



Forest Stewardship Council®

**International Generic Indicators (IGI)
addendum
IGI for the use of
Highly Hazardous Pesticides**

DRAFT 2-0 – revision crosswalk

International Generic Indicators (IGI) addendum IGI for the use of Highly Hazardous Pesticides FSC-STD-60-004a - **revision crosswalk**

05 February 2021

This crosswalk identifies the differences between the revised *International Generic Indicators (IGI) addendum IGI for the use of Highly Hazardous Pesticides* FSC-STD-60-004a draft 2-0 and the previous version (draft 1-0). The changes in the revised version are identified by colour coding (see legend below).

Legend of identifying change	
(blank)	No change
	No conceptual change. Format changed
	Revised content
	New content
	Removed content from the previous version

Content	Change to previous version
Introduction	
<p>A. Objective The objective of this document is to provide a set of IGIs for the use and risk management of HHPs, which facilitate the implementation of FSC-POL-30-001 V3-0 FSC Pesticides Policy. This set of indicators will be incorporated into the existing FSC-STD-60-004 International Generic Indicators in two different sections:</p>	No change
<p>a) The International Generic Indicators under Criterion 10.7 in Section F of this document will be placed under Criterion 10.7, replacing the current indicator 10.7.2.</p>	Language simplified and clarified.

	<p>b) The International Generic Indicators in Annex 'International Generic Indicators for the use and risk management of Highly Hazardous Pesticides (HHPs) in Section F of this document will be incorporated as an Annex to the next version of FSC-STD-60-004 International Generic Indicators</p>	
	<p>The IGIs have been developed considering:</p> <ul style="list-style-type: none"> • The exposure elements and variables described in FSC-POL-30-001 V3-0 FSC Pesticides Policy. • Research into less hazardous alternatives. • Engagement with interested and/or affected stakeholders. • Training requirements (FSC Principles and Criteria V5-2, Criteria 2.5 and 4.3). • Monitoring requirements (FSC Principles and Criteria V5-2, Criteria 8.2). • Use of personal protective equipment (FSC Principles and Criteria V5-2, Criteria 2.3). 	<p>No change</p>
	<ul style="list-style-type: none"> • Derogation procedure and derogation conditions based on the previous version of the Pesticides Policy. <p>This document also presents instructions for Standard Developers on how to incorporate the IGIs to National Standards when developing indicators for restricted and highly restricted HHPs in the country.</p>	<p>Added more clarity about the aim of the HHPs IGIs and the use.</p>
	<p>B. Scope</p> <p>The IGIs for HHPs will be a mandatory starting point for the Standard Development Groups to develop national indicators for National Forests Stewardship Standards (NFSS). Standard Development Groups shall consider the Instructions for Standard Developers, and all the IGIs, with the option to adopt, adapt, drop or add indicators as appropriate and relevant nationally. Justification for adapting, dropping or adding new indicators shall be presented, as indicated in the generic transfer procedure (FSC-PRO-60-006). The indicators for HHPs in the National Forests Stewardship Standards</p>	<p>Language clarified.</p>

	<p>are developed following FSC-STD-60-006 Process Requirements for the Development and Maintenance of National Forest Stewardship Standards.</p> <p>Certification Bodies developing Interim National Standards shall adopt these additional IGI into the Interim National Standards or adopt national indicators and locally relevant thresholds to HHPs from a country with similar pest problems and forest conditions, upon approval by FSC IC.</p>	
	<p>C. Effective and validity date</p> <p>Approval date XXX</p> <p>Publication date XXX</p> <p>Effective date XXX</p> <p>Period of validity XXX</p>	No change
	<p>D. References</p> <p>The following referenced documents are relevant for the application of this document.</p> <p>For references without a version number, the latest edition of the referenced document (including any amendments) applies.</p> <p><i>FSC-STD-01-001 FSC Principles and Criteria</i></p> <p><i>FSC-STD-60-004 International Generic Indicators</i></p> <p><i>FSC-STD-01-002 FSC Glossary of Terms</i></p> <p><i>FSC-POL-30-001 FSC Pesticides Policy</i></p>	

