

"In the absence of a hazard assessment risk rating process licensees may use the attached procedures".

Guidance

Fire Hazard Assessment

Ministry of Forests and Range Staff



September 2007

BACKGROUND

The *Wildfire Act* makes it mandatory for persons conducting an industrial activity on or within one kilometre of forest land or grass land to conduct fire hazard assessments and abate if required. The *Wildfire Regulation* prescribes the activities considered high risk, the factors to consider in the assessment namely hazard and associated risk, the intervals in which the assessments must be completed and the time frames to abate any identified fire hazards.

The expectation is that the person carrying out the industrial activity will employ qualified individuals including licensed professionals to complete these assessments. This guidance piece is intended to assist staff in the Ministry of Forests and Range with their assessment of fire hazards associated with industrial activities when they are encountered during routine inspections. At this time it is not our intention to prescribe all of the elements that must be considered during these assessments. Staff from Protection Branch are committed to working cooperatively with Compliance and Enforcement staff following the Protection/C&E Roles and Responsibilities Matrix to address any issues of identified fire hazard.

GENERAL PROCEDURES

Pre-Harvest Assessment

Fire hazard assessment at the pre-harvest stage is **not** a legal requirement, and that portion does not form part of the Fire Hazard Assessment form. It is included here because planning staff may wish to determine whether hazard abatement will be required after harvesting, and to adjust their prescriptions accordingly.

1. Complete the pre-harvest hazard, fire risk, and values at risk assessment tables. This does not require a field trip, as the data is obtained from the cruise compilation and the silviculture prescription, and from local knowledge of adjacent values.
2. Compare the predicted hazard, risk and values point totals with the "Maximum Allowable Slash Hazard from Forest Harvesting" When the fire hazard assessment exceeds 14 (table 1) and either the fire risk assessment exceeds 24 (table 3) or the values at risk assessment exceeds 29 (table 4), the fire hazard must be reduced to 14 or less, the risk assessment must be reduced to below 24, and the values risk assessment must be reduced below 29.
3. Field staff prescribing treatments must use their local knowledge to estimate the effect of the proposed treatment on post-harvest hazard and risk rating.
4. Apply the hazard and risk reduction factors to the original hazard and risk assessments and determine new hazard and risk point ratings.

Post-Harvest Assessment

Fire hazard assessment at the post-harvest stage is a legal requirement under the *Wildfire Act*.

1. Complete the post-harvest fire hazard fire risk assessment tables. The data should be gathered from each individual block to ensure that field conditions are accurately assessed. Each treatment unit within the block should be visited, and the assessment should reflect the sum of the values for each treatment unit, prorated by relative area.
2. Compare the predicted hazard, risk and values point totals with the "Maximum Allowable Slash Hazard from Forest Harvesting." When the fire hazard assessment exceeds 14(table 2) and either the fire risk assessment exceeds 24,(table 3) or the values at risk assessment exceeds 29,(table 4) the fire hazard must be reduced to 14 or less, the risk assessment must be reduce to below 24, and the values risk assessment must be reduced to below 29.
3. Apply the hazard and risk reduction factors to the original hazard and risk assessments and determine new hazard and risk point ratings. The treatment should reduce the hazard or risk to an acceptable level.
4. If the Ministry and a forest practitioner have each assessed the area and there is a disagreement between parties that cannot be resolved, a formal measurement should be taken.

