



Ministry
of Forests



FIA VEGETATION MANAGEMENT STANDARDS

Ground Herbicide Application

Effective April 1, 2002

These standards apply, in addition to the General FIA Standards (FS 1001), to all ground-based herbicide application activities funded under the Forest Investment Account (FIA).

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ARTICLE 1: GENERAL CONDITIONS

Definitions

1.1 In this document, the following words shall have the following meanings.

“Approved Vegetation Management Quality Inspection System” or “Approved VMQI System” means the inspection system contained in this document **or** another similar system approved in writing by the District Manager prior to the commencement of Work.

“Buffer Zone” means an area adjacent to a Pesticide Free Zone established to ensure herbicide does not enter the Pesticide Free Zone.

“Certified Pesticide Applicator” means a person holding a valid pesticide applicator's certificate, forestry category, issued by the Ministry of Water, Land and Air Protection.

“Contingency Plan” means a contingency plan to deal with herbicide spills, accidents or misapplication, prepared in accordance with Article 4 of this document.

“Crop Tree Damage” means any cut or scrape to the cambium of the main stem of a crop tree.

“Herbicide Field Handbook” means the most recent edition of the *Herbicide Field Handbook* published by the Ministry of Forests and includes every amendment. [Note: A revised edition of the handbook was issued in 2002.]

“No Treatment Zone” means an area under Permit that is not to be treated.

“**Pesticide Free Zone**” means an area in which no pesticides shall be applied or enter.

“**Permit**” means a pesticide use permit or a pesticide management plan issued or approved under the *Pesticide Control Act*.

“**Specified**” means, as the context so requires, specified in an Approved Plan or Work Plan, a Permit, a FIA Standard, or by a District Manager.

“**Treatment Type**” means a particular herbicide mixture and method of application Specified for a Work Area.

“**Treatment Unit**” means a Work Area, or any similar area which is individually identified as requiring a particular silviculture treatment.

Applicable Laws, etc

1.2 The Recipient must comply with all federal and provincial laws, regulations, policies, procedures and standards applicable to carrying out a forestry herbicide application, including but not limited to:

- (a) the FIA Standards;
- (b) the *Herbicide Field Handbook*;
- (c) the Material Safety Data Sheets for the herbicides being used;
- (d) every Permit applicable to the Work Areas;
- (e) every Approved Plan and Work Plan applicable to the Work Areas; and
- (f) applicable provisions of:
 - i) the *Pesticide Control Act* and regulations, and
 - ii) the *Transportation of Dangerous Goods Act* and regulations.

1.3 Despite the General FIA Standards (FS 1001), in the event there is a conflict between requirements in any of the above the more stringent requirement shall apply.

ARTICLE 2: PERSONNEL

Certified Pesticide Applicators

- 2.1 The number of Certified Pesticide Applicators must comply with the worker/supervisor ratio specified by the Ministry of Water, Land and Air Protection.
- 2.2 The project supervisor must be a Certified Pesticide Applicator, and must be familiar with the constraints and requirements of the Permits for the Work Areas.

Demonstration of Competency

- 2.3 The District Manager may require the Recipient to demonstrate that all persons performing the Work are adequately equipped, trained and experienced to conduct the herbicide treatment, and to take remedial action in the event of an equipment malfunction or spill of herbicide, oil carrier or spray solution.

Inspector's Qualifications

- 2.4 All Work must be inspected by a person (the “Inspector”) who is:
 - (a) the Registered Professional Forester (RPF), or operates under the direction of the RPF, who will sign and professionally seal reports for the Work;
 - (b) experienced and competent in conducting inspections of herbicide operations;
 - (c) familiar with the Approved Plans, Work Plans, and Permits for the Work Areas; and
 - (d) not engaged in the direct conduct of the herbicide operations.

