by scaling examiners appointed by the Chief Forester.

11.4.1 Scaler Training

The responsibility for scaler training largely rests with colleges, technical schools, and other private institutions. The forest industry is supportive of scaler training in providing facilities for field instruction and examination.

While anyone can challenge a scaling examination, candidates are encouraged to enroll in a formal scaling course. Courses range from weekend or evening classes to full time courses spanning several months. Scaling by its nature requires not only a good theoretical foundation, but also manual dexterity coupled with sound judgement. Experience has shown these skills are usually developed only through on-the-log and classroom instruction, practice, and ongoing coaching. As such, students should ensure prospective courses have at least 50 percent of the course content devoted to field exercises.

To ensure scaling courses meet scaling licencing requirements, the ministry's Scaling Board of Examiners may set criteria for minimum scaling course content and curricula.

Prospective scaling students may be required to take a pre-screening exam conducted by the college or other institution. This exam is in place to test the students' mathematical ability and aptitude. While this examination may not preclude students from enrolling in a scaling course, all students should be aware scaling does require a basic understanding of mathematics and weakness in this area is a significant disadvantage.

11.4.2 Scaling Examination

11.4.2.1 Coast and Interior Examinations

Because grading did not significantly apply to timber cut from the interior until the late 1980s and separate grade schedules are in effect, separate scaling licences are issued for the coast and the interior. Coast, for the purpose of scaling, refers to the area where timber is appraised using log selling process. Interior refers to the area where timber is appraised using lumber selling prices. Generally, coast is considered the area west of the Cascade Mountains and the interior is considered the area east of the Cascade Mountains.

Because the grading schedules are significantly different, scalers with a coast licence are not authorized to scale timber originating from the interior unless they have successfully passed the interior scaling licence exam. Similarly, scalers with an interior licence, are not authorized to scale timber originating from the coast until they have successfully passed the coastal scaling licence exam.

11.4.3 Examination Procedures

11.4.3.1 Conducting the Exam

Scaling examinations are held at the discretion of the regional scaling manager and are generally held in the spring or fall.

All scaling students should be aware that examinations are held only when there is adequate demand. Examinations are open to any member of the public who submits an application and pays the examination fee. Examinations are generally advertised at Forest Services offices at least two to four weeks prior to the examination date. Information regarding dates and locations of exams can be obtained by contacting any Forest Service office.

The procedures for conducting the practical exam, selection, spreading, and scaling of exam logs, setting and marking the written exam, are established and monitored by the Scaling Board of Examiners. In all cases, the exam must be conducted by appointed scaling examiners.


BRITISH COLUMBIA

Ministry of Forests
 

APPLICATION TO SCALE

I HEREBY MAKE APPLICATION (PLACE CHECK MARK IN SQUARES APPLICABLE):

☐ FOR AUTHORIZATION TO SCALE AT _____
(NAME AND ADDRESS OF MILL OR OTHER OPERATION)

☐ FOR APPOINTMENT AS ACTING SCALER TO SCALE AT _____

☐ TO TAKE EXAMINATION FOR SCALER'S LICENCE, TO BE HELD AT _____
(PLACE)

ON _____, 19 ____

☐ FOR APPOINTMENT AS OFFICIAL SCALER IN THE _____
(NAME OF REGION OR DISTRICT)

HAVE YOU EVER HELD A SCALING LICENCE, ACTING SCALER'S APPOINTMENT OR RESIDUE SURVEYOR'S LICENCE?	☐ YES ☐ NO	IF SO, WHERE?	APPOINTMENT OR LICENCE NO.
--	--	---------------	----------------------------

FULL LEGAL NAME AND ADDRESS (please print)

LAST NAME	FIRST NAME	MIDDLE NAMES / INITIALS	ADDRESS
TELEPHONE NO.		FAX NO.	

PROOF OF IDENTITY (please complete at least one of the following)

DRIVER'S LICENCE NO.	CITIZENSHIP CERTIFICATE NO.
BIRTH CERTIFICATE NO.	LANDED IMMIGRANT CARD NO.
SOCIAL INSURANCE NO.	WORK PERMIT NO.
PASSPORT	BRITISH COLUMBIA IDENTIFICATION

PLEASE STATE PLACE OF BIRTH	DATE OF BIRTH Y M D
SIGNATURE OF APPLICANT	DATE SIGNED Y M D

FOR OFFICE USE ONLY

DATE OF EXAMINATION Y M D	MARK %	LICENCE NO.	DATE ISSUED Y M D
LOCATION		FEE PAID ☐ YES ☐ NO ☐ N/A	
APPROVED ☐ YES ☐ NO		DATE APPROVED Y M D	
		FS CLIENT NO.	

FS 87 HVA 93/11

Figure 11.5 FS 87 - The application to scale.

11.4.4 Requirements to Take the Examination

11.4.4.1 Applications

Anyone wishing to take the licenced scalers examination must submit an application form FS 87 (see Figure 11.5).

11.4.4.2 Payment of Examination Fees

The *Scaling Regulation* requires that individuals applying to take an examination for a scalers licence must pay an examination fee and the regulation states the amount of the fee. Ministry of Forests employees and individuals who have paid an acting scaler appointment fee within the past twelve months of the examination date are exempted from payment.

11.4.5 Examination Marking Standards

Examination marking standards are set as follows:

11.4.5.1 Coast Examination

The coast examination consists of two parts: a written exam and a practical exam. Candidates are given a maximum of five hours for the written exam, while a maximum of eight hours is given for the practical exam, which requires the scaling of 90 logs. To pass the examination, a candidate must obtain at least 50 percent of the marks in each of four categories (the grading and accuracy categories include large and small diameter groups – each requiring 50 percent minimum to pass) and at least 75 percent of the total marks.

The following categories are included:

		Maximum Marks	Minimum Pass
Written paper		25	12.5
Net scale volume		40	20
Grading:	Large diameter logs	15	7.5
	Small diameter logs	5	2.5
Accuracy	Large diameter logs	12	6
	Small diameter logs	3	1.5
Total		100	75

a. Written Paper

The written paper mark is expressed as a percentage. The mark on the paper is multiplied by 0.25 for inclusion in the final mark.