	<p><i>FSC-STD-60-006 Process requirements for the development and maintenance of National Forest Stewardship Standards</i></p> <p><i>FSC-PRO-60-006 Development and Transfer of NFSS to FSC P&C V5-1</i></p>	<p>Two more references added: FSC-STD-60-006 & FSC-PRO-60-006</p>
	<p>E. Terms and definitions</p> <p>Active ingredient: part of the product that provides the pesticidal action (Source: FAO International Code of Conduct on Pesticide Management & http://www.fao.org/pesticide-registration-toolkit/information-sources/terms-and-definitions/terms-and-definitions-s).</p>	<p>Definition added.</p>
	<p>Allee effect: a scenario in which populations at low numbers are affected by a positive relationship between population growth rate and density (Source: <i>Courchamp et al. 1999. Trends in Ecology and Evolution: Vol 14, page 405-410</i>) (e.g. goldfish population is growing more rapidly when there are more individuals within the tank).</p>	<p>Definition deleted – combined to the definition of ‘critical population density’.</p>
	<p>Acute poisoning: An acute poisoning is any illness or health effect resulting from suspected or confirmed exposure to a pesticide within 48 hours. Warfarins, superwarfarins and coumarins are an exception to this rule as the onset of laboratory findings or symptoms may be delayed greater than 48 hours. (Source: adapted from FAO & WHO International Code of Conduct on Pesticide Management: Rome, 2014).</p>	<p>Definition added</p>
	<p>Affected stakeholder: any person, group of persons or entity that is or is likely to be subject to the effects of the activities of a Management Unit. Examples include but are not restricted to (for example in the case of downstream landowners), persons, groups of persons or entities located in the neighbourhood of the Management Unit.</p> <p>The following are examples of affected stakeholders: local communities, Indigenous Peoples, workers, forest dwellers, neighbours, downstream landowners, local processors, local businesses, tenure and use rights holders, including landowners, organizations authorized or</p>	<p>Definition added. Source: FSC-STD-01-001 V5-2 <i>Principles and Criteria for Forest Stewardship</i>).</p>


	known to act on behalf of affected stakeholders, for example social and environmental NGOs, labour unions, etc. (Source: FSC-STD-01-001 V5-2 <i>Principles and Criteria for Forest Stewardship</i>).	
	Chemical pesticide: synthetically produced pesticide. (Source: FSC-POL-30-001 V3-0 FSC Pesticides Policy).	Definition added. Source: FSC-POL-30-001 V3-0 FSC Pesticides Policy
	Chronic toxicity: Adverse effects that persist over a long period of time whether or not they occur immediately upon exposure or are delayed following continuous or intermittent long-term contact between an agent and a non-target. (Source: Based on FAO & WHO International Code of Conduct on Pesticide Management, 2016).	Definition added.
	Critical population density: Maximum acceptable number or density of individuals in a pest population, beyond which the pest threatens the achievement of management objectives. Assessment of the critical population density should take into account historical records from the affected area, the type of pest (insects, weeds, pathogens, etc.), and how the pest population is likely to change in relation to its density, including situations in which small populations show a positive relationship between population density and growth rate (the Allee effect). (Source: International Code of Conduct on the Distribution and use of Pesticides 2006).	Definition revised to add more clarity.
	Exclusion zone: Area in which chemical pesticides are used, and which people are prevented from entering during and after pesticide application in order to avoid unacceptable risk of exposure. The exclusion zone remains in force until the risk of exposure has reduced to an acceptable level (the period of re-entry).	Definition revised to add more clarity.
	Fair compensation: remuneration that is proportionate to the magnitude and type of services rendered by another party or of the harm that is attributable to the first party (Source: FSC-STD-60-004 V1-0 <i>EN International Generic Indicators</i>)	Definition added. Source: FSC-STD-01-001 V5-2 <i>Principles and Criteria for Forest Stewardship</i>).

	<p>Governmental order: the use of a specific chemical pesticide is ordered or carried out by governmental authorities independent of the Organization. (Source: FSC-POL-30-001 V3-0 FSC Pesticides Policy).</p>	<p>Definition added. Source: FSC-POL-30-001 V3-0 FSC Pesticides Policy</p>
	<p>Highly hazardous pesticide (HHP): chemical pesticides that are acknowledged to present particularly high levels of acute or chronic hazards to health and environment according to internationally accepted classification systems, or are listed in relevant binding international agreements or conventions, or contain dioxins, or heavy metals. In addition, pesticides that appear to cause severe or irreversible harm to health or the environment under conditions of use in a country may be considered to be and treated as highly hazardous (Source: FSC-POL-30-001 V3-0 FSC Pesticides Policy).</p> <p>FSC distinguishes between FSC prohibited HHPs, FSC highly restricted HHPs and FSC restricted HHPs:</p> <ul style="list-style-type: none"> - FSC prohibited HHPs: chemical pesticides that: a) are listed or recommended for listing under Annex A (elimination) of the Stockholm Convention on Persistent Organic Pollutants or Annex III of the Rotterdam Convention on the Prior Informed Consent Procedure, or listed under the Montreal Protocol on Substances that Deplete the Ozone Layer, or b) are acutely toxic and that can induce cancer (carcinogenic and likely to be carcinogenic), or c) contain dioxins or d) contain heavy metals). - FSC highly restricted HHPs: chemical pesticide presenting two or three out of the following hazards: acute toxicity, chronic toxicity and environmental toxicity. - FSC restricted HHPs: chemical pesticide presenting one out of three of the following hazards: acute toxicity, chronic toxicity and environmental toxicity. 	<p>No change</p>

