FOREST STEWARDSHIP COUNCIL
INTERNATIONAL CENTER

BECAUSE FORESTS MATTER

FSC GUIDANCE DOCUMENT

FSC PESTICIDES POLICY: GUIDANCE ON IMPLEMENTATION

FSC-GUI-30-001 VERSION 2-0 EN

May 5, 2007

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FSC Guidance Document

Title:	FSC Pesticides Policy: guidance on implementation
FSC reference code:	FSC-GUI-30-001 V2-0 EN
Status of document:	Approved by FSC Board of Directors May 5, 2007
Consultation period:	Open
Body responsible for drafting:	Policy and Standards Program
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The Forest Stewardship Council (FSC) is an independent, not for profit, non-government organisation based in Bonn, Germany.

The mission of the Forest Stewardship Council is to support environmentally appropriate, socially beneficial, and economically viable management of the world's forests.

FSC develops, supports and promotes international, national and provincial standards in line with its mission; evaluates, accredits and monitors certification bodies which verify the use of FSC standards; provides training and information; and promotes the use of products that carry the FSC logo.

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Summary
FSC's revised policy on pesticides (*FSC-POL-30-001 FSC Pesticides Policy (2005)*) was approved by the FSC Board of Directors in December 2005.

The policy is designed to implement the relevant requirements of the FSC Principles and Criteria for Forest Stewardship and has three main elements:

- The identification and avoidance of 'highly hazardous' pesticides;
- Promotion of 'non-chemical' methods of pest management as an element of an integrated pest and vegetation management strategy;
- Appropriate use of the pesticides that are used.

The policy requires the establishment of indicators and thresholds for the identification of pesticides recognised by FSC as being particularly hazardous, based on their active ingredients. These indicators and thresholds and the resulting list of pesticides recognised by FSC as being 'highly hazardous' are listed in this FSC Guidance document.

The FSC Pesticides policy prohibits the use of these 'highly hazardous' pesticides in FSC-certified forest management units unless such use has been explicitly justified on specified grounds (including stakeholder consultation), adequate provisions to preferably prevent, otherwise minimize or mitigate their negative impacts and a program in place to identify alternatives. In these circumstances the FSC Board of Directors may approve a ' temporary derogation' for the specified use in a defined geographical area (usually national or sub-national). This Guidance document provides further information of FSC's approach to pesticides and establishes the criteria for identifying 'highly hazardous' pesticides. Annex I of this guidance document specifies the complete set of indicators and thresholds used for the identification of 'highly hazardous' pesticides. Annex II lists the active ingredients which exceed these thresholds and which are therefore identified by FSC as being 'highly hazardous'.

Finally, this Guidance document recognises that further work is required in relation to general requirements for minimising pesticide use in FSC-certified forests, and for the appropriate measures to minimise risk when pesticides are used. This document will be revised and updated as and when this work is completed.

Notes on use of this guidance document
All aspects of this guidance document are considered to be normative, including the scope, procedure effective date, references, terms and definitions, tables and annexes, unless otherwise stated.

Notes on development of this document
Version 1-0 was approved by the FSC Board of Directors at their 40th meeting in December 2005. This version was reviewed in August-September 2006 taking into account the solicited stakeholder input. Versions 2-0 was approved by the FSC Executive Committee the 5th of May 2007.

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1 Introduction

FSC's mission is to promote environmentally appropriate, socially beneficial and economically viable management of the world's forests.

> "Environmentally appropriate forest management ensures that the harvest of timber and non-timber products maintains the forest's biodiversity, productivity, and ecological processes."
>
> "Socially beneficial forest management helps both local people and society at large to enjoy long term benefits and also provides strong incentives to local people to sustain the forest resources and adhere to long-term management plans.
>
> "Economically viable forest management means that forest operations are structured and managed so as to be sufficiently profitable, without generating financial profit at the expense of the forest resource, the ecosystem, or affected communities. The tension between the need to generate adequate financial returns and the principles of responsible forest operations can be reduced through efforts to market forest products for their best value".
>
> (extract from FSC By-laws, 1994)

As a tool to achieve its mission FSC has developed and implements an international, voluntary conformance assessment scheme applicable to forest management. FSC's Principles and Criteria of Forest Stewardship (FSC-STD-01-001) is the international standard against which all FSC-certified forests and plantations are evaluated. The FSC Principles and Criteria provide the international 'level playing field' to which all FSC-certified forest and plantation managers operate. Specific indicators and means of verification may then be developed at the national or sub-national levels in order to take account of variations

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in ecological, social, environmental and institutional conditions within this consistent international framework.

Products from forests which are certified as meeting the requirements of the FSC Principles and Criteria can be marketed to businesses and consumers as 'FSC-certified', and through the use of FSC's internationally recognised labels.

In relation to pesticides, the FSC Principles and Criteria aim to prevent, minimise and mitigate the negative environmental and social impacts of pesticides use whilst promoting economically viable management of the world's forests. The FSC label is a 'green' label, indicating high levels of social and environmental performance. FSC requirements commonly exceed the minimum legal obligations applicable to every company within a particular jurisdiction.

FSC takes a precautionary approach to pesticide use, in part because experience has repeatedly shown the difficulty of ensuring consistent proper use, and the limits of knowledge of the ecological and environmental impacts of pesticides and the consequent unforeseen consequences of their use.

A policy to implement these objectives was first approved by the FSC Board of Directors in May 2002, after extensive consultation. The policy was reviewed and revised during 2005. A substantially shorter policy was approved by the FSC Board of Directors in December 2005, together with this associated guidance document.

The policy and the associated guidance specify the correct implementation of the FSC Principles and Criteria as applicable to pesticide use, for the benefit of certification bodies, their clients, and other stakeholders.