For example, if the mark on the written paper were 79%, the marks for the category would be calculated as follows:

$$79\% \times 0.25 = 19.75$$

Rounds to 20 marks

b. Net Scale Volume

The scaled logs are marked as five group (60 large diameter logs broken into three groups of 20 logs, 30 small diameter logs and one group of all 90 logs). The net length, net top radius, and net butt radius recorded for each log are used to compute the net volume. The net volume of each group is compiled and the percent difference from the master scale is calculated. Marks are allocated as follows:

Difference %	Mark
0.0 to 3.0	$100 - (\% \text{ difference} \times 3.333)$
Over 3.0 to 5.0	$90 - ((\% \text{ difference} - 3) \times 10)$
Over 5.0 to 8.0	$70 - ((\% \text{ difference} - 5) \times 23.333)$

The allocation of marks resulting from the above formulae is graphically demonstrated in the following table:

Difference %	Mark %	Difference %	Mark %
0.5	98	4.5	75
1.0	97	5.0	70
1.5	95	5.5	58
2.0	93	6.0	47
2.5	92	6.5	35
3.0	90	7.0	23
3.5	85	7.5	12
4.0	80	8.0	00

The sum of the marks for the five groups is divided by five to obtain a percentage mark for the category and is multiplied by 0.4 and rounded to two decimal places for inclusion in the final mark.

For example, if the percentages for the five volume groups were 75%, 96.25%, 92.5%, 68.83% and 98.55%, the marks for the category would be calculated as follows:

$$\frac{(75.00\% + 96.25\% + 92.50\% + 68.83\% + 98.55\%)}{5} = \frac{431.13}{5} = 86.23$$

$$86.23 \times 0.4 = 34.49 \text{ marks out of a possible 40}$$

c. Grading

Grading is marked in two groups; the first group contains 60 large diameter logs and the second group contains 30 small diameter logs. For the large diameter group, a count of each incorrectly recorded species and grade is made and the total count subtracted from 60 and the result is multiplied by 100 and divided by 60 to obtain a percentage mark for the group. That mark is multiplied by 0.15 and rounded to two decimal places for inclusion in the log mark. For the small diameter group, a count of each incorrectly recorded species and grade is made and the total count subtracted from 30 and the result is multiplied by 100 and divided by 30 to obtain a percentage mark for the group. That mark is multiplied by 0.05 and rounded to two decimal places for inclusion in the log mark.

For example, if 20 grading errors were recorded for the large diameter group and 5 for the small diameter group, the marks for the category would be calculated as follows:

$$(60 - 20) \times \frac{100}{60} \times 0.15 = 10.00 \text{ marks}$$

and

$$(30 - 5) \times \frac{100}{30} \times 0.05 = 4.17 \text{ marks}$$

$$10.00 + 4.17 = 14.17 \text{ out of a possible 20 marks}$$

Marks for the two grading groups are rounded to two decimal places, then summed to obtain a mark for the grading category.

d. Accuracy

Accuracy is marked in two groups; the first group is for 60 large diameter logs and the second group is for 30 small diameter logs. For the large diameter group,

a count is made of each log with an incorrectly recorded gross length and gross radius out by more than one radius class, then the total number of logs with accuracy errors is subtracted from 60 and the result is multiplied by 100 and divided by 60 to obtain a percentage mark for the group. That mark is multiplied by 0.12 for inclusion in the log mark. For the small diameter group, a count is made of each log with an incorrectly recorded gross length and gross radius out by more than one radius class, then the total number of logs with accuracy errors is subtracted from 30 and the result is multiplied by 100 and divided by 30 to obtain a percentage mark for the group. That mark is multiplied by 0.03 for inclusion in the log mark.

For example, if 24 accuracy errors were recorded for the large diameter group and 6 for the small diameter group, the marks for the category would be calculated as follows:

$$(60 - 24) \times \frac{100}{60} \times 0.12 = 7.20 \text{ marks}$$

and

$$(30 - 6) \times \frac{100}{30} \times 0.03 = 2.40 \text{ marks}$$

$$7.20 + 2.40 = 9.60 \text{ out of a possible 15 marks}$$

Marks for the two accuracy groups are rounded to two decimal places, then summed to obtain a mark for the accuracy category.

To obtain a log mark the volume, grading and accuracy marks are summed then rounded to the nearest whole number. The written mark is added to the log mark to obtain the final mark.

Using the results from the previous examples, the log mark and final mark would be calculated as follows:

Volume	34.49		
Grading	14.17	Written Mark	20
Accuracy	9.60	Log Mark	58
Log Mark	58.26	Final Mark	78

11.4.5.2 Interior Examination

The interior examination consists of two parts: a written exam and a practical exam. Candidates are given a maximum of four hours for the written examination and a

maximum of five hours for the practical examination, which requires scaling and reporting scale results for 50 logs.

To pass the exam, candidates must achieve at least 50 percent in each of three categories and at least 75 percent of the overall exam marks.

Marks are allotted by the following categories:

	Maximum mark	Minimum pass
Written paper	30	15
Net scale volume	30	15
Grading and Accuracy	40	20
Total	100	75

a. Written Paper

The written paper mark is expressed as a percentage. The mark obtained on the written paper is multiplied by 0.3 for inclusion in the total mark for the examination.

b. Net Scale Volume

The net length, net top radius, and net butt radius recorded for each log are used to compute the net volume. The candidate looks up the net half volumes for each log in the Table of the Half Volume of Cylinders (FS 546), and enters these volumes in cubic decimetres on the exam tally.

Examiners recompile the net volumes correcting any errors the candidate has made. The corrected net volume is used to compute the mark for net scale volume.