	<p>Integrated pest management (IPM): careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations, encourage beneficial populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human and animal health and/or the environment. IPM emphasizes the growth of a healthy forest with the least possible disruption to ecosystems and encourages natural pest control mechanisms (Source: Based on <i>FAO International Code of Conduct on Pesticide Management</i> & http://www.fao.org/pesticide-registration-toolkit/information-sources/terms-and-definitions/terms-and-definitions-s).</p>	<p>Definition added. Source: FSC-STD-01-001 V5-2 <i>Principles and Criteria for Forest Stewardship</i>).</p>
	<p>Interested stakeholders: any person, group of persons, or entity that has shown an interest, or is known to have an interest, in the activities of a Management Unit. The following are examples of interested stakeholders: conservation organizations, for example environmental NGOs; labour (rights) organizations, for example labour unions; human rights organizations, for example social NGOs; local development projects; local governments; national government departments functioning in the region; FSC National Offices; experts on particular issues, for example High Conservation Values. (Source: FSC-STD-01-001 V5-2 <i>Principles and Criteria for Forest Stewardship</i>).</p>	<p>Definition added</p>
	<p>Intervention threshold: Population density level where the controlling measures of the targeted pest should start. It is determined in the IPM system and it is usually lower than the <i>critical population density</i>* level.</p>	<p>Definition revised to add more clarity.</p>
	<p>Medical Biomonitoring: Analysis of a chemical pesticide or one of its metabolites in the human body, using samples of substances such as blood, urine or breastmilk. (Source: Based on FAO and WHO (2016). <i>International Code of Conduct on Pesticide Management: Guidelines on Highly Hazardous Pesticides</i>. FAO & WHO, Rome.)</p>	<p>Definition added</p>
	<p>Non-target species: those species either directly or indirectly vulnerable to the adverse effects of the pesticide and which are not the target of said pesticide. (Source: Based on FAO & WHO and European Food Safety Authority (EFSA) 2009)</p>	<p>Definition revised to add more clarity.</p>


	The Organization: the person or entity holding or applying for certification and therefore responsible for demonstrating compliance with the requirements upon which FSC certification is based (Source: <i>FSC-STD-01-001 V5-2 Principles and Criteria for Forest Stewardship</i>).	Definition added. Source: <i>FSC-STD-01-001 V5-2 Principles and Criteria for Forest Stewardship</i> .
	Pest: any species, strain or biotype of plant, animal or pathogenic agent injurious to plants and plant products, materials or environments and includes vectors of parasites or pathogens of human and animal disease and animals causing public health nuisance (Source: <i>FAO International Code of Conduct on Pesticide Management</i> & http://www.fao.org/pesticide-registration-toolkit/information-sources/terms-and-definitions/terms-and-definitions-s).	Definition added
	Pesticide: any substance, or mixture of substances of chemical or biological ingredients intended for repelling, destroying or controlling any pest, or regulating plant growth (Source: <i>FAO International Code of Conduct on Pesticide Management</i>). This definition includes insecticides, rodenticides, acaricides, molluscicides, larvicides, nematocides, fungicides and herbicides.	Definition added
	Pesticide Buffer zone: the distance between the point of direct pesticide application and the nearest boundary of a sensitive habitat, unless otherwise specified on a product label. (Source: Based on FAO & WHO International Code of Conduct on Pesticide Management, 2016).	Definition revised from 'buffer zone' to 'pesticides buffer zone' and more clarity added.
	Preadolescence: the period of human development just preceding adolescence; specifically: the period between the approximate ages of 9 and 12.	Definition added
	Repair: process of assisting the recovery of environmental values and human health.	Definition added
	Risk: the probability of an unacceptable negative impact arising from any activity in the management unit combined with its seriousness in terms of consequences (Source: <i>FSC-STD-01-001 V5-2 Principles and Criteria for Forest Stewardship</i>).	Definition added. Source: <i>FSC-STD-01-001 V5-2 Principles and Criteria for Forest Stewardship</i> .