2 The FSC Principles and Criteria of Forest Stewardship

The FSC Principles and Criteria were developed through a multi-stakeholder consultative process incorporating the views and concerns of forest companies, environmental and social NGOs, academics and others. They are approved by the FSC membership. They may be revised on the basis of a vote of the FSC General Assembly, requiring the consensus support of the members of the three FSC chambers (social, environmental and economic), North and South.

Definitions

FSC has adopted the following definitions of the terms 'pest' and 'pesticide', approved by the FSC Board of Directors in December 2005:

> **Pest:** Organisms, which are harmful or perceived as harmful and as prejudicing the achievement of management goals. Some pests, especially introduced exotics, may also pose serious ecological threats, and suppression may be recommended. They include animal pests, plant weeds, pathogenic fungi and other micro-organisms.
>
> **Pesticide:** Any substance or preparation prepared or used in protecting plants or wood or other plant products from pests; in controlling pests; or in rendering such pests harmless. (This definition includes insecticides, rodenticides, acaricides, molluscicides, larvaecides, fungicides and herbicides).

The FSC Principles & Criteria of Forest Stewardship (approved in 1994, revised in 2000) include the following criteria relating to the use of pesticides:

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Criterion 6.6
(1) Management systems shall promote the development and adoption of environmentally friendly non-chemical methods of pest management and strive to avoid the use of chemical pesticides.

(2) World Health Organization Type IA and IB and chlorinated hydrocarbon pesticides; pesticides that are persistent, toxic or whose derivatives remain biologically active and accumulate in the food chain beyond their intended use; as well as any pesticides banned by international agreement, shall be prohibited.

(3) If chemicals are used, proper equipment and training shall be provided to minimize health and environmental risks.

Criterion 10.7
(1) Measures shall be taken to prevent and minimize outbreaks of pests, diseases, fire and invasive plant introductions.

(2) Integrated pest management shall form an essential part of the management plan, with primary reliance on prevention and biological control methods rather than chemical pesticides and fertilizers.

(3) Plantation management shall make every effort to move away from chemical pesticides and fertilizers, including their use in nurseries.

(*FSC-STD-01-001 FSC Principles and Criteria for Forest Stewardship*)

3 Scope for the use of 'highly hazardous' pesticides

The requirement for a temporary derogation is currently applicable to use a 'highly hazardous' pesticide on the FMU to control pests that are harmful or perceived as harmful and as prejudicing the achievement of management goals.

4 The FSC approach to the use of pesticides.

FSC's approach to the implementation of the applicable FSC Criteria was developed through a series of draft proposals and background papers between December 1999 and May 2002, and revised in 2005.

The FSC Criteria include three core elements:

a) The identification and avoidance of 'highly hazardous' pesticides;

b) Promotion of 'non-chemical' methods of pest management as an element of an integrated pest management strategy; and,

c) Appropriate use of the pesticides that are used.

To date, FSC policy has focused primarily on the first of these elements: the avoidance of 'highly hazardous' pesticides. This guidance document follows this precedent, since it is this element that has attracted most comment. The remaining elements are introduced briefly in Sections 5 and 6 of this paper but are not covered in detail. FSC recognises that further guidance needs to be developed focussing on the remaining elements.

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5 Identification, avoidance and control of 'highly hazardous' pesticides

5.1 Overview

The FSC pesticides policy recognises the distinction between hazard and risk. Hazard refers to the inherent danger in a situation. Risk recognises that the inherent danger may be limited by specific controls. The overall risk may be reduced both by identifying and avoiding hazard, and also by taking steps to control hazards which have been identified.

FSC policy follows this two-step approach. The chemical properties of pesticides are generally hazardous, but some are more hazardous than others. FSC Criterion 6.6 lists aspects of hazard that FSC considers (e.g. persistence, toxicity, etc). FSC has then specified technical indicators by which each identified element of hazard may be objectively evaluated (e.g. LD50 value as an indicator of toxicity) and specified a threshold above which a particular pesticide is considered 'highly hazardous' and below which it is considered 'less hazardous' (e.g. . LD50 < 200 mg/kg for mammals is 'highly hazardous', LD50 > 200 mg/kg for mammals is 'less hazardous').

Annex I of this guidance document specifies the complete set of indicators and thresholds used for the identification of 'highly hazardous' pesticides. Annex II lists the active ingredients which exceed these thresholds and which are therefore identified by FSC as being 'highly hazardous'.

The listing of a pesticide as 'highly hazardous' does not mean that the pesticide cannot be used under any circumstances. Nor does the fact that a pesticide is not on this list mean that it is 'safe'. Inclusion on the list means that FSC considers the pesticide as 'highly hazardous' in relation to one or more of the specified indicators. In order to reduce the risk of negative environmental or social impacts these pesticides shall be avoided, and should only be used in FSC-certified forests and plantations if there is no viable alternative. This implies that less hazardous (or no) pesticides shall be preferred, and that ultimately, if possible, use of the most hazardous pesticides should be eliminated.

Therefore, pesticides included on the FSC list of 'highly hazardous' pesticides may not be used in FSC-certified forests unless there is no viable alternative. In order to implement this, FSC requires that managers wishing to use these 'highly hazardous' pesticides must justify such use through a specific process which includes consultation with social, environmental and economic stakeholders. This is the 'derogation' process, described in more detail in Section 5.4 of this paper.

In summary the FSC approach to the use of 'highly hazardous' pesticides is as follows:

STEP ONE		STEP TWO
Is a pesticide 'highly hazardous' for one or more of the elements specified? (i.e. is it included on the *FSC list of 'highly hazardous' pesticides?).*	IF YES:	Do not use the pesticide, OR, if there is no viable alternative, request a temporary derogation, following the requirements established in *FSC-PRO-01-004 Procedure for processing temporary derogations to the FSC Pesticides Policy*. If a derogation is approved, the pesticide may be used under the conditions specified in your derogation. Other FSC and national requirements (e.g. safe use, training of operatives) continue to apply.
	IF NO:	The pesticide may be used without a specific derogation, so long as the other FSC

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		requirements (e.g. consideration of alternatives, safe use, training, disposal, etc.) are met, *AND* the pesticide is used in accordance with national legislation and regulations for its use.