The percentage difference of the candidate's net volume from the master scale net volume is calculated. Marks are allocated as follows:

Difference %	Mark
0.0 to 3.0	$100 - (\% \text{ difference} \times 3.333)$
Over 3.0 to 5.0	$90 - ((\% \text{ difference} - 3) \times 10)$
Over 5.0 to 8.0	$70 - ((\% \text{ difference} - 5) \times 23.333)$

The allocation of marks resulting from the above formulae is graphically demonstrated in the following table:

Difference %	Mark	Difference %	Mark
0.5	98	4.5	75
1.0	97	5.0	70
1.5	95	5.5	58
2.0	93	6.0	47

2.5	92	6.5	35
3.0	90	7.0	23
3.5	85	7.5	12
4.0	80	8.0	00

The mark is multiplied by 0.3 before being included in the total mark for the examination.

c. Grading and Accuracy

From the 40 marks allotted to this category, 1.0 mark is deducted for each incorrect species and each incorrect grade.

A further 0.5 of a mark is deducted for each incorrect gross length, gross radius out by more than one radius class, incorrectly entered half volume, and each type of procedural error made in recording the scale details.

The mark remaining after the deductions is added to the total mark for the examination.

11.4.6 The Administration of Scaling Licences

11.4.6.1 Invigilating Scaling Examinations

Both the written and practical parts of the examination are supervised by examiners who ensure each candidate receives no assistance from another person or from written notes. Candidates found to be receiving assistance or using notes will be disqualified and receive an automatic fail.

11.4.6.2 Marking Requirements

Examinations are to be marked by an examiner who must allocate marks in accordance with the mark distribution as described. All examinations are to be marked twice by different people to minimize errors. The examination papers of successful candidates are forwarded to Victoria for review and confirmation of results. At the same time, the examiner must ensure the names of successful candidates are entered on the corporate client record.

11.4.6.3 Issuance of Scaling Licences

Upon confirmation, the names of successful candidates are entered on the Scaling and Administrative Control System (SCS). This system assigns a licence number in accordance to licence type and issues the scaling licence. The examination papers of successful applicants are sent back to the regional scaling manager for retention.

11.4.6.4 Review by Unsuccessful Students

The pass rate on scaling examinations is frequently less than 50 percent. Scaling by its nature requires not only an understanding of theory, but also requires manual dexterity coupled with sound judgement. The most frequent cause of failure is insufficient time spent observing and scaling logs.

Any student taking a scaling examination is entitled to review the exam with a scaling examiner. Failing students should have a clear understanding where they went wrong before attempting the examination again.

11.4.7 Other Examination and Endorsements

11.4.7.1 Scaling Endorsements

As scaling serves the needs of various users, it must be responsive to often changing needs. To ensure all scalers are current and able to meet these needs, it is periodically necessary to conduct additional endorsement examinations. Such endorsement examinations have included metrication in the late 1970s, interior grading in the late 1980s, coastal letter grades in the early 1980s, and major coastal grading changes in 1990.

Failure to pass an endorsement exam within a specified time period will not result in termination of the scaling licence. It may, however, terminate the scalers authorization to scale or make the scaler ineligible for future authorizations until the endorsement has been achieved. Endorsement exams will be scheduled to minimize the disruption to active scalers. Where scalers are inactive and/or miss the scheduled endorsement exams, they may be required to take the licencing exam again to achieve the endorsement.

11.4.7.2 Re-examinations

In addition, the *Forest Act* empowers the Chief Forester to require a scaler to be re-examined. This provision is usually exercised where check scales or other inspections have concluded a re-examination is needed to confirm the scalers ability to meet licencing standards. Failure to pass the examination within a specified time will render the scaling licence cancelled.

11.4.7.3 Other Examinations

As the *Forest Act* authorizes the appointment of acting scalers other examinations are also administered by the ministry to ensure applicants are capable of meeting ministry requirements. These examinations are generally set and administered on a local basis under the overall guidance of the Scaling Board of Examiners.

11.4.8 Scalers Oath

Because scale data serves the needs of both buyers and sellers, as well as others, it is of utmost importance that scalers be absolutely objective in their conduct.

All scalers are required to swear and sign the following oath as part of receiving their scaling licence or being authorized or appointed to scale:

"I, _____, do solemnly swear that I will, in my capacity as a scaler, without fear, favour, or affection, and to the best of my ability and judgement, scale, record and

report scale results in accordance with the *Forest Act*, applicable regulations, the Scaling Manual and other requirements set by the Ministry of Forests."

To students just obtaining a scaling licence:

Students obtaining a scaling licence should be commended for their achievement. All students, however, should understand passing the scaling examination is the first step toward becoming a scaler.

To become proficient and maintain your skills as a scaler, you need experience on the job, periodic study, and you should always be receptive to new knowledge.

Having a scaling licence does not authorize you to scale timber for purposes of the *Forest Act*. If you want to scale, you must also be appointed and/or authorized to scale. Section 11.5 documents these requirements.

11.5 Authorization and Appointments of Scalers

11.5.1 Legal Requirement for Authorization and Appointments

Anyone wishing to scale for purposes of the *Forest Act* must first be appointed and/or authorized to scale by the ministry.

Figure 1.4 in Chapter 1 details the legal and administrative requirements of the *Forest Act*.

The *Forest Act* requires that all scalers except Forest Service scalers must be authorized by the Ministry of Forests to conduct the official scale, and provides for the appointment of acting scalers, official scalers and Forest Service scalers. It also states that it is an offence for any person to represent that they are authorized to perform a scale if that person is not so authorized.

11.5.2 Administrative Reasons for Authorization and Appointments

Authorization and appointment of scalers is carried out for the following reasons:

- to ensure the public's valuable resource is scaled by the most competent scalers available,
- to ensure scalers are clearly aware of their legal obligations and responsibilities with respect to scaling, and the documentation, retention, and submission of scale data, and
- to enable the ministry to monitor scaling activity and conduct check scales by knowing who is scaling, as well as, where and when.

11.5.3 Terms of Requirements of Authorization and Appointments

Authorizations and appointments are restricted to the geographic jurisdiction of the signing official. They are also limited in duration.

To meet the objectives of ensuring a reliable and controlled scale, the *Forest Act* provides considerable administrative flexibility in scaling appointments and authorizations. In all cases, unless otherwise specified, appointments and authorizations are restricted to the geographic jurisdiction of the signing official and are limited in duration.