ARTICLE 3: HERBICIDE**Permits and Licences**

- 3.1 The Recipient will not commence Work on a Work Area not having a Permit for that area.
- 3.2 Unless otherwise specified, the Recipient shall obtain and hold the required Permits.
- 3.3 Regardless of whether a Permit is held by the Province or the Recipient, the Recipient shall be solely responsible for ensuring all Work conforms with the terms and conditions of the Permit for a Work Area.
- 3.4 The Recipient shall possess a valid British Columbia Pest Control Service Licence.

Storage

- 3.5 Equipment and supplies must be securely stored to prevent unauthorized access to herbicides.

Mixing

- 3.6 The quantity of herbicide, additive and carrier to be mixed for application to a Work Area shall be as Specified.
- 3.7 The following procedures must be adhered to during herbicide mixing.
 - (a) Specific written mixing instructions must be prepared prior to the start of Work.
 - (b) All herbicide batching and application equipment must be clean and free from residue prior to the mixing of herbicide.
 - (c) Only clean water or other carrier may be used for the mixing of herbicides.
 - (d) Mixing operations must not be conducted in locations where any spilled herbicide, oil carrier or additive can enter a Pesticide Free Zone or water body.
 - (e) Containers must be compatible for the storing and mixing of chemicals (stainless steel, polyethylene, plastic or fibreglass are recommended).
 - (f) Spray tanks and other spray equipment must not be washed in or near streams, rivers or lakes.
- 3.8 To prevent contamination of a water source, the suction hoses used for herbicides or additives must not be used to pick up water from natural sources such as streams or ponds. The intake of water for mixing must be protected from backflows into the natural source by an "air gap" or "reservoir" between the source and the mixing tank.

Wash-up Facilities

- 3.9 Wash-up facilities must be provided for personnel and equipment. Facilities must be separate from the area where the herbicides are being handled and/or stored. At a minimum, wash-up facilities for personnel must include clean water and soap for routine washing of face and hands and for emergency washing of the body.

Empty Containers

- 3.10 Empty "returnable" herbicide containers must be delivered to the manufacturer's depot.
- 3.11 Empty non-returnable containers must be triple rinsed with the carrier solution and/or other solutions as required by the Ministry of Water, Land and Air Protection. After rinsing, containers must be removed from Crown land and disposed of in accordance with provincial laws and regulations.

ARTICLE 4: PRE-OPERATIONS REQUIREMENTS**Work Plan**

- 4.1 Where any of the following is not specified in an Approved Plan it must be specified in a Work Plan:

- (a) by Treatment Unit
 - i) the Treatment Type (e.g. foliar spray, basal bark spray, hack and squirt, ground treatment, etc.) together with specific methods and standards of application appropriate to the Treatment Type (see additional requirements below),
 - ii) the herbicide, carrier and additive to be applied,
 - iii) the concentration of herbicide to be applied (% active ingredient),
 - iv) the volume of herbicide spray to be applied (litres/ha),
 - v) the herbicide application rate (amount of active ingredient/ha),
 - vi) the species of vegetation to be treated with herbicide;
- (b) a herbicide operations plan which must include
 - i) the location of loading sites,
 - ii) a schedule of herbicide application to the Work Areas,
 - iii) the location of buffer strips,
 - iv) method of controlling public access;
- (c) a Contingency Plan in the event of herbicide spill and/or accident which shall include, but is not limited to,
 - i) the names and telephone numbers of emergency contacts, and other parties and agencies to be given notice in the event of a herbicide spill or misapplication,
 - ii) a description of the types of spills considered an emergency, warranting immediate action and notification of emergency contacts,
 - iii) a water quality monitoring plan for spills in or near a water body,
 - iv) accident clean-up procedures,
 - v) disposal of spill materials; and
- (d) other scheduling requirements and conditions as deemed necessary by the District Manager.

