



Ministry
of Forests



FIA VEGETATION MANAGEMENT STANDARDS

Aerial Herbicide Application

Effective April 1, 2002

These standards apply, in addition to the General FIA Standards (FS 1001), to all aerial 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.

"Aerial Spray System" means the combination of spray equipment (types of booms, nozzles, pumps and gauges etc.) and specific aircraft to be used for the Work.

"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 Province 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 Environment, Lands and Parks.

"Contingency Plan" means a contingency plan to deal with herbicide spills, accidents or misapplication, developed in accordance with Article 5 of this document.

"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.

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

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

"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:
- (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:
- (a) be a Certified Pesticide Applicator;
 - (b) be familiar with the constraints and requirements of the Permits for the Work Areas; and
 - (c) not be the pilot applying the pesticide.

Aircraft Pilots

- 2.3 A pilot of an aircraft applying herbicide must:
- (a) hold a valid Commercial Pilot's Licence;
 - (b) be a Certified Pesticide Applicator;
 - (c) be familiar with the constraints and requirements of the Permits;
 - (d) have all other applicable federal and provincial licences and certificates;

- (e) have demonstrated ability and experience in spraying in forest situations; and
 - (f) carry out a reconnaissance flight of the Work Areas prior to commencing spraying operations.
- 2.4 No pilot may make an unsupervised operational flight without having:
- (a) at least one spray season of training and experience as a ground support person on aerial herbicide projects including experience in mixing, weather and spray monitoring, buffer marking, nozzle and boom replacements, and other related activities; and
 - (b) successfully sprayed a minimum of one thousand hectares of forest land under the supervision of an experienced pilot.
- 2.5 In the event that a substitution of a pilot and/or Aerial Spray System is required, the substitute must meet the FIA Standards.
- Inspector's Qualifications**
- 2.6 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: EQUIPMENT

Equipment Specifications

- 3.1 Equipment used in aerial herbicide application must be capable of performing in a manner that meets the FIA Standards and, where required by law, is licensed for the intended use.
- 3.2 The helicopter and/or fixed wing aircraft spraying apparatus must have the following specific parts and features:
- (a) loading equipment with an accurate metering device, or aircraft tank/hopper with a calibration so as to provide a positive measure of the herbicide;
 - (b) leak proof system with positive shut-off device;
 - (c) functional quick dump system;
 - (d) spray boom mounted according to helicopter/fixed wing aircraft or boom manufacturer's specifications;
 - (e) boom lengths not exceeding 75 percent of the rotor diameter (helicopter) or total wing span (fixed wing);
 - (f) nozzles which operate under controllable pressure to the spray boom;
 - (g) when using a helicopter, nozzles distributed evenly along the spray boom, except where the spray may hit parts of the aircraft (such as the skids);
 - (h) when using a fixed wing aircraft, the inboard section of the right hand boom may require additional nozzles to compensate for the propeller effect;
 - (i) spray boom nozzles of uniform angle and oriented to give the best droplet spectrum for the desired treatment;
 - (j) the allowable variation in orifice diameter of spray tip as per manufacturer's specifications;
 - (k) appropriate spray nozzles for the drift control additive specified for the Work Area; and
 - (l) a pressure gauge mounted in such a location that it may be read from outside the aircraft during calibration operations.

- 3.3 Aerial Spray Systems must have an accurate on-board flow meter for continuous monitoring of the application rate and the amount of herbicide in the spray tank during the application.

Calibration at Ministry of Forests Site

- 3.4 The aerial spray equipment system must be checked, calibrated and tested at a Provincial Ministry of Forests' calibration site prior to spraying.

ARTICLE 4: HERBICIDE

Permits and Licences

- 4.1 The Recipient will not commence Work on a Work Area not having a Permit for that area.
- 4.2 Unless otherwise Specified, the Recipient shall obtain and hold the required Permits.
- 4.3 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.
- 4.4 The Recipient shall possess a valid British Columbia Pest Control Service Licence.