11.5.3.1 Official Scalers

Official Scalers are usually appointed by the regional manager for a term not exceeding five years. Appointments may be re-issued upon expiry.

Requirements to be appointed as an official scaler include:

- valid scaling licence (endorsements must be current),
- demonstrated scaling competency (an acceptable check scaling history),
- scaling experience (minimum of five years for coastal scalers and three years for interior scalers), and
- at least six months scaling activity in the past year.

11.5.3.2 Licenced Scalers

A licenced scaler may be authorized for up to two years and may be re-authorized upon expiry.

Requirements to be authorized as a licenced scaler include:

- valid licence with all endorsements current.

11.5.3.3 Acting Scalers

An acting scaler appointment is considered only where:

- securing a licenced scaler would impose unreasonable costs or delays, and/or
- volumes and values are minimal and there is little risk that the scaling requirements of the *Forest Act* will not be met.

Persons working as a weighmaster or assisting a scaler in taking measurements or other capacity must be appointed as an acting scaler.

Requirements to be appointed as an acting scaler are:

- order must be issued by the regional manager, the district manager, or a forest officer stating that the timber may be scaled by an acting scaler,
- applicant must complete an acting scalers examination,

- applicants who scale more than 300 m³/year must pay a fee of \$100, and
- appointment may be conditional upon the applicant attending the next scaling examination held in the region. Each acting scaler appointment may not exceed one year. While these appointments are normally for minor volumes and for a short term they may be renewed upon expiry.

11.5.3.4 Forest Service Scalers

An employee of the Ministry of Forests may be appointed as a Forest Service scaler if they:

- hold a valid scaling licence, and
- have been appointed as a forest officer.

Forest Service scalers do not have to be authorized to scale.

All scalers are required to take the Scalers Oath upon their first authorization to scale (see Section 11.4.9).

11.5.4 How to Obtain an Authorization and/or Appointment

Any person requiring an authorization or appointment should complete an Application to Scale (FS 87) and return it to the local Forest Service office for processing.

11.5.5 Authorization Conditions

In addition to being limited to a time period and an administrative jurisdiction, all scaler authorization documents carry two standard conditional clauses:

- authorization is conditional upon compliance with the *Forest Act*, the *Scaling Regulation*, and approved ministry policies and procedures as detailed in the *Scaling Manual*, and
- failure to comply with conditions of the authorization may result in cancellation or suspension of the authorization.

Other clauses are included in the authorization. These may set conditions to ensure a complete and accurate scale, orderly and timely scaling, conduct on the scale site, documentation and submission of scale data, and other conditions falling under the scalers control.

The issuance of scale authorizations is supported by SCS. Where the standard clauses on the SCS do not satisfy the specific requirements of an authorization, custom clauses may be drafted by the system user. A number of considerations govern the issuance of custom clauses. They must be:

- reasonable (can this scaler comply without undue hardship? Is the requirement under the scalers control?),
- enforceable (can an inspecting officer effectively evaluate compliance?),
- legal (do they conflict with the *Forest Act* and regulations, the *Canadian Charter of Rights, Freedom of Information and Protection of Privacy Act, Federal Weights and Measures*, or others. Is the ministry empowered to set the condition?),
- equitable (do they conform to ministry policy and procedures?),
- compatible (do they conflict with any other clause(s) in the authorization or other authorization?), and
- coherent (are they written clearly and concisely? Are they easily understood?).

Figure 11.6 is an example of an authorization to scale issued using SCS.

	BRITISH COLUMBIA	Ministry of Forests	
AUTHORIZATION TO SCALE			
Authorization Num.....119223 License Num.....XXXX Authorization Date....April 01, 1994			
Pursuant to the Forest Act, Part Six, Section 73, I hereby authorize			
<u>JOE SCALER</u> , of P.O. BOX 555 SMITHERS, BC V0J 2N0			
to Weigh and Stratify Timber at site 237 (SMITHERS)			
for a period commencing <u>April 01, 1994</u> and ending <u>December 31, 1995</u> subject to the following condition			
1.	COMPLIANCE WITH FOREST ACT		
	All scaling shall be conducted in accordance with Part 6 of the Forest Act, the Scaling Regulation the Forest Service Scaling Manual and Ministry policies and procedures.		
2.	FAILURE TO COMPLY WITH CONDITIONS		
	This authorization may be suspended or cancelled by the District Manager or Scaling Supervisor for failure to comply with these conditions.		
3.	ORDERLY SCALING		
	The scale is to be made in an orderly manner by load or parcel with each parcel or load to be assigned a unique return number and so identified.		
4.	SCALE PROCEDURES - UNIQUE RETURN NUMBER		
	The scale details of each parcel or load are to be recorded against the licence number and unique return number assigned by the scaler.		
5.	SCALE PROCEDURES - SCALED PARCELS		
	After scaling, each piece and parcel or load are to be clearly marked to clearly indicate they have been scaled.		
6.	ACCURATE RECORDS RETAINED BY SCALER		
	Accurate records (including date and place of scaling) are to be retained by the scaler for all scales performed.		

Page 1 of 3

Figure 11.6 An example of an authorization to scale - page 1.

 BRITISH COLUMBIA		Ministry of Forests	
AUTHORIZATION TO SCALE			
		Authorization Num.....119223 License Num.....XXXX Authorization Date....April 01, 1994	
7.	PRIOR TO SCALING - CONDITIONS Before scaling at each site, the scaler must familiarize themselves with the conditions of scale for the site and ensure each timber mark has been approved for scaling at that site.		
8.	SCALERS OBLIGATION - CONDITION OF SCALE The scaler must ensure that conditions of scale for the scale site are met and report to the Forest Service where they are not met.		
9.	WEIGHING OF TRUCKS All loaded trucks must be weighed entering the site and reweighed after unloading and prior to leaving the scaling station.		
10.	UNMARKED TIMBER Loads of unmarked timber must not be scaled without first contacting the local Forest Service Office for instructions.		
11.	RESPONSIBILITY OF WEIGHMASTER The person weighing shall ensure that the scale functions accurately and within tolerances. Regular tests are to be done and the scale and associated attachments and devices are to be maintained in good working condition.		
12.	MIXING SCALED AND UNSCALED TIMBER No unscaled logs are to be mixed with scaled material at any stage of the operation.		
13.	SCALE MALFUNCTIONS The Forest Service must be notified immediately in the event of malfunctioning equipment or any other irregularity affecting the weighing and selection of loads.		
14.	ILLEGIBLE MARK All logs which do not bear a legible timber mark must be recorded as NMV. This does not apply to weight scale samples unless they must be 100% marked.		
15.	LOADS NOT MEETING STRATA SPECIFICATIONS Loads not meeting stratification specifications must be excluded from the population and piece scaled.		