4.2 Further to section 4.1(a)i), Treatment Type specifications in a Work Plan must include:

- (a) where foliar spray treatment is to be used,
 - i) the type of sprayer and the allowable range in operating spray pressure,
 - ii) the maximum height of the vegetation to be treated by a sprayer,
 - iii) the hose length allowable for vehicle-mounted tank sprayers;
- (b) where basal bark treatment is to be used,
 - i) the specific basal bark treatment technique (e.g., one side, thinline, streamline) by tree diameter,
 - ii) the height to which spray mixture must be applied to the lower tree trunk or branch areas;
- (c) where hack and squirt treatment is to be used,
 - i) the diameter below which a tree of the target species must be completely cut and the stump treated,
 - ii) upper and lower diameter limits for trees to be treated with non-continuous notching and the number of notches (hacks) per specified length of diameter,
 - iii) the diameter above which a tree must be treated by complete frilling (for such trees, any unbroken bark must not exceed 2.5 cm between injections),
 - iv) the volume of the undiluted herbicide to be injected into each hack or equivalent frill length, or if to be diluted the dilution mixture to be injected; and
- (d) where ground treatment with soil-active herbicide is to be used,
 - i) the herbicide application rate,

- ii) the technique of application (e.g., broadcast rate per hectare, spacing of spots, amount of herbicide per spot),
 - iii) where necessary to spot treatment effectiveness, the depth to which the soil organic layer at the treatment spots must be scraped prior to herbicide application.
- 4.3 The Work Plan must be consistent with the *Herbicide Field Handbook* and may only supercede a FIA Standard with the written approval of the District Manager.

Layout

- 4.4 The District Manager may at any time require the Recipient to identify and flag on the ground the boundaries of Work Areas and zones.
- 4.5 Buffer Zones must be sufficient in width to ensure pesticides will not enter a Pesticide Free Zone and must be varied in width in response to changing weather conditions and operational factors.

Public Information Signs

- 4.6 Prior to the commencement of herbicide operations, public information signs indicating the location and expected dates of herbicide application and the name of the herbicide to be applied must be posted at the Work Areas and in locations along public access routes that would give reasonable notice to persons travelling into or near the Work Areas.

Ministry Notification Prior to Commencement

- 4.7 The Recipient shall notify the District Manager of its intended commencement of operations at least two Work Days prior to the commencement of Work.

Inspection by the Province

- 4.8 Further to Article 3 of the General FIA Standards (FS 1001), a District Manager or an administrator of the *Pesticide Control Act* may at any time inspect:
- (a) the Recipient's
 - i) spill kit,
 - ii) Work Plan,
 - iii) layout of boundaries,
 - iv) written procedures for mixing;
 - (b) required pesticide applicator certificates and British Columbia Pest Control Service Licence; or
 - (c) any other aspect of the operation it deems necessary to ensure it is being carried out in accordance with the FIA Standards and applicable plans and Permits.

ARTICLE 5: APPLYING THE HERBICIDE

General Requirements

- 5.1 All herbicide application shall be in accordance with the FIA Standards, including any standards or specifications stated or implied in the Approved Vegetation Management Quality Inspection System which forms part of the FIA Standards.
- 5.2 Despite any requirement that is Specified on a per hectare basis, all herbicide application requirements must be met throughout the entire Work Area, so that the herbicide is as evenly applied as possible.
- 5.3 A Herbicide Operation Record form (FS 705) must be completed as operations progress.

Information to be On-Site

- 5.4 The following documents must be on site at all times:
- (a) a copy of the FIA Standards applicable to the Work;

- (b) the Work Plan; and
- (c) any other documents which are required by law or a government agency to be on-site.

Broadcast Foliar Spraying

5.5 Where broadcast foliar spraying is Specified as the Treatment Type:

- (a) the Specified amounts of spray mixture per hectare and total herbicide, plus or minus five percent (5%), must be applied to each Work Area;
- (b) despite the above allowance, a herbicide application limit stated in a Permit or Approved Plan must not be exceeded;
- (c) the effective droplet sizes needed for the herbicide application must be determined and the spraying system adjusted to produce the required droplet sizes;
- (d) the calibration of the application system must be checked prior to the start of operations, and periodically checked during operations; and
- (e) the effective swath width must be adjusted to prevent double spraying or skips during spraying operations.

