



To: ALL DISTRICT MANAGERS
VANCOUVER FOREST REGION

From: Vanc-Protection

Date: March 19, 1984

File: 890-1-4-14

Enclosed is a copy of the "Guide to Rating Fuel Loading" for the Vancouver Region.

The guide is presented in a series of photos for instant visual interpretation and is intended to serve as benchmarks for rating various levels of slash.

It is designed to help mainly the inexperienced field staff in assessing logging slash and in planning burns. However more experienced staff can also benefit, as with the use of this guide slash will be rated more uniformly throughout the region. This should create better communication and understanding by staff at all levels when discussing fuel loading.

We ask you to use the guide for a trial period and then give us your comments as to its usefulness and how it might be improved.

R. Hughes
Regional Protection Officer

c.c.:	MacMillan Bloedel, Nanaimo	Attn: Mr. R. Lafferty
	BCFP, Vancouver	Attn: Mr. B. Howard
	CFP, Vancouver	Attn: Mr. Stan Chester
	Pacific Logging, Victoria	Attn: Mr. John Phillips
	Weldwood, Vancouver	Attn: Mr. R. Beaumont
	Crown Forests	Attn: Mr. J. Johnson

- A copy enclosed for your field staff to try out. Any comments on its value and suggestions for improvement will be greatly appreciated.

c.c.: Protection, Victoria Attn: T. England
A copy enclosed for your information and interest. Initial response from field was highly favourable. Do you have any comments?

looks ok.

J.E.E.

CONTENTS

Introduction	Page 1
Objective	Page 1
Data	Page 2
Photo Design	Page 3
Cedar - Light	Page 4
Cedar - Moderate	Page 5
Cedar - Heavy	Page 6
Hemlock/Balsam - Light	Page 7
Hemlock/Balsam - Moderate	Page 8
Hemlock/Balsam - Heavy	Page 9
Mature Fir - Light	Page 10
Mature Fir - Moderate	Page 11
Mature Fir - Heavy	Page 12
Immature Fir - Light	Page 13
Immature Fir - Moderate	Page 14
Immature Fir - Heavy	Page 15
Deciduous - Light	Page 16
Deciduous - Moderate	Page 17
Deciduous - Heavy	Page 18
Appendix I	Page 19

INTRODUCTION

This photo guide is presented as an aid in assessing slash loading. It is intended that this guide be used in conjunction with other aids, such as the F. S. 117, the Prescribed Fire Predictor, and the Vancouver Region Prescribed Burning Manual, in determining slash disposal requirements.

The guide is segregated into the following species:

- (A) Cedar
- (B) Hemlock/Balsam
- (C) Mature Fir
- (D) Immature Fir
- (E) Deciduous

Each species has been further broken down to illustrate light, moderate, and heavy rated areas.

The data supplied with the photos is intended to coincide broadly with Part A of the F. S. 117 which in turn is fed as input into the Prescribed Fire Predictor. Specifically, that part of the data which is pertinent to Part A of the F. S. 117, is fuel size, fuel depth, and continuity (see Appendix I). Fuel size is further segregated by size class and weight per hectare to give an indication of fine material present.

OBJECTIVE

The objective of this photo guide is to present bench mark slash conditions representative of light, moderate, and heavy fuel rating with sufficient information to relate to Part A of the F. S. 117.

DATA

Surveys have been conducted on each photo area to determine slash loading using the Line Intersect Method as outlined in MacRae et al (1979) (C. F. S. Info. Rep. O-X-287) and with advice and assistance from B. D. Lawson and B. C. Hawkes of the Pacific Forest Research Centre.