Table 1. Overview of FSC's approach to the use of pesticides.

This two-step description is a simple illustration of FSC's overall approach in relation to one aspect of pesticide use, based on evaluation of hazard. It is NOT intended to act as a full decision support framework for the use of pesticides and should not be used as such.

The following sections specify the indicators and thresholds that have been used by FSC to identify 'highly hazardous' pesticides and aspects related to temporary derogation applications for the use of these pesticides in FSC certified forests and plantations.

5.2 Indicators and thresholds for 'highly hazardous' pesticides

Criterion 6.6 of the FSC Principles and Criteria identifies the general properties of pesticides that should be evaluated in the determination of hazard. These properties are:

- Persistence
- Toxicity (chronic or acute toxicity to non-target organisms)
- Biological activity and accumulation in the food chain

In order to evaluate these properties effectively FSC considers the following aspects:

- Carcinogenicity
- Mutagenicity
- Endocrine disruption
- Presence of heavy metals
- Presence of dioxins (including dioxins in the by-products of burning)

In addition, FSC Criterion 6.6 identifies as 'highly hazardous' pesticides which are, or include:

- Chlorinated hydrocarbons
- Chemicals identified by the World Health Organization (WHO) as either "Extremely Hazardous" (Class 1A) or "Highly Hazardous" (Class 1B)
- Pesticides which are banned by international agreement.

The FSC Pesticides Policy and associated documents specify objective indicators and thresholds for the identification of particularly hazardous pesticides in relation to each of these aspects. The basis for selection of these indicators and thresholds was discussed in detail in the paper *Use of Chemical Pesticides in Certified Forests: clarification of FSC criteria 6.6, 6.7 and 10.7* (Radosevich, S., M.Lappé & B.Addlestone (2000) FSC-USA). This work was reviewed in detail in *Review of the Forest Stewardship Council's Pesticide Indicators and Thresholds* (2005) by PAN-UK, followed by another in 2007: *Review of the Forest Stewardship Indicators and Thresholds for identifying 'highly hazardous pesticides'* by a panel of experts.

Review and revision of indicators and thresholds

Whilst the indicators and thresholds for identifying potentially hazardous pesticides are benchmarked by the best science available, the ultimate choice of indicators and thresholds to identify pesticides considered as "highly hazardous" is a socially determined decision in the FSC system. Thus, based on the available scientific information about use of pesticides

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and their associated impacts, the FSC system sets a bar above which certain pesticides are considered unacceptable for use in FSC certified forests. However use of such pesticides may be allowed under specific circumstances where there is evidence of no current viable alternative to the pesticide in question but subject to fulfilling the derogation requirements as outlined on *FSC-PRO-01-004 Procedure for processing temporary derogations to the FSC Pesticides Policy*.

In the case of the FSC system the choices of indicators and thresholds were first specified in 2002 after consideration of existing norms used by organisations such as the WHO and US Environmental Protection Agency (EPA) followed by extensive consultation with social, environmental and economic stakeholders.

The specified indicators and thresholds are subject to being reviewed and revised if necessary according to the latest scientific available information.

5.3 FSC list of 'highly hazardous' pesticides

FSC has attempted to identify the active ingredients of all the pesticides which are commonly used in forests, plantations and nurseries use worldwide. These active ingredients have then been evaluated against the indicators and thresholds specified in Annex I. The resulting FSC list of 'highly hazardous' pesticides is presented in Annex II. Annexes I and II will periodically be reviewed and updated.

The most recently published version of' highly hazardous' pesticides shall be considered definitive at any point in time. Certification bodies are not expected to carry out their own evaluations of pesticides used by applicant or certified clients to determine whether they exceed the thresholds specified by FSC.

Certification bodies shall check whether the active ingredient of any pesticide in use in a forest applying for certification is included on the FSC list of 'highly hazardous' pesticides. If a pesticide is not on the list then a derogation is not currently required. The list will be regularly reviewed and updated by FSC. If an active ingredient or particular formulation (see below) is added to the list, then the managers of a certified forest currently using the pesticide which became restricted, or which contains a restricted active ingredient may continue to use the pesticide in question during the first six months after its inclusion on the list. After this period, repeated or continued use without an FSC approved temporary derogation or a temporary derogation request under evaluation by FSC shall lead to the immediate suspension of the certificate by the certification body.

Certification bodies have a duty to inform their clients promptly of any additions to the list of 'highly hazardous' pesticides, to ensure that their clients have enough time to phase out their use or apply for a temporary derogation if needed.

NOTE: National, Regional or Generic FSC accredited standards may prohibit the use of additional pesticides not listed in Annex II of this guidance document.

5.3.1 Formulations

Pesticide formulations including the use of wetting agents, propellants, surfactants, solvents, etc. can all affect the value of the indicators specified in Annex I, either positively or negatively. However reliable information on the effects of these variables on particular formulations is not widely and publicly available. The FSC list of 'highly' hazardous pesticides has therefore been based on an evaluation of active ingredients only. The impacts of formulations shall be accounted for as follows:

a) Formulations that reduce the level of hazard will be taken into account through the derogations process. If a derogation application clearly

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demonstrates that the formulation reduces the value of an indicator for the active ingredient to below the specified threshold and that the resulting synergetic effects do not increase the level of hazard, then a temporary derogation for the use of the active ingredient in such a formulation may be approved; and,

b) Advice that specified formulations increase the level of hazard will be reviewed, and specific formulations may be added to the list of 'highly hazardous' pesticides in future revisions.