Completing the form

Table 1. Fire hazard assessment - pre-harvesting

| Fuel loading Factors | Site characteristics and point rating | | | |
|------------------------------------|--|--|--|--|
| Fuel depth/size | | | | |
| 1. D+W+B (vol./ha) | <30 m ³ 2 | 30-40 m ³ 3 | 41-50 m ³ 4 | >50 m ³ 5 |
| 2. Windfall (stems/ha) | <15 0 | 15-30 1 | 30-45 2 | >45 3 |
| 3. Snags (stems/ha) | <15 0 | 15-30 1 | 30-45 2 | >45 3 |
| 4. Harvesting method/season | interior summer full tree or coastal all season full tree 0 | interior winter full tree or topping 1 | all season topping and limbing 2 | all season topping limbing and bucking 3 |
| Horizontal fuel arrangement | | | | |
| Volume/ha (net m ³) | <200 1 | 200-300 3 | 300-400 5 | >400 7 |
| Vertical fuel arrangement | | | | |
| Harvesting | Skidder, cat system 1 | Skidder, cat random skid 3 | High lead skid trail 5 | Helicopter sky line 7 |
| Vegetation | | | | |
| (contributes to fuel load) | None 0 | Low 1 | Moderate 2 | High 3 |
| Other factors | | | | |
| Cedar slash component | <20% 1 | 20-40% 2 | 41-60% 3 | >60% 4 |
| Hazard assessment subtotal | | | | |

Fuel depth/size

1, 2 & 3 - Decay, waste, and breakage, windfall, and snag figures can all be obtained from the cruise compilation.

4 - Harvesting method and season can be obtained from the silviculture prescription.

Horizontal fuel arrangement

Timber volume can be obtained from the cruise. Where it is known that a certain volume of species will be left as felled waste, this volume should be included in the assessment

Vertical fuel arrangement

The harvesting system can be obtained from the silviculture prescription.

Vegetation

Determine from the silviculture prescription whether the herb-shrub-under storey Layer will encourage or inhibit the spread of fire. If it will encourage the spread of fuel, the point ratings are positive; if it will inhibit the spread of fire, the point ratings are negative.

Other factors

The cedar component can be obtained from the cruise compilation.

Table 2. Fire hazard assessment - post-harvesting

| Fuel loading factors | Site characteristics and point rating | | | |
|---|--|----------------------------------|----------------------------------|--------------------------------|
| Fuel depth | <20 1 | 20-40 cm 3 | 40-60 cm 5 | >60 cm 7 |
| Fuel size (% of all fuels that are <7.1 cm) | <15% 1 | 15-30% 3 | 31-45% 5 | >45% 7 |
| Horizontal fuel arrangement (% of area) | Fuel coverage <20% 1 | Fuel coverage 20-50% 3 | Fuel coverage 51-80% 5 | Fuel coverage >80% 7 |
| Vertical fuel arrangement (fine fuels <7.1cm) | Mixed with soil 1 | On ground 3 | Partially elevated 5 | Mostly elevated 7 |
| Vegetation (contributes to fuel load) | None 0 | Low 1 | Moderate 3 | High 5 |
| Cedar slash component | <20% 1 | 20-40% 2 | 41-60% 3 | >60% 4 |
| Hazard Assessment | | | | |

Debris pile greater than 5 m3 must be disposed.

The post-harvesting assessment form should be filled out in the field while walking through the block. Care should be taken to include all of the fuel types and/or treatment units so that the estimate is representative of the complete block.

Average fuel depth

Can be measured using a scale stick or similar device, from the top of the duff to the top of the slash.

Fuel size, horizontal and vertical fuel arrangement

Can all be estimated visually. All of the estimates are based on fine fuels in the <7.5 cm DBH class.

Vegetation

Determine whether the vegetation is green or cured. If green vegetation predominates, determine whether it will promote fire spread (grasses, woody or dry shrubs, and forbs) or inhibit fire spread (succulent shrubs or forbs). If green vegetation that inhibits fire spread dominates, the numbers on the form are negative; if cured vegetation or green vegetation that promotes fire spread dominates, the numbers on the form are positive.

Cedar slash component

This should also be checked during the walk through, as the actual breakage may differ significantly from the estimate in the cruise compilation.