A very abbreviated description of the Line Intersect Method and included slash material is as follows:

- (1) Sample lines in the form of an equilateral triangle with sides of 30 meters are established for each photo area.
- (2) All slash material, including rotted material, lying above the duff layer and that would intersect the sample line, is tallied.
- (3) The measured slash is segregated by size class as follows:
0.0 - 0.49 cm., 0.5 - 0.99 cm.,
1.0 - 2.99 cm., 3.0 - 4.99 cm.,
5.0 - 6.99 cm., 7.0 cm. and greater.
- (4) Undisturbed stumps and dead stems or branches still attached to a standing tree are not counted.
- (5) Slash depth is measured every 5 meters.
- (6) Foliage is assessed and added as a segment of the total fuel loading.
- (7) All survey information is computed to arrive at the total fuel loading in tons per hectare.

For a full description of the Line Intersect Method refer to 'The Line Intersect Method' MacRae et al (1979) (C. F. S. Info. Rep. O-X-287).

DATA (Continued)

The information that has been included with each photo includes:

- pre-harvesting stand data as to timber type, age, height, cull factor
- fuel rating expressed as light, moderate, heavy
- fuel loading expressed in tons per hectare
- fuel depth
- diameter - this is the average diameter for all material 7.0 cm. and greater
- continuity
- fuel loading by diameter class expressed in tons per hectare.

PHOTO DESIGN

Each photo series is designed to show a general view of the slash continuity and loading with two progressive closeups to indicate depth.

The numbered marker included in most photos is marked in 30 cm., progressions (i.e. 0 to 1 is 30 cm., 0 to 2 is 60 cm., and so on).

SLASH ASSESSMENT

WESTERN RED CEDAR (Thuja Plicata)



FUEL RATING - LIGHT

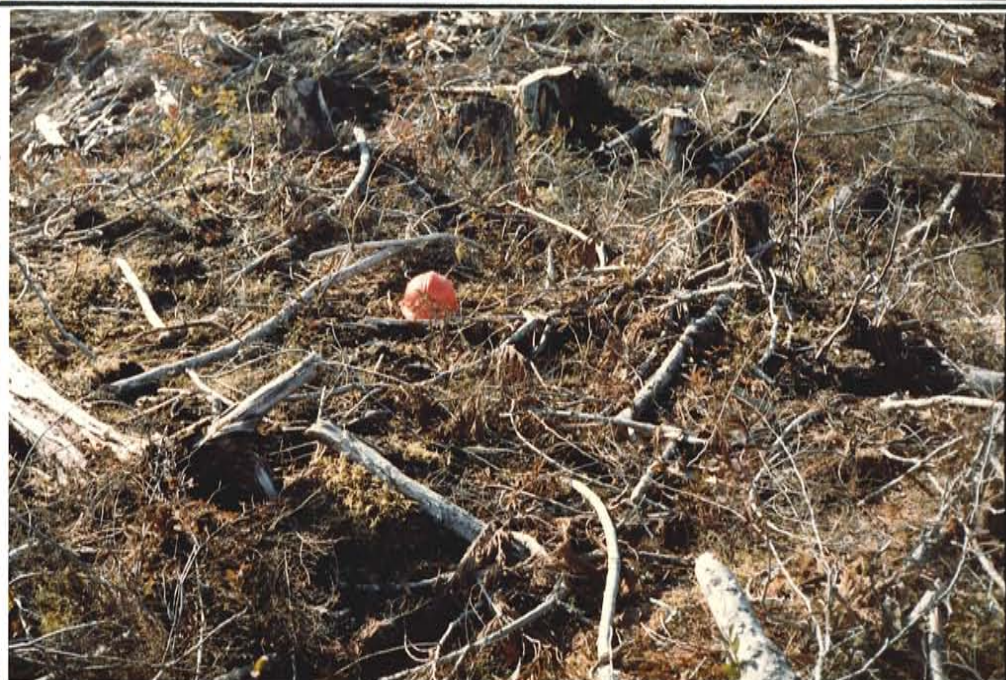
STAND DATA

Timber Type: C(He)

Age: 110 years

Height: 35 meters

Cull Factor: 18%



FUEL RATING - LIGHT

FUEL LOADING - 65 tons
per hectare

FUEL DEPTH - 20 cm.