Page 2 of 3

Figure 11.6 An example of an authorization to scale - page 2.

 BRITISH COLUMBIA		Ministry of Forests	
AUTHORIZATION TO SCALE			
		Authorization Num.....119223 License Num.....XXXX Authorization Date.....April 01, 1994	
16.	FOREST SERVICE RIGHT OF ACCESS A Forest Officer has the right of access to the scaling office and yard and, if necessary, to temporarily shut down the operation to check compliance with the conditions of scale to obtain a check scale or to test the weighing equipment.		
17.	DEVIATIONS FROM SAMPLE PLAN - REPORTING Deviations from the approved stratification plan, and unrepresentative samples must be reported to the Forest Service.		
18.	CANCELLATION/SUBSTITUTIONS OF SAMPLES Weight scale samples are not to be cancelled or substituted without express written permission by the District Scaling Supervisor.		
19.	NOTIFICATION PRIOR TO SCALING Prior to scaling, the District Scaling Supervisor must be notified of the dates and duration of scaling, changes in operating hours, and must be notified on completion before logs are moved so as to ensure check scale requirements are met.		
Issued At	Bulkley Forest District 3333 Tatlow Road, Bay 6000 SMITHERS, BC V0J 2N0		
On this	6th day of March, 1995		
By	District Manager		

Page 3 of 3

Figure 11.6 An example of an authorization to scale - page 3.

11.5.6 Suspensions and Cancellations

Where scalers fail to fulfill their requirements under an authorization or appointment, or fail to perform in a capable and competent manner, the authorization and/or appointment may be subject to suspension for a set term or it may be cancelled where contravention is blatant. Any person subject to a cancellation will be given an opportunity to be heard before the regional manager or a district manager.

The *Forest Act* also provides for the Chief Forester to cancel a scaling licence where scalers fail to properly perform their duties. Where this is contemplated, the scaler will be given an opportunity for a hearing before the Chief Forester.

11.6 Assessing Compliance with Scaling Requirements

Under policy the Ministry is required to maintain an adequate level of monitoring, inspecting, and auditing to ensure the Crown's interests are protected. This requirement is largely met through three activities:

1. check scaling,
2. scale site inspections, and
3. data monitoring.

Several basic questions are answered through these activities:

- is scaling being done in accordance with this manual, the *Forest Act*, and the *Scaling Regulation* and the Scalers authorization?
- are all conditions of the scale site authorization being complied with?
- is all required documentation in good order?
- is all material that is harvested both scaled and billed?
- has all data been compiled and submitted in accordance with Ministry standards?
and
- are scaling practices and interpretations consistent?

11.6.1 Data monitoring is covered in detail in the Scale Data Control Manual

11.6.2 Check Scaling

11.6.2.1 Purpose of Check Scaling

Check scales are conducted by the Forest Service to maintain scaling standards and uniform scaling practices throughout the province. This is achieved through remeasuring loads of logs scaled by the original scaler and comparing scale results in terms of volume and value in addition to assessing compliance with the scalers authorization to scale.

11.6.2.2 Conducting a Check Scale

Because check scales may result in actions affecting the scalers authorization to scale or scaling licence, it is important that they be representative of the scalers work. To achieve this it is ministry policy that check scales be conducted unannounced and at random whenever feasible. To be valid, the original scaled load must be left untouched after scaling and remain in the same position for check scaling. While the original scaler may be under various production pressures, the check scaler in setting the standard of comparison is required to scale each load with care and not be subject to any time constraints or other operational pressures.

Usually the check scale should comprise one truckload of logs. Where this is not feasible, the check scale should comprise enough logs so that meaningful conclusions can be made about the original scale.

11.6.2.3 Check Scale Frequency

The objective defined under ministry policy is to set check scale frequency by analyzing the relative revenue risk, the volume scaled, and the scalers past performance. This objective requires an objective evaluation of each scaling situation.

For example, increased check scaling frequency might be warranted where:

- the scalers experience or past performance is weak,
- the scale site conditions may not facilitate accurate scaling, or
- the values and volumes scaled at the scale site are high.

Similarly, a reduced checking frequency might be warranted where:

- values and volumes scaled at the site are low,
- only private timber is scaled and risk assessment is low, or
- scalers past performance or experience is strong.

Scaling policy may also impose specific frequency, volume, or value objectives.

11.6.2.4 Coaching

While check scaling plays an important role in assessing compliance with ministry requirements and scaling procedures, it also plays an important role in scaler development and training. Whenever feasible, the check scale should include an on-site review by the check scaler and the original scaler to share the check scale details and go over significant variances between the check scale and the original scale. This may include use of a saw or axe to confirm assumptions concerning the extent of decay or other defects. It is only through this process that inconsistencies or other sources of variance can be identified and resolved.

11.6.2.5 Division of Responsibilities

11.6.2.5.1 The Scaler

Every scaler must understand the ministry has the responsibility of ensuring that scale results are correct and ensuring scaling duties are performed correctly. To enable the check scaler to carry out these responsibilities requires the scaler to retain at the scale site a copy of the scale details for the most recently scaled parcel or load of timber and making available any other required documentation for inspection.

At the request of the check scaler, scalers must make themselves available to discuss check scale results and where required, review check scale logs on-site.

11.6.2.5.2 Scale Site Operator

The scale site operator is responsible for ensuring the last scaled load for each scaler is retained for check scaling. To this end the last scaled load must be clearly marked or tagged as scaled as per the scale site authorization and wherever feasible the load should remain in exactly the same position as originally scaled. This is an integral part of ensuring reliable check scale results, and as such, several provisions in the *Forest Act* and *Scaling Regulation* address this topic.