Table 3. Fire risk assessment

| Fire risk factors | Factors affecting fire risk and points rating | | | |
|--|--|---------------------------------|--------------------------------------|--|
| Site information | | | | |
| Size of area | <20 ha 1 | 20-40 ha. 2 | 41-60 ha 3 | >60 h-a 4 |
| Aspect of area | N,NE 0 | NW,E 1 | W, SE, level variable 2 | S,SW 4 |
| Slope (top third of block) | <20% 1 | 20-35% 2 | 36-45% 3 | >45% 4 |
| Position on slope | Top 1/3 1 | Valley bottom 2 | Bottom 1/3 3 | Middle 1/3 4 |
| Area Information | | | | |
| Adjacent slash - % perimeter not abated (or landings only) | None 0 | <15% 2 | 16%-40% 4 | >40% 6 |
| Risk of ignition | | | | |
| 1. Lightning fire zone (refer to zone map) | Low 2 | Medium 6 | High 10 | Extreme 14 |
| 2. Man-caused fire zone (excludes industrial) (refer to zone map) | Low 1 | Medium 2 | High 3 | Extreme 4 |
| 3. Industry operations present or planned within 5 yrs and 1 km of site | None 0 | Planting surveys 1 | Site prep mining 2 | Log, spacing small eng. 3 |
| 4. Access (present or planned within next 5 yrs) (Industrial and Recreational) | Foot access 1 | ATV 2 | 4WD 3 | 2WD 4 |
| 5. Proximity to 2WD road - | >5 km 0 | 3-5 km 1 | 1-3 km 2 | <1 km 3 |
| 6. Danger class 3 or better | <30 days 1 | S0-50 3 | 50-70 5 | >70 days 7 |
| Fire risk assessment subtotal | | | | |

Site Information

This information can be obtained from the final harvesting report or from a site visit.

Area information

This information can be obtained from the development/stewardship plan map or from a visit to the site. Consideration for future development must be considered including potential fire hazards from other licensee’s operations. This is where landscape unit planning can be factored into fire hazard assessments.

Risk of Ignition

1 - The number of lightning-caused fires has been analyzed for the province over a 20-year period (1973-1992) on a five-kilometre grid. Based on the data, the number of lightning-caused fires has been grouped into the following categories.

| Number of fires | Rating | Points |
|-----------------|---------|--------|
| 0 | Low | 2 |
| 1-2 | Medium | 6 |
| 3-5 | High | 10 |
| 6+ | Extreme | 14 |

The data are displayed in Figure 1 and give a general indication of the lightning risk throughout the province.

To calculate the specific lightning risk for your area, determine the number of lightning-caused fires within a 2.81 kilometre radius over a 20-year period (e.g., 1973-1992). You may have to contact your local B.C. Forest Service forest protection officer to obtain this information.

2 - The number of people-caused fires (excluding forest industry-caused fires), has been analyzed for the province for a 20-year period (1973-1992) on a five-kilometre grid. Based on the data, the number of people-caused fires, (excluding forest-industry caused fires) has been grouped into the following categories:

| Number of fires | Rating | Points |
|-----------------|---------|--------|
| 0 | Low | 1 |
| 1-2 | Medium | 2 |
| 3-5 | High | 3 |
| 6+ | Extreme | 4 |

The data are displayed in Figure 2 and give a general indication of the people-caused fire risk throughout the province.

To calculate the specific people-caused fire risk for your area, determine the number of people-caused fires, excluding fires caused by the forest industry, within a 2.81 kilometre radius over a 20-year period (e.g., 1973-1992). You may have to contact the local fire department and your local B.C. Forest Service forest protection officer to obtain this information.

3, 4, & 5 - This information can be obtained from the development/stewardship plan and from local knowledge of the area.

6- This information can be obtained from the fire danger summary for weather station data that is collected and sorted in the B.C. Forest Service protection program computer system. Contact your local B.C. Forest Service Forest Protection Officer for this information.

Risk Zones

FIRE HISTORY MAPS

Figure 1. (UNDER DEVELOPMENT) Risk of lightning-caused fires. Risk zones indicate probable occurrence of lightning fires in a 25 square kilometre area over a 20-year period (1973-1992 fire data).