5.4 Temporary derogations to the FSC Pesticides Policy

In accordance with the FSC Pesticides Policy, FSC-certified forest and plantation managers shall not use pesticides containing any of the active ingredients listed on the *FSC list of 'highly hazardous' pesticides* (Annex II) except in specific circumstances authorized by the FSC Board of Directors through the issue of a formal derogation. Forest and plantation managers that wish to apply for a temporary derogation for the use of a 'highly hazardous' pesticide shall follow the requirements established in *FSC-PRO-01-004 Procedure for processing* temporary *derogations to the FSC Pesticides Policy*.

An up to date list of approved derogations is published separately as FSC-*GUI-30-001a Approved temporary derogations for the use of 'highly hazardous' pesticides in FSC-certified forests and plantations*.

5.4.1 Mitigating factors

Specific factors such as soil type in the area of application, distance from water courses, rate, method and frequency of application are factors which may reduce the risk associated with the application of hazardous pesticides.

These factors may be taken into account in the consideration of requests for derogations, but do not affect the hazard classification of the active ingredients themselves.

5.4.2 Extension of approved temporary derogations

Derogations will normally be issued for a five-year period, but can be extended according to the requirements outlined in *FSC-PRO-01-004 Processing applications for temporary derogations to FSC Pesticides Policy*. An extension of a derogation after the expiry of the five-year period will not be granted unless it can be clearly demonstrated that the program to identify alternatives has been fully implemented but failed to identify an acceptable alternative in the available time.

Forest managers working under an approved derogation should therefore ensure that they have a contingency plan in place with the objective to eliminate use of the pesticide prior to the end of the derogation period, in case the approved derogation is not extended.

5.4.3 National and sub-national FSC standards

Although during the standard development process the national or sub-national stakeholder consultation may provide an appropriate mechanism for supporting derogation applications, applications shall follow the normal procedures for submitting derogation applications (as detailed in *FSC-PRO-01-004 Processing applications for temporary derogations to FSC Pesticides Policy*) independent of the approval of the FSC-accredited national or sub-national standard.

5.4.4 Monitoring

It is essential to the credibility of the system for issuing temporary derogations that the continuing use of pesticides is monitored both by the certification body and by FSC. The

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collection of basic data allows FSC to evaluate the impacts of its policy over time and, if necessary, propose modifications.

Approved derogations applications will require that forest managers maintain records of their use of pesticides, and certification bodies will be required to include basic quantitative and qualitative data on such use in evaluation and surveillance reports on FSC-certified forests and plantations.

Monitoring the use of pesticides listed as 'highly hazardous' as well as other pesticides not on the list allows FSC to ensure that the list can be readily updated. It should also allow FSC to monitor the overall impact of its policy, for example to indicate whether the avoidance of 'highly hazardous' pesticides is leading to an increased use of other pesticides.

6 Decision support and integrated pest and vegetation management

FSC's requirement to avoid the use of 'highly hazardous' pesticides should be considered in the context of the more general support for 'non-chemical' methods of pest management as an element of an integrated pest and vegetation management strategy. General requirements are specified in both FSC Criterion 6.6 and 10.7:

> **Criterion 6.6**
> (1) Management systems shall promote the development and adoption of environmentally friendly non-chemical methods of pest management and strive to avoid the use of chemical pesticides.
>
> **Criterion 10.7**
> (1) Measures shall be taken to prevent and minimize outbreaks of pests, diseases, fire and invasive plant introductions.
>
> (2) Integrated pest management shall form an essential part of the management plan, with primary reliance on prevention and biological control methods rather than chemical pesticides and fertilizers.

A lot of attention has been focused over the past years on the identification and avoidance of 'highly hazardous' pesticides. Much less attention has been devoted to the development of indicators and means of verification for recognising effective integrated pest management strategies, and methodologies for promoting non-chemical methods.

Well-designed integrated pest and vegetation management should be an essential part of implementing FSC standards in relation to pesticide use. FSC is committed to develop guidance on appropriate indicators and means of verification for inclusion in generic and national or sub-national Forest Stewardship Standards. Work on integrated pest and vegetation management including non-highly hazardous methods for pest management and appropriate use of pesticides will begin during the first half of 2007.

7 General requirements for the use of pesticides

Finally, it should not be forgotten that the FSC Principles and Criteria include basic requirements for the proper use of pesticides when they are accepted as an appropriate choice for pest management.

> **Criterion 6.6**
> (3) If chemicals are used, proper equipment and training shall be provided to minimize health and environmental risks.

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The FSC International Center is committed to develop guidance on appropriate indicators and means of verification for the implementation of these requirements.

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Annex I: Indicators and thresholds for the identification of 'highly hazardous[1]' pesticides

NB: these indicators and thresholds will periodically be reviewed according to the latest available scientific information.

Criterion (derived from FSC Principles and Criteria, 2002)	Indicator	Threshold for inclusion on FSC list of 'highly hazardous' pesticides
Quantitative or semi-quantitative		
Acute toxicity to mammals *and birds*	WHO toxicity class (active ingredients) Acute toxicity (oral LD50 for rats*/birds*)	If acute oral LD50 for rats*/birds* ≤ 200[2] mg/kg b.w. *(or most sensitive mammal/bird)* WHO toxicity class 1a, 1b.
Acute toxicity to aquatic organisms	Aquatic toxicity (LC50)	If LC50 < 50 ug/l (microgrammes per liter) *(Pesticides Manual2005/2006)* *Daphnia as the test organism or other aquatic organisms that show greater sensitivity than Daphnia.*
Persistence in soil or water and Soil sorption potential. The target of protection is surface and ground water.	Half-life in soil or water (DT50) Soil sorption coefficient (Koc) Water solubility (S)	If DT50 ≥ 90 days (EU), 'strongly persistent' AND if Koc <300 ml/g (Whitiford, F. 2002) AND S >30 mg/l (Cohen et al, 1987) A pesticide is listed if it fails either the Koc or S threshold or both.
Bio-magnification, bio-accumulation	Octanol-water partition coefficient (KOW) or bio-concentration factor (BCF) or bio-accumulation factor (BAF)	If KOW > 1000 i.e. log(KOW) > 3 *(based on US EPA standard PBT Final Rule, Federal Register 64(209), p. 58669 www.epa.gob/fedrgstr/EPA-WASTE/1999/October/Day-29/f28169.htm)*
Carcinogenicity	IARC carcinogen; US EPA carcinogen	If listed in any category below (a) International Agency for Research on Cancer (IARC) within Group 1: 'The agent

[1] *Based on explicit FSC indicators and thresholds and not to be confused with the WHO classification of pesticides*

[2] The current LD50 threshold corresponds to the WHO classes Ia, and Ib (taken together i.e. up to the 200mg/kg body weight.)