Under the *Forest Act* the owner and operator of the scale site and the owner of the timber are responsible for ensuring the most recently scale parcel or load of logs is set aside or retained at the scale site and be accessible for check scaling. In the event of non-compliance with this requirement, the *Scaling Regulation* enables the ministry to assess its costs in attempting to conduct a check scale. In addition, contravention of this section of the *Forest Act* is an offence and subject to ticketing and/or summary conviction. Similarly, contravention may jeopardize the scale site authorization.

11.6.2.6 Checks to be Made

In addition to the actual scaling, a forest officer will check that authorized scalers are on site to scale the timber, that scaled parcels are being properly identified, that records of scale details are correctly identified and filed and that scale returns are being completed and forwarded on time.

11.6.2.6.1 Piece Scale

A check scale of the most recently scaled parcel is made. The details of the check scale and the original scale each must have the volume and the market value of the timber computed.

To enable meaningful comparisons of the original and check scales, volume and value computations should be made on site. The differences between the volumes is divided by the volume of the check scale to determine the percentage difference. Where the original scale is less, the difference is low or negative. Where the original scale is greater, the difference is high or positive. The difference in market value is calculated following the rules for volumes as is the difference in number of pieces.

The classification of each log to species is to be checked and the number of incorrect classifications identified. Each log where there is no deduction for defect is to have the length and recorded radius measure compared. Any difference in length is considered an error whereas a difference exceeding one radius measure, or rad (2 cm of diameter) is considered to be an error.

11.6.2.6.2 Weight Scale

A check of the most recently scaled sample is to be made in the same manner as the piece scale parcel is scaled. As with piece scale parcels, computation of values and volumes should take place at the scaling site to enable meaningful comparisons. In addition, the weight recorded should be checked against the load slip and the block and block load number checked against the sampling plan. Check that the load has been placed in the correct stratum.

The gross, tare, and net weights of trucks recorded on the daily summary should be reviewed for abnormalities and it is desirable to re-weigh the most recently weighed truck, gross or tare, to check that this function has been performed correctly. If a recently weighed truck cannot be re-weighed, supervise the weighing of a truck and compare the results with those recorded against previous weighings for compatibility. Check that the weigh scaler has checked the weigh scale each day by weighing a vehicle at different ends of the platform, or in the case of a lift weigh scale, by weighing a test load of known weight. Check that the platform is being kept clean and free of debris, snow, and ice which may affect the accuracy of the weighing.

Check that the monthly return summary is balanced correctly by days and timber marks and that the total net weight per day on the summary agrees with the total on the daily load inventory. Check a completed daily load inventory to see that the total gross weight equals the sum of the net and tare weights. Cross check a few weight scale slip details with the details on the daily load inventory and ensure these agree.

11.6.2.6.3 Special Forest Products - Stacked

The most recently scaled stack is to be remeasured and the stack volume computed and compared with the stack volume computed from the original scale. Check the face of the stack and estimate the ratio of area of wood to area of wood, air, and bark. Compare the resultant figure with the factor used to convert stacked volume to volume of wood.

11.6.2.6.4 Special Forest Products - Piece Sampling

Check count the number of pieces by category in the most recently counted parcel and compare with the scale record. Sample measure a number of pieces in each category and compare the average volume per piece of the category sample with the average used by the original scaler.

11.6.3 Actions Upon Completion of the Check Scale

11.6.3.1 Check Scale Advisory

In all instances, only the original scaler is privy to the results of the check scale. To this end an advisory letter showing the scale details for the original and check scales is issued to the original scaler as soon as possible following the check scale. This report is usually printed at the scale site and presented by hand to the original scaler.

While the check scale advisory letter can be in different formats, its basic intent is to provide a meaningful feedback mechanism to assist scalers in assessing their own performance and making them aware of any deficiencies in their scaling methods or interpretations. While check scales confirming the original scale need not provide significant detail other than the scale volumes, check scales outside acceptable tolerances should clearly identify the sources of variance.

Figure 11.7 shows an example of a check scale comparison report produced by a handheld computer and printed at the scale site.

Release of Check Scale Data

1. Upon completion of a check scale, the check scale comparison reports and detailed log listing will always be provided to the scaler who performed the scale.
2. Check scale comparison reports and detailed log listings are available to other parties upon request, subject to provisions of the *Freedom of Information and Protection of Privacy Act*.

11.6.3.2 Replacement of the Original Scale by a Check Scale

Where the volume or value of the check scales varies by more than the prescribed 3 percent set by regulation, the *Forest Act* requires that the original scale be replaced by the check scale. The *Forest Act* also authorizes an exemption to this replacement where it is considered the original scale was conducted in accordance with good scaling practices and the differences in the original and check scale are attributable to the condition of the timber. The term 'good scaling practices' is subjective and requires an assessment of the nature, magnitude and frequency of scaling errors (both interpretative and quantitative).

For example, where timber is sound and of little butt flare an exemption to a replacement would likely not follow. On the other hand, where timber is decadent and otherwise good scaling practices were followed, an exemption to a replacement would likely be considered.

Where the scale is to be replaced by the check scale, a copy of the new scale return should be provided to the scaler, the owner of the timber and the mark holder.

The responsibility for ensuring that the scale is replaced by the check scale rests with the owner of the scale site, the operator of the scale site, the owner of the timber, and the scaler.

Non-compliance to this responsibility constitutes an offence that is subject to ticketing and/or summary conviction.