Storage

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

Mixing

- 4.6 The quantity of herbicide, additive and carrier to be mixed for application to a Work Area shall be as Specified.
- 4.7 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 any mixing of herbicide.
 - (c) Only clean water or other carrier may be used for the mixing of herbicides.
 - (d) Mixing operations must be conducted only in locations where any spilled herbicide, oil carrier or additive cannot 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.
- 4.8 To prevent contamination of the 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

- 4.9 Wash-up facilities must be provided for personnel and equipment. Facilities must be separate from the area where 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

- 4.10 Empty "returnable" herbicide containers must be delivered to the manufacturer's depot.
- 4.11 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 5: PRE-OPERATIONS REQUIREMENTS**Work Plan**

- 5.1 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 herbicide, carrier type, and additive to be applied,
 - ii) the quantity of additive per 100 litres of spray mix,
 - iii) the volume of herbicide spray to be applied (litres/ha),
 - iv) the herbicide application rate (kilograms of active ingredient/ha);
 - (b) a herbicide operations plan which must include
 - i) the Aerial Spray System to be used,
 - ii) the location of helispots, air strips, and loading sites,
 - iii) a plan for aircraft ferrying routes between the staging areas and the Work Areas that minimizes flights over major aquatic systems and avoids human residences,
 - iv) a requirement for a guidance aircraft (staffed by a pilot and a navigator) when a project is of sufficient size to warrant one,
 - v) a schedule of herbicide application to the Work Areas,
 - vi) the location of Buffer Zones,
 - vii) radio frequencies to be used during operations,
 - viii) the visual signal system to be used for emergencies,
 - ix) methods of controlling public access;
 - (c) a Contingency Plan in the event of herbicide spill and/or accident which must include:
 - 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 a water body,
 - iv) accident clean-up procedures,
 - (d) disposal of spill materials.
- 5.2 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

- 5.3 The District Manager may at any time require the Recipient to identify and flag on the ground the boundaries of Work Areas and zones.

Safety

- 5.4 The Recipient bears all responsibility for safe operations.
- 5.5 Prior to the commencement of herbicide application, helispots and/or airstrips must be confirmed as safe for use by the application aircraft and support equipment. Minor improvements may be made before or after commencement of herbicide application without having to obtain the approval of the Province. For the purposes of this section minor improvements are defined as cutting and removing

brush and non-crop trees less than five metres in height occupying landings or old road beds on an area not exceeding one tenth of a hectare.

- 5.6 If there is a need to fall snags or other trees on a Work Area to meet safety or operational requirements, the Recipient shall submit a plan to the District Manager at least five Work Days prior to commencing operations.

Public Information Signs

- 5.7 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

- 5.8 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

- 5.9 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 shall be carried out in accordance with the FIA Standards and applicable plans and Permits.

ARTICLE 6: APPLYING THE HERBICIDE

General Requirements

- 6.1 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.
- 6.2 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.
- 6.3 A Herbicide Operation Record form (FS 705) must be completed as operations progress.

Information to be On-Site

- 6.4 The following 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 is required by law or a government agency to be on-site.

Reconnaissance

- 6.5 Prior to commencing the application of herbicide:
- (a) a pre-treatment reconnaissance flight must be flown in order to become familiar with Work Area and zone boundaries, and sensitive areas;
 - (b) the pilots designated to perform the operational herbicide application must either pilot or be present on the pre-treatment reconnaissance flight; and
 - (c) the Recipient and the pilots shall determine the number and direction of flights, and the swath overlap for each Work Area which will achieve the Specified requirements.

Commencing Operations

- 6.6 Unless otherwise Specified, operations must not commence when significant precipitation is predicted within six hours following the intended time of herbicide application.
- 6.7 The calibration of the application system must be checked at the start of operations and periodically checked during operations to ensure it is correctly set for the delivery rates as specified by its manufacturer.

Application Near Roads

- 6.8 When applying herbicide near a road, all necessary precautions must be taken to ensure the safety of road users. Where necessary, information signs must be posted along roads and flag persons supplied to coordinate traffic. Road delays must not exceed fifteen (15) minutes.

Application Near Zones

- 6.9 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.
- 6.10 Herbicide must not be applied to Buffer, Pesticide Free and No Treatment zones, and aircraft must fly parallel to their boundaries when applying herbicide in adjacent areas.