Table 4. Values at risk assessment

| Values at risk factors | Factors affecting values at risk and point rating | | | |
|--|--|--|--|--|
| Life and Property | | | | |
| Distance from populated areas (continuous burnable fuels - i.e., no significant natural fire breaks) | > 10 km 0 | 3-10 km 4 | 1-3 km 8 | <1 km 12 |
| Size of development (within 10 km) | No development campsite 0 | Rural home park facility 4 | Rural subdivision small resort 8 | Village municipality large resort 12 |
| Timber Values | | | | |
| 1. Primary contributor to AAC (within 2 km) | None or <250 ha 0 | Over mature >250 ha 2 | Mature >250 ha 4 | Immature >250 ha 6 |
| 2. Silvicultural investments (within 2 km) | <250 ha 0 | 250-500 ha 1 | 500- 1000 ha 3 | >1000 ha 6 |
| 3. Silvicultural system (on site) | Clear-cut NSR 0 | Clear-cut with seed trees 2 | Clear-cut SR 4 | Selection shelter wood 6 |
| 4. Slope position | Top 1/3 or adjacent to operability lines 1 | Middle 1/3 2 | Bottom 1/3 3 | Valley bottom 4 |
| 5. Valley orientation | Secondary - back 1/3 1 | Secondary - mid 1/3 2 | Secondary front 1/3 3 | Main valley 4 |
| Water quality | | | | |
| downstream domestic use | No use or agriculture only 0 | Single dwelling 4 | Rural subdivn. small resort 8 | Comm. water Large resort village 12 |
| Habitat | | | | |
| Habitat (within 2.5 km) | Beneficial or no concern | Low | Moderate | High |
| Wildlife | 0 | 1 | 3 | 5 |
| Fish | 0 | 1 | 3 | 5 |
| Other | | | | |
| Visual/aesthetics (visual quality objectives) | Maximum mod. 0 | Modification 3 | Partial retention 5 | Preservation to retention 7 |
| Cultural (Historical or archaeological sites) | >10km 0 | 3-10km 1 | 1-3km 3 | <1km 5 |
| Values at risk assessment subtotal | | | | |

Life and property

This information can be collected from existing plans (TSA, RMZ, landscape unit, development/stewardship, and local community) or from local knowledge.

Timber values

1 - This only refers to stands that are free growing. The highest rating applies; for example, if there are 750 ha of over mature timber and 250 ha of immature timber, the point rating is 6.

2 - This only refers to stands that are not free growing. Forestry investments in stands beyond free growing are captured in "immature" above.

5 -A secondary drainage is any drainage that is less than 10 km in length, as measured in a reasonably straight line, from its stream junction at the front of the drainage to the merchantability and/or accessibility line at the back of the drainage.

Water quality

The values listed here only apply if they are downstream in the watershed, or within 2.5 km upstream and in the watershed.

Habitat

Only habitat that has been identified by Ministry of Environment or a licensee, and used to prepare a landscape unit or development plan, is to be used here. Also, the effect of fire on the habitat must be generally considered detrimental.

For example, a stand-maintaining fire in the pp BGC Subzone would not damage the habitat of the pointy-headed woodpecker (a red-listed species), so its habitat wouldn't count as high value at risk.

Wildlife habitat is rated as follows;

| | |
|----------|--------------------------------|
| High | Red-listed species |
| Moderate | Yellow-listed species |
| Low | Regionally significant species |

Fish habitat is rated as follows:

| | |
|----------|--------------------------------|
| High | Special rivers and lakes |
| Moderate | Regionally significant species |
| Low | Sport fish not listed above |

Visual/aesthetics

This section only applies where VQOs have been formally established by the district manager through some planning process. If this has not happened, the default VQO is "maximum modification."

Cultural

This refers only to inventoried and identified cultural heritage resources that have been used to formulate a development, stewardship, or higher-level plan.