DIAMETER - 16 cm.

CONTINUITY - Fuel free
areas smaller than fuel
areas.



FUEL LOADING BY DIAMETER CLASS

Size Class (cms.)	Tons/ hectare
0.0 - 0.49	5.4
0.5 - 0.99	2.0
1.0 - 2.99	3.2
3.0 - 4.99	6.2
5.0 - 6.99	7.2
7.0+	41.0



FUEL RATING - MODERATE

STAND DATA

Timber Type: C(he)
Age: 130 years
Height: 30 meters
Cull Factor: 26%



FUEL RATING - MODERATE

FUEL LOADING - 165 tons
per hectare

FUEL DEPTH - 48 cm.

DIAMETER - 20 cm.

CONTINUITY - Fuel is
continuous over 95% of
the area.



FUEL LOADING BY DIAMETER CLASS

Size Class (cms.)	Tons/ hectare
0.0 - 0.49	6.5
0.5 - 0.99	4.0
1.0 - 2.99	6.2
3.0 - 4.99	13.0
6.0 - 6.99	14.3
7.0+	121.0



FUEL RATING - HEAVY

STAND DATA

Timber Type: C(Ba)

Age: 180 years

Height: 30 meters

Cull Factor: 41%



FUEL RATING - HEAVY

FUEL LOADING - 240 tons
per hectare

FUEL DEPTH - 60 cm.

DIAMETER - 20 cm.

CONTINUITY - Continuous,
broken only by roads.



FUEL LOADING BY DIAMETER CLASS

Size Class (cms.)	Tons/ hectare
0.0 - 0.49	8.1
0.5 - 0.99	9.0
1.0 - 2.99	10.6
3.0 - 4.99	30.1
5.0 - 6.99	28.9
7.0+	163.3

SLASH ASSESSMENT

WESTERN HEMLOCK - AMABILIS FIR

(*Tsuga heterophylla* - *Abies amabilis*)



FUEL RATING - LIGHT

STAND DATA

Timber Type: HwBa

Age: 180 years

Height: 35 meters

Cull Factor: 20%



FUEL RATING - LIGHT

FUEL LOADING - 50 tons
per hectare

FUEL DEPTH - 15 cm.

DIAMETER - 14 cm.

CONTINUITY - Fuel free
areas larger than fuel
areas.



FUEL LOADING BY DIAMETER CLASS

Size Class (cms.)	Tons/ hectare
0.0 - 0.49	4.2
0.5 - 0.99	2.7
1.0 - 2.99	4.1
3.0 - 4.99	7.7
5.0 - 6.99	10.8
7.0+	20.5



FUEL RATING - MODERATE

STAND DATA

Timber Type: HwBa

Age: 250+ years

Height: 35 meters

Cull Factor: 30%



FUEL RATING - MODERATE

FUEL LOADING - 150 tons
per hectare

FUEL DEPTH - 50 cm.

DIAMETER - 18 cm.

CONTINUITY - Fuel is
continuous over 90% of
the area.



FUEL LOADING BY DIAMETER CLASS

Size Class (cms.)	Tons/ hectare
0.0 - 0.49	4.8
0.5 - 0.99	5.3
1.0 - 2.99	8.1
3.0 - 4.99	16.2
5.0 - 6.99	15.2
7.0+	100.4



FUEL RATING - HEAVY

STAND DATA

Timber Type: Hw(Ba)

Age: 250+ years

Height: 40 meters

Cull Factor: 40%



FUEL RATING - HEAVY

FUEL LOADING - 250 tons
per hectare

FUEL DEPTH - 70 cm.

DIAMETER - 20 cm.

CONTINUITY - Fuel is
continuous, broken only by
roads.