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Criterion (derived from FSC Principles and Criteria, 2002)	Indicator	Threshold for inclusion on FSC list of 'highly hazardous' pesticides
		(mixture) is carcinogenic to humans', or within Group 2A: 'The agent (mixture) is probably carcinogenic to humans' (IARC 2004); (b) Pesticides which are carcinogenic and probable or likely carcinogenic to humans as classified by the US.EPA. This applies to pesticides in Categories: "A", "B" (1986); "Known/Likely" (1996) and "Likely to be carcinogenic" and "Carcinogenic to humans (1999 & 2005).
Endocrine disrupting chemical (EDC)	EDC listed by the US EPA) and National Toxicological Program (NTP) and the EU	If classified as EDC category 1 by EU or by US NTP or EPA
Mutagenicity to mammals	When there is a globally harmonized scheme (OECD), FSC should incorporate it including its threshold.	If mutagenic to any species of mammals.
Qualitative		
Heavy metals:	Lead (Pb), cadmium (Cd), arsenic (As) and mercury (Hg)	If pesticide contains any heavy metal as listed
Dioxins (residues or emissions)	Equivalents of 2,3,7,8-TCDD	If contaminated with any dioxins at a level of 10 part per trillion (corresponding to10 ng/kg) or greater of tetrachlorodibenzo-p-dioxin (TCDD) equivalent, or if it produces such an amount of] dioxin[s] when burned
International legislation	Banned by international agreement	If banned by international agreement under the POP convention
Indicators for which further review is required		
**Developmental and reproductive toxin	To be reviewed later when more information becomes available.	
**Chronic toxicity to mammals	To be reviewed later when more information becomes available.	

* Pesticides (currently six) that were listed as 'highly hazardous' based on this indicator shall remain on the FSC list of 'highly hazardous' pesticides until more information on *Developmental and reproductive toxin* has been obtained.

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** More information needed to determine whether this criterion should remain as a criterion for identifying 'highly hazardous' pesticides. However, no pesticide is included on the list solely on account of chronic toxicity.

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Annex II a: FSC list of 'highly hazardous3' pesticides - prohibited in FSC certified forests and plantations unless a temporary derogation for use has previously been approved by the FSC Board of Directors.

The chemicals listed below are used as pesticides in forestry and qualify as '*highly hazardous'* in relation to one or more of the indicators specified in Annex I of this guidance document. Their use is prohibited in FSC-certified forests without an approved derogation. Forest and plantation managers that wish to apply for a temporary derogation for the use of a 'highly hazardous' pesticide shall follow the requirements established in *FSC-PRO-01-004 Procedure for processing temporary derogations to the FSC Pesticides Policy*.

The indicator(s) for which these pesticides have been identified as 'highly hazardous' is (are) listed.

Name of chemical	Basis for inclusion on FSC 'highly hazardous' list
Aldicarb	WHO Table 1, Class Ia. Acute toxicity (oral): Acute oral LD50 for rats 0.93 mg/kg (e-PM-2006-2007)
Aldrin	WHO Table 1, Class Ib → (e-PM-2006-2007) Acute toxicity (oral): Acute oral LD50 for rats 38-67mg/kg (e-PM-2006-2007) Carcinogenicity: Group B2 US EPA Banned by international agreement: Stockholm
Alpha-cypermethrin	Acute toxicity (oral): Acute oral LD50 for mice 57 mg/kg; Aquatic toxicity: LC50 (96 h) rainbow trout 2.8 µg/l (e-PM-2006-2007). Bioaccumulation: Kow logP = 6.9 (e-PM-2006-2007). Persistence : Half life (DT50): 91 days, (e-PM-2006-2007) Soil Sorption Potential (Koc) :??
Aluminium phosphide	Acute toxicity (oral): Acute oral LD50 for rats 8.7 mg/kg; Aquatic toxicity: LC50 (96 h) for rainbow trout 9.7 µg/l (e-PM-2006-2007).
Amitrole	Carcinogenicity: (Group B2, US EPA;)
Atrazine	Endocrine Disruptors category 1 (European Union, 1999)
***Benomyl**	Developmental toxicity (US TRI)
Brodifacoum	WHO Table 1, Class Ia. Acute toxicity (oral): Acute oral LD50 for rats 0.4 mg/kg; (e-PM-2006-2007). Bioaccumulation: Kow logP = 8.5 (e-PM-2006-2007).
Bromadiolone	WHO Table 1, Class Ia. Acute toxicity (oral): Acute oral LD50 for rats 1.125 mg/kg; (e-PM-2006-2007). Kow logP = 4.7 (e-PM-2005-2006).
Carbaryl	Endocrine Disruptors category 1 (European Union, 1999)
Carbosulfan	Acute toxicity (oral): Acute oral LD50 for male rats 250, female rats 185 mg/kg. Aquatic toxicity: Daphnia LC50 (48 h) 1.5 µg/l. Bioaccumulation: Kow logP = 5.4 (e-PM-2006-2007)
Chlordane	Acute toxicity (oral): Acute oral LD50 for rats 133-649 mg/kg; (e-PM-2006-2007). Carcinogenicity: (Group B2, US EPA 1986)