Spraying Operations

- 6.11 Ministry of Forests employees or agents must not be permitted to be in an aircraft applying herbicide.
- 6.12 The acceptable spray pattern for foliar-applied herbicides in the Work Areas shall be as indicated in the *Herbicide Field Handbook*.
- 6.13 With conventional spray systems, application must be at an average airspeed of 180 km/h for fixed wing aircraft, or at an average of 72 km/h (maximum 100 km/h) for helicopters. The spray must be at an altitude that will ensure complete coverage of the vegetation without increasing the risk of drift but must not exceed 10 metres above the vegetation. Average air speed for other spray systems shall be as specified by the manufacturer.
- 6.14 Operating spray pressure at the boom must be between 124 to 240 kPa (18 to 35 psi). Operating spray pressure for other spray systems shall be as specified by the manufacturer.
- 6.15 The effective droplet sizes needed for the herbicide application must be determined and the spraying system adjusted to produce the required sizes.
- 6.16 The spray swath to be flown will be the width most effective for each equipment configuration and drift control additive used. Spraying must be continuous and contiguous to give the desired uniform coverage.
- 6.17 The herbicide must be applied within five percent of the Specified application rates per hectare and must not exceed the maximum application rate allowed by the Permit.
- 6.18 The volume of spray mixture carried per application flight must not exceed that amount necessary to complete the Work Area.

Requirement to Stop Operations

- 6.19 Unless otherwise Specified, herbicide application operations must be stopped when:
- (a) weather conditions arise which could adversely affect normal application patterns, safety of application, treatment effectiveness, or result in unacceptable movement of herbicide;
 - (b) a leak and/or spill of chemicals occurs (such as herbicide, oils and fuel);
 - (c) there is a breakdown in ground-based communications;
 - (d) wind velocity exceeds 8 km/h or is dead calm;
 - (e) temperature
 - i) exceeds 21°C for application with ester formulated products (e.g., Esteron® 600),
 - ii) exceeds 26.5°C for application with amine formulations (e.g., 2,4-D amine, Vision®), or
 - iii) is at or below 0°C for dormant application;
 - (f) relative humidity is less than 50% (as low as 40% may be accepted when high volume and large droplets (e.g., D8-46) are used);
 - (g) snow, ice, or excessive moisture covers the leaves of the target species;
 - (h) inversion, or air turbulence (e.g. thermal updrafts) is so great as to seriously affect the normal application pattern;
 - (i) foggy weather occurs;
 - (j) overall conditions favour herbicide drift; or
 - (k) there is inadequate daylight for safe application;
- until such time as the condition causing the stoppage changes or is rectified.
- 6.20 In the event of a herbicide spill or misapplication into non-target areas (e.g. water sources), operations must be stopped and the Contingency Plan immediately implemented.
- 6.21 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

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

ARTICLE 7: INSPECTION & NOTIFICATION**Quality Inspection**

- 7.1 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.
- 7.2 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.
- 7.3 The Inspector shall monitor the herbicide application operations with sufficient frequency so as to be able to determine whether or not the herbicide has been satisfactorily applied to each Treatment Unit and that all Work has been performed in accordance with the FIA Standards, and to this end shall maintain a written record of:
- (a) observations regarding the herbicide application operations, including the procedures used for measuring and mixing the herbicide, carriers and additives, calibration of the equipment, the determination of swath widths, and the checking of droplet size and distribution;

- (b) if the aircraft has a flight data recorder, verify with the pilot after herbicide application on each Treatment Unit that the herbicide was applied to the correct area and include a copy of the flight data with the inspector's records;
- 7.4 The Inspector may declare a Work Area satisfactorily treated if all Work has been performed in accordance with the FIA Standards, particularly:
- (a) the entire Work Area has been treated satisfactorily;
 - (b) without exceeding a herbicide application limit stated in a Permit or Approved Plan, 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,
 - ii) the required range of droplet sizes, effective swath width, and volume delivery per hectare were achieved, and
 - iii) compliance with the application procedures.

Recipient to Notify the District Manager and the Administrator

- 7.5 The Recipient shall immediately notify the District Manager and the Administrator whenever:
- (a) an inspection reveals, on any contiguous area greater than one (1) 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) herbicide is applied to an area outside a Work Area or inside a Pesticide Free or No Treatment Zone;
 - (c) 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; or
 - (d) an accident involving aircraft occurs.
- 7.6 Any notification under the previous section shall be followed by written notice within one Work Day.
- 7.7 Where an aircraft is involved in an accident, the Recipient shall also notify Transport Canada and the Aviation Management Section of the Ministry of Forests, Victoria.

ARTICLE 8: REQUIRED REPORTS & RECORDS

- 8.1 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).
- 8.2 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.
- 8.3 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.