FUEL LOADING BY DIAMETER CLASS

Size Class (cms.)	Tons/ hectare
0.0 - 0.49	6.3
0.5 - 0.99	8.7
1.0 - 2.99	20.6
3.0 - 4.99	40.6
5.0 - 6.99	43.0
7.0+	131.0

SLASH ASSESSMENT

MATURE DOUGLAS FIR (*Pseudotsuga menziesii*)



FUEL RATING - LIGHT

STAND DATA

Timber Type: F(Hw)

Age: 250+ years

Height: 40 meters

Cull Factor: 20%



FUEL RATING - LIGHT

FUEL LOADING - 40 tons
per hectare

FUEL DEPTH - 20 cm.

DIAMETER - 12 cm.

CONTINUITY - Fuel free
areas smaller than fuel
areas.



FUEL LOADING BY DIAMETER CLASS

Size Class (cms.)	Tons/ hectare
0.0 - 0.49	1.5
0.5 - 0.99	2.4
1.0 - 2.99	3.6
3.0 - 4.99	5.6
5.0 - 6.99	9.1
7.0+	17.8



FUEL RATING - MODERATE

STAND DATA

Timber Type: F(Hw)

Age: 250+ years

Height: 40 meters

Cull Factor: 28%



FUEL RATING - MODERATE

FUEL LOADING - 180 tons
per hectare

FUEL DEPTH - 40 cm.

DIAMETER - 15 cm.

CONTINUITY - Fuel is
continuous over 90% of
area.



FUEL LOADING BY DIAMETER CLASS

Size Class (cms.)	Tons/ hectare
0.0 - 0.49	6.4
0.5 - 0.99	7.0
1.0 - 2.99	5.7
3.0 - 4.99	14.3
5.0 - 6.99	30.0
7.0+	116.6



FUEL RATING - HEAVY

STAND DATA

Timber Type: F(HwC)

Age: 250+ years

Height: 40 meters

Cull Factor: 35%



FUEL RATING - HEAVY

FUEL LOADING - 230 tons
per hectare

FUEL DEPTH - 60 cm.

DIAMETER - 15 cm.

CONTINUITY - Slash is
continuous over 95% of
area.



FUEL LOADING BY DIAMETER CLASS

Size Class (cms.)	Tons/ hectare
0.0 - 0.49	4.5
0.5 - 0.99	3.3
1.0 - 2.99	6.1
3.0 - 4.99	15.6
5.0 - 6.99	17.1
7.0+	183.4

SLASH ASSESSMENT

IMMATURE DOUGLAS FIR (*Pseudotsuga menziesii*)



FUEL RATING - LIGHT

STAND DATA

Timber Type: F(Ba)
Age: 65 - 90 years
Height: 25 meters
Cull Factor: 15%



FUEL RATING - LIGHT

FUEL LOADING - 25 tons
per hectare

FUEL DEPTH - 15 cm.

DIAMETER - 10 cm.

CONTINUITY - Fuel free
areas are larger than fuel
areas.



FUEL LOADING BY DIAMETER CLASS

Size Class (cms.)	Tons/ hectare
0.0 - 0.49	1.0
0.5 - 0.99	1.2
1.0 - 2.99	2.4
3.0 - 4.99	2.7
5.0 - 6.99	3.4
7.0+	14.3



FUEL RATING - MODERATE

STAND DATA

Timber Type: F(Hw)

Age: 80 years

Height: 30 meters

Cull Factor: 15%



FUEL RATING - MODERATE

FUEL LOADING - 40 tons
per hectare

FUEL DEPTH - 30 cm.

DIAMETER - 13 cm.

CONTINUITY - Continuous
fuel area, broken only by
roads.



FUEL LOADING BY DIAMETER CLASS

Size Class (cms.)	Tons/ hectare
0.0 - 0.49	3.5
0.5 - 0.99	3.4
1.0 - 2.99	3.6
3.0 - 4.99	5.6
5.0 - 6.99	6.3
7.0+	17.6



FUEL RATING - HEAVY

STAND DATA

Timber Type: F(Hw)

Age: 80 to 100 years

Height: 30 meters

Cull Factor: 20%



FUEL RATING - HEAVY

FUEL LOADING - 120 tons
per hectare

FUEL DEPTH - 45 cm.