[3] *Based on explicit FSC indicators and thresholds and not to be confused with the WHO classification of pesticides*

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Name of chemical	Basis for inclusion on FSC 'highly hazardous' list
	Bioaccumulation: Kow logP = 6.0 (e-PM-2006-2007). Banned by international agreement: Stockholm Endocrine Disruptors category 1 (European Union, 1999) Persistence: Half life (DT50) in soil about 1 year (e-PM-2006-2007). Soil Sorption Potential (Koc) :??
Chlorothalonil	Aquatic toxicity: LC50 47 µg/l in rainbow trout (e-PM-2006-2007). Carcinogenicity: (Group B2, US EPA 1986,
Chlorpyrifos	Bioaccumulation: Kow logP = 4.7 (e-PM-2006-2007). Acute toxicity (oral): Acute oral LD50 for rats 135-163 mg/kg Aquatic toxicity: Daphnia LC50 (48 h) 1.7 µg/l.
Cyfluthrin	Aquatic toxicity: (PM) LC50 0.47µg/l in rainbow trout (e-PM-2005-2006). Bioaccumulation: log Kow >3 (e-PM-2006-2007).
Cypermethrin	Acute toxicity (oral): Acute oral LD50 for mice 138 mg/kg; (e-PM-2006-2007). Bioaccumulation: Kow logP = 6.6 (e-PM-2006-2007).
2,4-D, 2-ethylhexyl ester	Bioaccumulation: Kow logP = 5.78 (e-PM-2006-2007). Developmental toxicity (US TRI)
***2-(2,4-DP), dma salt (= dichlorprop, dma salt)**	Developmental toxicity (US TRI)
DDT	Acute toxicity (oral) : Acute oral LD50 for mice 113-118, mg/kg Aquatic toxicity: Daphnia LC50 (48 h) 1.10 µg/l (e-PM-2006-2007). Carcinogenicity: (Group B2, US EPA), Banned by international agreement: Stockholm Endocrine Disruptors category 1 (European Union, 1999) DT50= 3months in India (tropical) in temperate regions-4-30years (e-PM-2005-2006). Soil Sorption Potential (Koc):??
Deltamethrin	Bioaccumulation: Kow logP = 4.6 (e-PM-2006-2007). Acute toxicity (oral) :Acute oral LD50 for rats ranges from 135 to >5000 mg/kg Aquatic toxicity: Daphnia LC50 (48 h) 3.5 µg/l.
Diazinon	Acute toxicity (oral): Acute oral LD50 for mice 80-135, mg/kg (e-PM-2006-2006). Bioaccumulation: Kow logP = 3.3 (e-PM-2006-2007).
***Dicamba, dma salt**	Developmental toxicity (US TRI)
Dicofol	Bioaccumulation: Kow logP = 4.3.(e-PM-2006-2007).
Dieldrin	WHO Table 1, Class Ib –check with BCPC. Acute toxicity (oral): Acute oral LD50 for rats 37-87mk/kg (e-PM-2006-2007). Carcinogenicity: (Group B2, US EPA
Dienochlor	Bioaccumulation: Kow logP = 3.23 (e-PM-2006-2007).
Difethialone	WHO Table 1, Class Ia. Acute toxicity (oral): Acute oral LD50 for rats 0.56, mg/kg (e-PM-2006-2007). Bioaccumulation: Kow logP = 5.17 (e-PM-2006-2007).
Diflubenzuron	Bioaccumulation: Kow logP = 3.89 (e-PM-2006-2007). Aquatic toxicity: Daphnia LC50 (48 h) 7.1 µg/l.

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Name of chemical	Basis for inclusion on FSC 'highly hazardous' list
Dimethoate	Acute toxicity (oral): Acute oral LD50 for mice 160mg/kg (e-PM-2006-2007). Bioaccumulation: Kow logP = -4.6 (e-PM-2006-2007). Developmental toxicity (US TRI)
Diquat dibromide	Aquatic toxicity: Daphnia LC50 (48 h) 2.2 µg/l (e-PM-2006-2007).
Diuron	Persistence:Half life (DT50): 90-180 d (e-PM-2005-2006). Soil Sorption Potential (Koc):400ml/g 3.3 (e-PM-2006-2007) Water solubility: 37.4 mg/l 3.3 (e-PM-2006-2007) Developmental toxicity (US TRI)
Endosulfan	Acute toxicity (oral): Acute oral LD50 for rats 75-88 mg/kg (e-PM-2006-2007). Bioaccumulation: Kow logP for α- = 4.74; β- = 4.79 (both at pH 5 (e-PM-2006-2007).
Endrin	WHO Table 1, Class Ia. Check with BCPC Acute toxicity (oral): Acute oral LD50 for rats 7.5-17.5 mg/kg (e-PM-2006-2007). Banned by international agreement: Stockholm
Epoxiconazole	Bioaccumulation: Kow logP = 3.33 (e-PM-2006-2007)
Esfenvalerate	Acute toxicity (oral): Acute oral LD50 for rats 75-88 mg/ (e-PM-2006-2007) LCD 50 rainbow trout 0.26 µg/l (e-PM-2006-2007). Bioaccumulation: Kow logP = 6.22. (e-PM-2006-2007). Persistence: m.), In sand (0.38% o.m.), DT50 88 d; in silty loam (pH 5.3, 2.0% o.m.), DT50 114 d; in clay loam (pH 5.7, 0.2% o.m.), DT50 287 d; in clay loam Soil Sorption Potential (Koc) = 5300 ml/g (e-PM-2006-2007).
Ethion	Bioaccumulation: Kow logP =4.28 (e-PM-2006-2007)
Fenitrothion	Bioaccumulation: Kow logP = 3.43 (e-PM-2006-2007)
Fipronil	Bioaccumulation: Kow logP = 4.0(e-PM-2006-2007) Acute toxicity (oral): Acute oral LD50 for rats 97 mg/kg(e-PM-2006-2007).
Fluazifop-butyl	Bioaccumulation: Kow logP = 4.5 (e-PM-2006-2007)
Flufenoxuron	Bioaccumulation: Kow logP = 4.0 (e-PM-2006-2007) Aquatic toxicity:LC50 (96 h) for rainbow trout >4.9 µg/l.
Gamma-HCH, lindane	Acute toxicity (oral): Acute oral LD50 values vary with test conditions, especially the carrier: for rats 88-270, mg/kg e-PM-2006-2007 LC50 (96 h) for rainbow trout 0.022-0.028 mg/l (e-PM-2006-2007). Bioaccumulation: Kow logP = 3.5 (e-PM-2006-2007). Endocrine Disruptors category 1 (European Union, 1999)
Heptachlor	Acute toxicity (oral): Acute oral LD50 for rats 147-220,mg/kg . (e-PM-2006-2007). Carcinogenicity: (Group B2, US EPA) Banned by international agreement: Stockholm Bioaccumulation: Kow logP = 4.4-5.5 (e-PM-2006-2007). Persistence: Soil half life (DT50): 9-10 months when used at agricultural rates. (e-PM-2006-2007) Soil Sorption Potential (Koc):??
Hexachlorobenzene	WHO Table 1, Class Ia. Carcinogenicity: (Group B2, US EPA,) Banned by international agreement: Stockholm