Hazard risk acceptability evaluation

Table 5. Hazard/Risk Assessment summary

| Type | points | |
|-----------------------------------|--------|--|
| Hazard Subtotal (table 2) | | |
| Fire Risk Subtotal (table 3) | | |
| Values at Risk Subtotal (table 4) | | |
| Total Assessment Points | | |

Maximum allowable slash hazard from forest harvesting

1. When the hazard assessment points from harvesting slash exceeds 14 and **either** the fire risk exceeds 24 **or** the values at risk exceed 29, the fire hazard rating must be reduced to 14 or less.
2. Slash accumulations created during the process of hazard reduction must be disposed of unless other resource management objectives require the debris to be left on site. .
3. All landing and R/W debris (including processor debris) within harvested areas must be disposed of unless other resource management objectives require the debris to be left on site.

Hazard/Risk reduction methods

The following guide lists various site treatments and provides estimates of the degree of hazard reduction each treatment will provide. For example, if your harvested area has a hazard rating of 18 and you choose to bunch and burn roadside slash, you can expect a hazard reduction of 20-40 percent. Expect the hazard figure to be 11-14 after treatment, and the area would no longer constitute a hazard. Table 6 is designed to assist you in making these calculations.

Site sensitivity should be considered before prescribing or implementing any hazard reduction method, so that the integrity and productivity of the site is not reduced. Slash accumulations created during hazard abatement must be abated concurrently with the abatement being carried out.

Table 6. Suggested Hazard/Risk Reduction Methods

| Hazard Reduction Method | Point Reduction (%) | Method to be used |
|---|-----------------------------|-------------------|
| 1. Prescribed fire | | |
| Broadcast burn | 50 - 80 | |
| Wind row and burn | 50 - 80 | |
| Windrow - no burning | 0 | |
| Bunch and burn - 100% of area | 50 | |
| Bunch - no burn | 0 | |
| Bunch and burn - roadside slash for 30 m | 20 | |
| Under burn | 50 - 80 | |
| Spot burn accumulations | 5 - 15 | |
| 2. Mechanical Site Prep | | |
| Drag scarify | 10 - 25 | |
| Disc trench scarify | 10 - 25 | |
| Blade scarify | 10 - 25 | |
| Trampling and crushing slash | 10 - 20 | |
| Bucking and limbing/lop and scatter | 5 - 20 | |
| V-blade, prows | 0 - 10 | |
| Excavators, mounders | 0 - 10 | |
| Spot or patch scarify | 0 - 10 | |
| Hand held spot | 0 | |
| Mulching or chipping - 100% of area | 50 - 80 | |
| Mulching or chipping - roadside slash for 30 m. | 20 - 40 | |
| 3. Utilization | | |
| Full tree skidding | 20 - 50 | |
| Clean skid | 20 - 50 | |
| Increase utilization standards | 20 - 50 | |
| Minor products (throughout area) | 5 - 30 | |
| - Chip and haul (includes tub grinding) | 5 - 40 | |
| - Hog and pellet fuel | 5 - 40 | |
| - Firewood | 5 - 10 | |
| - Post and rail | 20 - 50 | |
| - Grape stakes | 5 - 30 | |
| - Shakes (rearranges fuels and significantly adds to the amount of fine fuels left on site) | Increase hazard pts 5-10 | |
| Total Hazard points reduction % | | |
| Risk Reduction Method | Point Reduction (%) | Method to be used |
| 1. Access restriction | | |
| Physical road closure | 10-25 | |
| Access controlled by signage | 5-10 | |
| Active Patrols – air & ground | 10-25 | |
| 2. Informing area users | | |
| Hazard warning signs | 5-10 | |
| Total Risk points reduction % | | |

Table 7. Adjusted hazard assessment

| Type | Original Assessment Points (table 5) | Point Reduction (table 6) | Net Assessment Points |
|----------------|--------------------------------------|---------------------------|-----------------------|
| Hazard | | | |
| Fire Risk | | | |
| Values at Risk | | | |