CHECKS

Page 1

Printed

95.03.08

COMPARISON OF SCALE AGAINST CHECK - SUMMARY REPORT

Parcel ID :

Company :

Scale Site Sclr Ret ScaleDate Time G/N Scaled By

Orig. 5G5 852A 023 94.07.13 13:19 G TOM ZELEZNIK

Check 5G5 861A 040 94.07.13 13:11 G E. KUSY

Category

Original Scale

Check Scale

ThrMark	Pt	S	Sp	G	Srt	Pcs	GrsVol	NetVol	NetVal	Pcs	GrsVol	NetVol	NetVal
NACRS			CE	2		18	8.22	8.19	75.10	18	8.22	8.18	75.01
NACRS			CE	4		2	1.51	1.32	0.33	2	1.43	1.12	0.28
NACRS			R	Z		1	0.00	0.00	0.00	1	0.00	0.00	0.00

Gross

Net

Totals	Pieces	Lengths	Tops	Butts	Volume	Lengths	Tops	Butts	Volume	Value
Orig.	21	218.8	183	277	9.73	216.1	183	277	9.51	75.43
Check	21	218.6	181	276	9.65	214.6	181	276	9.30	75.29
Diff.	0	0.2	2	1	0.08	1.5	2	1	0.21	0.14

% Diff/

Check	0.0	0.1	1.1	0.4	0.8	0.7	1.1	0.4	2.3	0.2
-------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Remarks:

C.C:

Forest Officer

Figure 11.7 Example of a check scale comparison report prepared at the scale site - part 1.

CHECKS
Page 1

Printed
95.03.08

COMPARISON OF SCALE AGAINST CHECK - LOG REPORT

Parcel ID : Company :

Scale Site Sclr Ret ScaleDate Time G/N Scaled By

Orig. 5G5 852A 023 94.07.13 13:19 G TOM ZELEZNIK

Check 5G5 861A 040 94.07.13 13:11 G E. KUSY

ORIGINAL													CHECK																				
Defects													Defects																				
-Top- -But- Defect													-Top- -But- Defect													-- Differences --							
Log#	Sp	G	Len	Top	Butt	DTM	Ou	In	Ou	In	Len	Per	Volume	Log#	Sp	G	Len	Top	Butt	DTM	Ou	In	Ou	In	Len	Per	Volume	Sp	Gr	Len	Top	Butt	
0001	CE	2	100	011	012	BF3	0		4		20		0.003	0001	CE	2	100	010	012	BF3	0		5		20		0.005						1
0002	CE	2	150	010	019									0002	CE	2	150	010	019														
0003	CE	2	140	007	012	BF3	0		7		26		0.013	0003	CE	2	140	007	012	BF3	0		7		25		0.013						
0004	CE	2	110	006	012									0004	CE	2	110	006	012														
0005	CE	2	100	012	014									0005	CE	2	100	012	014														
0006	CE	2	138	008	014	BF3	0		4		12		0.002	0006	CE	2	138	008	014														
0007	CE	2	142	006	011									0007	CE	2	140	006	011														2
0008	CE	4	100	015	021	HF1	14		14		30		0.185	0008	CE	4	100	015	021	HF1	1		14		100		0.309						
0009	CE	2	100	018	021									0009	CE	2	100	018	021														
0010	CE	2	150	006	013									0010	CE	2	150	006	013														
0011	CE	2	100	010	011									0011	CE	2	100	010	011														
0012	CE	2	100	005	010									0012	CE	2	100	005	010														
0013	R	2	004	005	005									0013	R	2	004	004	005														1
0014	CE	2	100	008	014									0014	CE	2	100	008	014														
0015	CE	2	076	007	011									0015	CE	2	076	007	011														
0016	CE	4	100	010	014									0016	CE	4	100	010	012														2
0017	CE	2	100	008	015									0017	CE	2	100	008	015														
0018	CE	2	058	008	012									0018	CE	2	058	008	012														
0019	CE	2	110	008	014									0019	CE	2	110	008	014														
0020	CE	2	110	005	010									0020	CE	2	110	005	010														
0021	CE	2	100	010	012	BF3	0		7		30		0.015	0021	CE	2	100	010	013	BF3	0		8		30		0.020						-1

Summary of Differences : Number = %

--Species--	---Grade---	--Length---	---Top---	---Butt---	-Defects Volume
0 = 0.0%	0 = 0.0%	1 = 4.8%	0 = 0.0%	1 = 4.8%	0.133 = 37.8%

DEFECT CODES

A Ring Count	G Goiter	O Conk	U Sweep
B Butt Rot	H Heart Rot	P Pocket Rot	V Crook
C Star Check	I Pitch Pockets	Q Ring Shake	W Water Shake
D Straight Check	K Knots	R Ring Rot	
E Sun Check	L Hole	S Sap Rot	
F Fire Damage	M Missing Wood	T Twist	

Figure 11.7 Example of a check scale comparison report prepared at the scale site-part 3.

11.6.3.3 Update Scaler File and Records

The results of each check scale is posted to the scalers file and the scalers record or the Scale and Administrative Control System (SCS) so that each scalers performance can be tracked and monitored.

In addition to reviewing current check scale comparisons, check scales over the previous twelve months are reviewed to identify any possible bias. This shortcoming, along with any other trend or required corrective action should be noted in the check scale advisory letter.

11.6.3.4 Second Check Scale

Under the *Forest Act* a scaler whose scale is replaced by a check scale may request a second check scale if they disagree with the original check scale. As such, this section provides a recourse for scalers to have a second binding opinion about a scale.

Where the scaler requests a second check scale the ministry is obligated under the regulation to perform it where it is feasible.

Where a second check scale is conducted, it becomes the basis of comparison with the original scale. If the second check scale varies in volume or value from the original scale by more than the prescribed percent (± 3 percent set under the Scaling Regulation), the second check scale must replace the original scale. When the original scale is replaced by the second check scale, the scaler requesting the second check scale must pay the costs and expenses incurred by the ministry in conducting the second check scale. Where the volume or value of the second check scale is between 0 and 3 percent of the original scale, the original scale is confirmed and the scaler who requested the second check scale is free of any expenses incurred by the ministry in conducting the second check scale.

11.6.3.5 Second Scales

Unlike a second check scale, which is available to a scaler who disagrees with a check scale that replaces the original scale, a second scale is available to anyone with an interest in the scale but only if it is feasible to conduct another scale.

A second scale is available to any person whose interest is affected by the scale who

- Objects to a scale return completed for a scale, and
- Serves notice of their objection to a regional or district manager and requests a second scale.