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Name of chemical	Basis for inclusion on FSC 'highly hazardous' list
	Endocrine Disruptors category 1 (European Union, 1999)
Hexazinone	Persistence: Half life (DT50) in soil about 1-6 months (e-PM-2006-2007); 105 days (The FOOTPRINT Pesticide Properties Database); 222 days (PAN Pesticides database). Soil Sorption Potential (Koc) : 54 ml/g (The FOOTPRINT Pesticide Properties Database) Water solubility: 29.8 g/ (e-PM-2006-2007);
***Hydramethylnon**	Developmental and Reproductive toxicity (US TRI)
Isoxaben	Bioaccumulation: Kow logP = 3.94 (e-PM-2006-2007)
Lamba-cyhalothrin	Acute toxicity (oral):Acute oral LD50 for male rats 79, female rats 56 mg/kg. Bioaccumulation: Kow logP = 7 (e-PM-2006-2007).
Mancozeb	Carcinogenicity: (Group B2, US EPA,) Endocrine Disruptors category 1 (European Union, 1999)
Metam sodium	Endocrine Disruptors category 1 (European Union, 1999) Carcinogenicity: (Group B2, US EPA,) Developmental toxicity (US TRI)
Methoxychlor	Endocrine Disruptors category 1 (European Union, 1999) Aquatic toxicity: Daphnia LC50 (48 h) 0.00078 mg/l.
Methylarsonic acid (monosodium methanearsenate, MSMA)	Chemical class (heavy metals) As
Methylbromide	Inhalation LC50 (4 h) for rats 3.03 mg/l air (N. Kato et al., Ind. Health, 1986, 24, 87-103). Highly toxic to man, with a threshold limit value of 0.019 mg/l air (ACGIH). Check this.
Mirex	Banned by international agreement: Stockholm Endocrine Disruptors category 1 (European Union, 1999)
***Naled**	Reproductive toxicity (US TRI)
Oryzalin	Bioaccumulation: Kow logP = 3.73 (e-PM-2006-2007).
Oxydemeton-methyl, Metasystox	WHO Table 2, Class Ib. Acute toxicity (oral): Acute oral LD50 for rats about. 50 mg/kg (e-PM-2005-2007). Developmental toxicity (US TRI)
Oxyfluorfen	Bioaccumulation: Kow logP = 4.47 (e-PM-2006-2007).
Paraquat	Acute toxicity (oral): Acute oral LD50 for rats 157-129 mk/kg (e-PM-2006-2007). Bioaccumulation: Kow logP = 4.5 (e-PM-2006-2007).
Parathion	WHO Table 1, Class Ia. Toxicity: Acute oral LD50 for rats 2 mk/kg (e-PM-2006-2007). Aquatic toxicity: Daphnia LC50 (48 h) 0.0025 mg/l Bioaccumulation: Kow logP = 3.83 (e-PM-2006-2007).
Pendimethalin	Acute toxicity (oral): Acute oral LD50 for rats 2 mk/kg (e-PM-2006-2007). Bioaccumulation: Kow logP = 5.2 (e-PM-2006-2007). Persistence:Half life (DT50) in soil is 3-4 months (A. Walker & W. Bond, Pestic. Sci., 1977, 8, 359 (e-PM-2006-2007). Soil Sorption Potential (Koc):??