DIAMETER - 15 cm.

CONTINUITY - Continuous
over 95% of area.



FUEL LOADING BY DIAMETER CLASS

Size Class (cms.)	Tons/ hectare
0.0 - 0.49	7.1
0.5 - 0.99	5.6
1.0 - 2.99	7.8
3.0 - 4.99	9.4
5.0 - 6.99	9.8
7.0+	80.3

SLASH ASSESSMENT

DECIDUOUS



FUEL RATING - LIGHT

STAND DATA

Timber Type: Alder (F)

Age: 20 years

Height: 10 meters



FUEL RATING - LIGHT

FUEL LOADING - 60 tons
per hectare

FUEL DEPTH - 15 cm.

DIAMETER - 10 cm.

CONTINUITY - Fuel free
areas are larger than fuel
areas.



FUEL LOADING BY DIAMETER CLASS

Size Class (cms.)	Tons/ hectare
0.0 - 0.49	1.2
0.5 - 0.99	2.0
1.0 - 2.99	3.5
3.0 - 4.99	3.0
5.0 - 6.99	14.2
7.0+	36.1



FUEL RATING - MODERATE

STAND DATA

Timber Type: Alder

Age: 20 years

Height: 10 meters



FUEL RATING - MODERATE

**FUEL LOADING - 180 tons
per hectare**

FUEL DEPTH - 45 cm.

DIAMETER - 20 cm.

**CONTINUITY - Fuel free
areas smaller than fuel
areas.**

FUEL LOADING BY DIAMETER CLASS

Size Class (cms.)	Tons/ hectare
0.0 - 0.49	1.9
0.5 - 0.99	2.4
1.0 - 2.99	5.8
3.0 - 4.99	9.6
5.0 - 6.99	21.0
7.0+	139.3



FUEL RATING - HEAVY

STAND DATA

Timber Type: Alder

Age: to 30 years

Height: 15 meters



FUEL RATING - HEAVY

FUEL LOADING - 260 tons
per hectare

FUEL DEPTH - to 90 cm.

DIAMETER - 30 cm.

CONTINUITY - Fuel is
continuous over entire area.



FUEL LOADING BY DIAMETER CLASS

Size Class (cms.)	Tons/ hectare
0.0 - 0.49	3.5
0.5 - 0.99	4.0
1.0 - 2.99	16.0
3.0 - 4.99	18.9
5.0 - 6.99	21.5
7.0+	196.1

APPENDIX 1

The information contained in this photo guide as to fuel size, fuel depth, and continuity relate to Part A of the F. S. 117.

Part A of the F. S. 117 below has been broadly defined as to light, moderate, or heavy rating for illustration purposes.

FIRE DANGER RATING

A. HAZARD (Circle appropriate rating and enter in right-hand column)

		LOW	MODERATE	HEAVY	
1	FUEL SIZE	Needles and finer sparse or absent or mixed with soil 1	Needles and finer present but on ground 2	Finer abundant and partially elevated 5	Finer abundant and mostly elevated 7
2	FUEL DEPTH	Less than 30 cm 1	30 cm to 60 cm 2	60 cm to 100 cm 4	More than 100 cm 5
3	FUEL CONTINUITY	Fuel free areas larger than fuel areas 1	Fuel free areas smaller than fuel areas 2	Continuous fuel area broken by roads 3	Fuel is generally continuous 5
4	VEGETATION*	None	Partially hidden	Mostly hidden	Slash obscured
	Cured**	0	1	2	4
	Green	0	-1	-2	-3
5	SPECIAL FACTOR	This factor rates from -2 to +4 to cover the following situation ----- ----- -----			
TOTAL HAZARD RATING					

*Project state of vegetation at time of treatment.

**Either 'Cured' or 'Green' vegetation should be completed but not both.