Where notice is served, the Ministry is obligated to have the timber scaled again if another scale is feasible.

In addition, a second scale may be required at the discretion of a regional manager or a district manager.

When conducted, the results of the second scale are binding. When the second scale varies from the original scale by more than ± 3 percent in terms of value or volume, the second scale governs for all purposes of the *Forest Act* and must replace the original scale. When the original scale is replaced by a second scale, the person requesting the second scale is free of any costs and expenses incurred by the ministry in conducting the second scale.

Where, however, the original scale is confirmed by the second scale (i.e. the second scale is within ± 3 percent in terms of value or volume of the original scale), the person requesting the second scale must pay for the costs and expenses incurred by the ministry in conducting the second scale.

11.6.3.6 Suspension of a Scaling Licence

Under the *Forest Act*, the regional manager or the district manager is authorized to suspend a scaling licence where its holder fails to properly perform their duties or comply with the requirements of the *Forest Act* or applicable regulation(s).

Where there is a flagrant contravention of scaling requirements the inspecting forest officer should promptly recommend suspension of the scaling licence to the district manager and suspension should proceed under Section 102 (1) of the *Forest Act*.

Where there is no flagrant contravention of scaling requirements the scaler should receive at least one warning letter signed by the district manager prior to any suspension. When a suspension is made, it must be for a specific term of up to one year and the suspension automatically terminates all authorizations and appointments to scale. All suspensions are recorded on the scalers record as well as the harvest billing system.

Where suspensions are made because the scaler lacks expertise, the scaler may be required to pass the licenced scalers examination again before being authorized or appointed to scale again.

11.6.4 Scale Site Inspections

11.6.4.1 Purpose of Scale Site Inspections

Scale site inspections are conducted by the Forest Service to assess compliance with the scale site authorization and ensure scaling conditions support an accurate and reliable scale. Where the inspection reveals contravention of Forest Service requirements, the inspection may result in an instruction letter, a suspension, or penalty as provided under the *Forest Act*.

11.6.4.2 Conducting a Scale Site Inspection

Scale site inspections are conducted at the same time as a check scale or as a separate inspection. Like check scales, these inspections are unannounced and at random whenever feasible.

Because scaling is conducted under diverse conditions, the format of the inspection varies considerably. Appendix 11.A, for example is a procedure used for inspecting a piece scale site. Figure 11.8 provides an example of a Site Inspection Report.

Another series of checks is required for weight scaling operations:

- check that the monthly return summary is balanced correctly by days and timber marks, and that the total net weight per day on the summary agrees with the total on the daily load inventory,
- check a completed daily load inventory to see that the total gross weight equals the sum of the net and tare weights,
- cross check a few weight scale slip details with the details on the daily load inventory and ensure these agree,
- review the gross, tare and net weights recorded on the daily summary for any abnormalities,
- if feasible, reweigh the most recently weighted truck to ensure weighings are the same,
- check that daily scale section tests are performed and corrective action is taken if applicable,
- check stratification calls using sample scale details where feasible,
- check the frequency and documentation of red tag loads,
- check compliance with weight scale emergency procedures if applicable, and
- check compliance with other conditions defined under the scale site authorization.

Ministry of Forests	SCALING SITE INSPECTION FORM	Page 1 of 2
Site Number: 3FS	Inspection Date: 94.02.01	
Site Name: CHAPUT	Inspection by: GEORGE MORGAN	
Site Type: Weight Piece	Region: KA KAMLOOPS	
File Number:	District: VE VERNON	

- 1: Site operating? Y
- 2: Scaler on site? Y
Authorized? Y
- 3: Unauthorized person performing scaling duties? N
- 4: Last scaled parcel retained for check scaling? Y
- 5: All scaled timber marked to signify scaling status as required? Y
- 6: Required scale data on site? Y
Completed correctly? Y
Scale data submitted as required? Y
- 7: Production ledger/site diary current? Y
- 8: Logs spread properly for scaling? Y
- 9: Previously scaled timber being delivered to this site? N
- 10: Scaled timber being removed from this site? Y
To where? 353
- 11: Timber marking requirements being met? Y
- 12: Scaling area free of scaled chunks and pieces? Y
- 13: Check scale done? Y
Reference #: _
- 14: Unscaled timber on site? Y
Estimated volume: 2 LOADS
Scaling of loads being kept current? Y
- 18: Approved scaling procedures being followed? Y
- 19: All loads being numbered upon arrival? Y
- 21: Unauthorized decking of unscaled timber? N
- 22: Mixing of scaled and unscaled timber? N
- 23: Loads flagged/tagged as required? Y
- 26: All timber designated to be scaled at this site? Y
- 29: Area designated for scaling being used for other activities? N

Figure 11.8 Scaling site inspection report - page 1.

Ministry of Forests	SCALING SITE INSPECTION FORM	Page 2 of 2
Site Number: 3FS	Inspection Date: 94.02.01	
Site Name: CHAPUT	Inspection by: GEORGE MORGAN	
Site Type: Weight Piece	Region: KA KAMLOOPS	
File Number:	District: VE VERNON	
31: In compliance with all authorization conditions? Y		
32: Other documents/ instructions issued? N		
34: Final Remarks? N		
GEORGE MORGAN		
_____		_____ (Forest Officer's Signature)
(Received by)		

(Print received by name)		

Figure 11.8 Scaling site inspection report - page 2.

11.6.4.3 Actions Upon Completion of a Scale Site Inspection

Upon completion of the scale site inspection, a report is prepared and copied to the scale site file. Any contraventions to the scale site authorization or other ministry requirements must be communicated to the site operator in written form. Where violations are serious and compromise the ability to achieve an accurate and reliable scale at that site, a suspension to the scale site authorization may be considered. Suspending a site authorization is serious and disruptive, and is considered a last resort before cancellation of the authorization.

The *Forest Act* provides that only the regional manager may suspend or cancel a scale site authorization and may only do so after giving the authorized party an opportunity to be heard.

Where a site inspection reveals non-compliance with the scale site authorization conditions, always be sure the contraventions are communicated to the site operator and try to resolve them on site before considering any other action.