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Name of chemical	Basis for inclusion on FSC 'highly hazardous' list
Pentachlorophenol	WHO Table 2, Class Ib. Bioaccumulation: Kow logP = 5.1 (e-PM-2006-2007). Carcinogenicity: (Group B2, US EPA,) Endocrine Disruptors category 1 (European Union, 1999)
Permethrin	Aquatic toxiciyt: Daphnia LC50 (48 h) 0.6 µg/l. (e-PM-2006-2007). Bioaccumulation: Kow logP = 6.10. (e-PM-2006-2007).
Propaquizafop	Bioaccumulation:Kow logP = 4.78 (e-PM-2006-2007).
Propyzamide	Bioaccumulation: Kow logP = 3.3 (e-PM-2006-2007)
Quintozene	Bioaccumulation: Kow logP = 5.1 (e-PM-2006-2007). Persistence: Persists in soil, with half life (DT50) about 4-10 months (e-PM-2006-2007). Soil Sorption Potential (Koc):??
***Simazine**	Reproductive toxicity (US TRI)
Sodium cyanide	WHO Table 2, Class Ib. Toxicty: Acute oral LD50 for rats 6.44 mg/kg (e-PM-2006-2007).
Sodium fluoroacetate, 1080	WHO Table 1, Class Ia. Acute oral LD50 for Rattus norvegicus 0.22 mg/kg Reproductive toxicity (US TRI)
Strychnine	WHO Table 1, Class Ib Bioaccumulation: Kow logP = 4.0 (e-PM-2006-2007). Acute toxicity (oral): Acute oral LD50 for rats 1-30 mg/kg (e-PM-2006-2007).
Sulfluramid	Bioaccumulation: Kow logP >6.8 (e-PM-2006-2007)
2,4,5-T	Often contaminated with dioxin. Endocrine Disruptors category 1 (European Union, 1999)
Tebufenozide	Bioaccumulation: Kow logP = 4.25 (e-PM-2006-2007; The FOOTPRINT Pesticide Properties Database).
Terbumeton	Bioaccumulation: Kow logP = 3.04 (e-PM-2005-2006). Persistence : DT50 in soil about 300 days (e-PM-2006-2007). Soil Sorption Potential (Koc):??
Terbuthylazine	Bioaccumulation: Kow logP = 3.21
Terbutryn	Bioacummulation : Kow logP = 3.65 (e-PM-2006-2007). Endocrine Disruptors category 1 (European Union, 1999)
Thiodicarb	Acute toxicity (oral): Acute oral LD50 for rats 66 (in water), Aquatic toxicity: Daphnia LC50 (48 h) 27 µg /l Carcinogenicity: Group B2, US EPA,
Toxaphene (Camphechlor)	Acute toxicity (oral): Acute oral LD50 for rats 80-90 mg/kg (e-PM-2006-2007). Carcinogenicity: Group B2, US EPA, Banned by international agreement: Stockholm Endocrine Disruptors category 1 (European Union, 1999) Persistence: Half life (DT50) varies between 70 days and 12 years, depending on soil type and climate) (e-PM-2006-2007). Soil Sorption Potential (Koc):??
Triadimenol	Bioaccumulation: Kow A: logP = 3.08; B: logP = 3.28 (e-PM-2006-2007) Persistence: DT50 in sandy loam 110-375 days, in loam 240-

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Name of chemical	Basis for inclusion on FSC 'highly hazardous' list
	270 days (e-PM-2006-2007) Soil Sorption Potential (Koc): ??
Trifluralin	Bioaccumulation: Kow logP = 4.83 (e-PM-2006-2007).
Warfarin	WHO Table 2, Class Ib. Acute toxicity (oral): Acute oral LD50 for rats 186 mg/kg (e-PM-2006-2007). Developmental toxicity (US TRI)
Zeta-cypermethrin	WHO Table 1, Class Ib Acute toxicity (oral): Acute oral LD50 for rats 105.8 mg/kg (e-PM-2006-2007). Aquatic toxicity: Daphnia LC50 (48 h) 0.15 µg/l. (e-PM-2006-2007).
Zinc phosphide	WHO Table 2, Class Ib. Acute toxicity (oral): Acute oral LD50 for rats 45.7 mg/kg (e-PM-2006-2007). Aquatic toxicity: LC50 (96 h) for rainbow trout 9.7 µg/l (e-PM-2006-2007). Developmental toxicity (US TRI) Reproductive toxicity (US TRI)

* indicates that were listed as 'highly hazardous' based on stated indicator and shall remain on the FSC list of 'highly hazardous' pesticides until information on Developmental and reproductive toxin has been obtained.

FSC list of 'highly hazardous' pesticides is based on data from:

- FOOTPRINT: Creating tools for pesticide risk assessment and management in Europehttp://www.herts.ac.uk/aeru/footprint/en/
- The e-electronic Pesticide Manaul (e-PM)
- The US Environment Protection Agency (US EPA)
- The International Agency for Research on Cancer
- The World Health Organization (WHO)
- The European Union
- The Stockholm convention on Persistence Organic Pesticides (POPs)

Annex I b WHO classes I A and I B list of pesticides - prohibited in FSC certified forests and plantations unless a temporary derogation for use has previously been approved by the FSC Board of Directors. This annex will be updated in accordance with future WHO updates.

WHO Extremely hazardous (Class IA) technical grade active ingredients in pesticides	WHO Highly hazardous (Class IB) technical grade active ingredients in pesticides
Aldicarb Brodifacoum Bromadiolone Bromethalin Calcium cyanide Captafol Chlorethoxyfos Chlormephos Chlorophacinone Difenacoum Difethialone	Acrolein Allyl alcohol Azinphos-ethyl Azinphos-methyl Blasticidin-S Butocarboxim Butoxycarboxim Cadusafos Calcium arsenate Carbofuran Chlorfenvinphos 3-Chloro-1,2-propanediol

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Diphacinone Disulfoton EPN Ethoprophos Flocoumafen Hexachlorobenzene Mercuric chloride Mevinphos Parathion Parathion-methyl Phenylmercury acetate Phorate Phosphamidon Sodium fluoroacetate Sulfotep Tebupirimfos Terbufos	Coumaphos Coumatetralyl Zeta-cypermethrin Demeton-S-methyl Dichlorvos Dicrotophos Dinoterb DNOC Edifenphos Ethiofencarb Famphur Fenamiphos Flucythrinate Fluoroacetamide Formetanate Furathiocarb Heptenophos Isoxathion Lead arsenate Mecarbam Mercuric oxide Methamidophos Methidathion Methiocarb Methomyl Monocrotophos Nicotine Omethoate Oxamyl Oxydemeton-methyl Paris green Pentachlorophenol Propetamphos Sodium arsenite Sodium cyanide Strychnine Tefluthrin Thallium sulfate Thiofanox Thiometon Triazophos Vamidothion Warfarin Zinc phosphide