Basal Bark Treatment

5.6 Where basal bark treatment is Specified as the Treatment Type:

- (a) the Specified basal treatment technique (e.g., conventional volume, one sided, low volume, thinline or streamline) must be used;
- (b) an oil carrier (e.g., diesel fuel, kerosene or mineral oil) must be used where a carrier is required for dilution of the herbicide;
- (c) the oil carrier and herbicide must be mixed in accordance with the label specifications of the herbicide and the specific treatment technique; and
- (d) only the target species may be treated.

Cut-surface Herbicide Treatment

5.7 Where cut-surface herbicide treatment is Specified as the Treatment Type:

- (a) target species must be treated (either hacked or cut through) in accordance with Specified requirements with multi-stemmed trees treated as individual stems;
- (b) where trees are to be hacked, hacks must
 - i) be below the lowest living branch - where this is not practical, each live branch below the hacks must also be treated,
 - ii) be made downward at the same height around the circumference of the target tree, and
 - iii) penetrate the sapwood by at least 0.5 cm;
- (c) where trees are to be cut through
 - i) the cut must be horizontal and as close to the ground as possible,
 - ii) any live branches below the stump height must be completely cut,
 - iii) cut surfaces must be treated with herbicide within five minutes of cutting, and
 - iv) herbicide must be applied around the perimeter of the stump surface in a minimum 2.5 cm band (including the cambium) and to all cut surfaces of live branches.

Ground Treatment with Soil-Active Herbicide

5.8 Where ground treatment with soil-active herbicide is Specified as the Treatment Type:

- (a) the herbicide must be applied to the ground in the Specified manner and amounts; and

- (b) in addition to the Pesticide Free Zone requirements, ground-treatment herbicide must not be applied on
 - i) roads (including skid roads and compacted trails) and landings,
 - ii) ditches, drainages and gullies within 100 metres upstream of where they leave the Work Area,
 - iii) swamps or other wetlands, and
 - iv) snow-covered areas and frozen soils.

Requirement to Stop Operations

- 5.9 Unless otherwise Specified, herbicide application operations must be stopped when:
- (a) there is inadequate daylight for safe application;
 - (b) weather conditions arise which could adversely affect normal application patterns, safety of application, treatment effectiveness, or unacceptable movement of herbicide;
 - (c) a leak and/or spill of chemicals occurs (such as herbicide, oils and fuel); or
 - (d) there is a breakdown in ground-based communications;
- until such time as the condition causing the stoppage changes or is rectified.
- 5.10 In addition to the requirements of the previous section, unless otherwise Specified, broadcast foliar spraying operations must be stopped when:
- (a) wind velocity exceeds 8 km/h;
 - (b) temperature is at or below 0°C or exceeds 30°C;
 - (c) relative humidity is less than 25% for Ester formulations, or is less than 30% for Vision, Velpar L or D Amine;
 - (d) temperature and relative humidity conditions make it uncomfortable for ground workers;
 - (e) snow, ice, or excessive moisture covers the leaves of the target species;
 - (f) foggy weather occurs;
 - (g) precipitation is occurring or is predicted within six hours following the application of the herbicide; or
 - (h) overall conditions favour herbicide drift.
- 5.11 In the event of a herbicide leak, spill or misapplication into non-target areas (e.g. water bodies), operations must be stopped and the Contingency Plan immediately implemented.
- 5.12 Any leaks and/or spills of chemicals (such as herbicides, additives, carriers, oils and fuel) must be cleaned up and disposed of in accordance with provincial laws and regulations prior to the resumption of herbicide application.

Remaining or Excess Herbicide

- 5.13 If the Permit allows, any remaining spray mixture resulting from metering or mixing errors may be applied to the Work Areas.