Red	<p>Over-exposure: excessive exposure, especially to something harmful.</p> <p>Period of re-entry: time during which there is a risk of contamination.</p> <p>Persistent: continuing to exist or endure over a prolonged period.</p>	<p>Definition deleted. 'period of re-entry' definition is combined with Exclusion zone</p>	
	Blue	<p>Secondary or latent health impact: Further or dormant effects of the Highly Hazardous Pesticide that may emerge with a time delay (WHO Human Biomonitoring: facts and figures, Copenhagen, 2015)</p>	<p>Definition revised from 'secondary or latent impact' to 'secondary or latent health impact' and more clarity added.</p>
	Yellow	<p>Silviculture: the art and science of controlling the establishment, growth, composition, health and quality of forests and woodlands to meet the targeted diverse needs and values of landowners and society on a sustainable basis (Source: <i>Nieuwenhuis, M. 2000. Terminology of Forest Management. IUFRO World Series Vol. 9. IUFRO 4.04.07 SilvaPlan and SilvaVoc.</i>)</p>	<p>Definition added</p>
Yellow	<p>Stakeholder: see definitions for 'affected stakeholder' and 'interested stakeholder':</p>	<p>Please see definition of "affected stakeholder" and "interested stakeholder"</p>	
Blue	<p>Trigger Value: the value of toxicity exposure ratio (TER) above which exposure is considered to be an unacceptable risk. TER is calculated based on the acute toxicity value and exposure for each pesticide. Its value will be local and based on exposition parameters. (Source: Adapted from Connon, Geist & Werner, 2012).</p>	<p>Definition revised to add more clarity.</p>	
Red	<p>NOTE: all categories have a LD/LC50 for each pesticide (acute toxicity value). This is used to calculate the toxicity exposure ratio for each category by dividing it by the dose (measured exposure concentration/dose = TER). The EU developed trigger values for the TER for each category so if the calculated TER is above the trigger value it is a risk, if not it is not a risk (Source: Connon, Geist & Werner, 2012).</p>	<p>Deleted from Definition section, note is moved to under applicable hazard criterion indicators.</p>	

	<p>Verbal forms for the expression of provisions [Adapted from ISO/IEC Directives Part 2: Rules for the structure and drafting of International Standards]</p> <p>“shall”: indicates requirements strictly to be followed in order to conform to the document.</p> <p>“should”: indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required.</p> <p>“may”: indicates a course of action permissible within the limits of the document.</p> <p>“can”: is used for statements of possibility and capability, whether material, physical or causal.</p>	<p>Definition added</p>
	<p>F. INTERNATIONAL GENERIC INDICATORS INCLUDING ADJUSTMENTS TO CRITERION 10.7 TO REFLECT CHANGES IN FSC-POL-30-001 FSC PESTICIDES POLICY International Generic Indicators that will be incorporated under Criterion 10.7</p> <p>10.7 The <i>Organization* shall*</i> use integrated pest management and <i>silviculture*</i> systems which avoid, or aim at eliminating, the use of <i>chemical pesticides*</i>. The <i>Organization* shall*</i> not use any <i>chemical pesticides*</i> prohibited by FSC policy. When <i>pesticides*</i> are used, The <i>Organization* shall*</i> prevent, mitigate, and/or repair damage to <i>environmental values*</i> and human health. (C6.6 and C10.7 P&C V4)</p>	<p>No change</p>
	<p>Proposed Instructions and IGIs under 10.7</p> <p> INSTRUCTIONS FOR STANDARD DEVELOPERS: Standard Developers shall* include the relevant aspects of the 'FSC Guide to integrated pest, disease and weed management in</p>	<p>Format changed.</p>