ARTICLE 6: INSPECTION & NOTIFICATION

General

- 6.1 The Inspector must inspect the Work in accordance with an Approved Vegetation Management Quality Inspection (VMQI) System in a timely manner to ensure all Work is performed to the FIA Standards.
- 6.2 Unless otherwise approved by a District Manager, the methodology given in this Article shall form the basis for the Approved Vegetation Management Quality Inspection System.
- 6.3 Where the Approved VMQI system requires the installation of quality inspection plots, the Inspector shall

- (a) systematically establish and evenly distribute plots of 0.005 ha (50m² - 3.99 m radius) in size throughout the Work Area as required,
- (b) mark the location of the plots on a survey map, and
- (c) record the required information for each plot on a plot card;

Inspection by Treatment Method

- 6.4 Where **broadcast foliar spraying or broadcast ground treatment with soil-active herbicides** is the required treatment, the Inspector may declare an area satisfactorily treated if all Work has been performed in accordance with the FIA Standards, particularly:
- (a) all target stems (foliar spraying method) or ground areas (ground treatment method) have been sprayed;
 - (b) without exceeding a Permit limit, the required volume, plus or minus five percent, and type of herbicide has been applied; and
 - (c) operational monitoring confirms,
 - i) the mixing of the herbicide formulation in the specified quantities, and
 - ii) proper demonstration of the required range of droplet sizes, effective swath width, volume delivery per hectare and compliance with the application procedures.
- 6.5 Where **cut surface or basal bark** treatment is the required treatment, the Inspector must:
- (a) in a plot, count,
 - i) the number of stems which were satisfactorily treated (A),
 - ii) the total number of treatable stems (B),
 - iii) the number of crop trees having Crop Tree Damage (C), and
 - iv) the total number of crop trees (D);
 - (b) total the above counts across all plots in an area into Totals 'A', 'B', 'C' and 'D' respectively;
 - (c) determine performance quality for an area by dividing Total 'A' by Total 'B', and expressing this number as a percentage;
 - (d) determine the percentage of Crop Tree Damage for an area by dividing Total 'C' by Total 'D', and expressing this number as a percentage;
- 6.6 The inspector may declare an area having cut surface or basal bark treatment satisfactorily treated when:
- (a) the average performance quality of all plots is 85% or higher,
 - (b) no more than 1% of Crop Trees have Crop Tree Damage, and
 - (c) there are no contiguous areas greater than one tenth (1/10) hectare of unsatisfactory Work or having greater than 1% Crop Tree Damage.
- 6.7 Where **ground spot treatment with soil-active herbicides** is Specified, the Inspector:
- (a) in a plot, must count the total number of potential spots and the number of spots which were treated to the Specified standards;
 - (b) must determine performance quality for an area by dividing the totals across all plots of satisfactory spots by the potential spots, and expressing this number as a percentage; and
 - (c) may declare an area satisfactorily treated when the average performance quality of all plots is 85% or higher and there are no contiguous areas greater than one tenth (1/10) hectare of unsatisfactory Work.

Requirement to Notify the District Manager and the Administrator

- 6.8 The Recipient shall immediately notify the District Manager and the Administrator whenever:

- (a) an inspection reveals, on any contiguous area greater than one-tenth (1/10) hectare (or other minimum area that may be Specified) performance quality to be less than the minimum acceptable Specified standard, and the nature and extent of the errors are such that performance quality cannot be raised to at least that standard;
- (b) Crop Tree Damage has occurred to more than 1% of the crop trees;
- (c) herbicide is applied to an area outside a Work Area or inside a Pesticide Free or No Treatment Zone; or
- (d) herbicide is spilled, other than minor spills in the normal course of operations and which are not considered under the Contingency Plan as requiring immediate notification.

6.9 Any notification under the previous section shall be followed by written notice within one Work Day.

ARTICLE 7: REQUIRED REPORTS & RECORDS

- 7.1 Where a Permit for a Work Area is held by the Province, within 60 days of completing the Work the Recipient shall submit to the District Manager a copy of the completed Herbicide Operation Record form (FS 705).
- 7.2 The Recipient shall retain a copy of the Herbicide Operation Record form (FS 705) for a minimum of three years from the date of the operation and shall, pursuant to the *Pesticide Control Act*, make it available for inspection upon the request of an administrator of that act.
- 7.3 The District Manager may at any time request the Recipient provide him or her with any information related to the inspection of the Work that was not previously submitted, and the Recipient shall supply the information within a reasonable period of time.