	<p>FSC certified forests and plantations' (2009) and associated policies, guidelines, advice notes and other FSC normative documents for the development of indicators (Indicator 10.7.1).</p> <p>Standard Developers shall* either reference or include the relevant aspects of the ILO document "Safety in the use of chemicals at work" (Geneva, ILO, 1993) or any national interpretation of this document in National Standards (Indicator 10.7.4).</p> <p>Standards Developers shall consider the Annex 'International Generic Indicators for the use and risk management of Highly Hazardous Pesticides (HHP)' and develop national indicators for HHP used or likely to be used in the country.</p> <p>Standards Developers should consider listing the requirements in FSC-POL-30-001 V3-0 FSC Pesticides Policy Clause 4.12 in National Standards.</p> <p>10.7.1 Integrated pest management, including selection of <i>silviculture</i>* systems, is used to avoid, or aim to eliminate, the frequency, extent and amount of chemical <i>pesticide</i>* applications, and result in non-use or overall reductions in applications.</p>	
	<p>10.7.2 Prior to using <i>chemical pesticides</i>*, the requirements of the ESRA framework for Organizations (FSC-POL-30-001 V3-0 FSC Pesticides Policy clause 4.12) are met.</p>	<p>Content revised.</p> <p>Previous 10.7.2: Chemical pesticides* prohibited by FSC's Pesticide Policy are not used or stored in the Management Unit* unless FSC has granted derogation.</p>
	<p>Previous 10.7.3:</p> <p>10.7.3 A decision process and rationale are in place for selecting a pest management method that considers <i>economic viability</i>* and effectiveness to determine the lowest risk option(s).</p>	<p>Deleted. Please see revised version below.</p>

	10.7.3 ESRA is reviewed and, if necessary, revised within the five-year certificate cycle.	Revised.
	<p>10.7.4 Affected and <i>interested stakeholders</i>* are informed about the ESRA process and provided with an opportunity for culturally <i>appropriate</i>* <i>engagement</i>*.</p> <p>10.7.5 A decision process and rationale are in place to select the option that demonstrates least social and environmental damages, more effectiveness and equal or greater social and environmental benefits.</p>	Newly added.
	<p>10.7.6 Records of <i>pesticide</i>* usages are maintained, including trade name, active ingredient, quantity of active ingredient used, period of use, number and frequency of applications, location and area of use and reason for use.</p> <p>10.7.7 The use of <i>pesticides</i>* complies with the ILO document “Safety in the use of chemicals at work” regarding requirements for the transport, storage, handling, application and emergency procedures for clean-up following accidental spillages.</p> <p>10.7.8 If <i>pesticides</i>* are used, application methods minimize quantities used, while achieving effective results, and provide effective <i>protection</i>* to surrounding <i>landscapes</i>*.</p> <p>10.7.9 Damage to <i>environmental values</i>* and human health from <i>pesticide</i>* use is prevented and mitigated or repaired where damage occurs.</p> <p>10.7.10 When pesticides* are used:</p> <ol style="list-style-type: none"> 1) The selected <i>pesticide</i>*, application method, timing and pattern of use offers the least risk to humans and <i>non-target species</i>*; and 2) Objective evidence demonstrates that the <i>pesticide</i>* is the only effective, practical and cost-effective way to control the pest. 	Format changed.

	G. INTERNATIONAL GENERIC INDICATORS INCLUDING ADJUSTMENTS TO CRITERION 10.7 TO REFLECT CHANGES IN <i>FSC-POL-30-001 FSC PESTICIDES POLICY</i>	
	 INSTRUCTIONS FOR STANDARD DEVELOPERS:	
	<p>Standard Developers <i>shall*</i> follow Annex 4 of FSC-POL-30-001 FSC Pesticide Policy V3-0: Procedure to implement policy requirements for ESRA framework at national level, prior to considering this set of International Generic Indicators. This procedure describes how Standards Developers shall use Annex 2 to establish the conditions for the use of highly restricted and restricted HHPs at national level.</p> <p>Standard Developers <i>shall*</i> incorporate the IGIs to the national context and develop locally relevant thresholds or conditions for the use of the relevant FSC Highly Restricted HHPs and FSC Restricted HHPs permitted for use.</p> <p>Standard Developers <i>shall*</i> engage with <i>stakeholders*</i> in this process as per FSC-STD-60-006 Process Requirements for the Development and Maintenance of National Forest Stewardship Standards and FSC-PRO-60-007 Structure, Content and Development of Interim National Standards.</p> <p>Standard Developers <i>shall*</i> consider <i>workers*</i> rights in relation to use of pesticides in accordance with the ILO Code of Practice Safety in the use of chemicals at work, including the right to refuse to use HHPs.</p>	Newly added.

	<p>Indicators for the use and risk management of specific HHPs are recommended to be compiled into an annex of the National Standards, but they can be inserted to the body of the National Standard. Also, combining these two options is possible.</p> <p>In case indicators are inserted to the national standard, the need for the HHP indicators should be considered at least for following criteria: C1.3; C1.6; C2.1; C2.3; C2.5; C2.6; C3.1; C3.2; C4.1; C4.2; C4.5; C4.6; C4.7; C5.1; C6.1; C6.2; C6.3; C6.6; C6.7; C7.4; C7.6; C8.2; C8.3; C8.4; C9.1; C9.3; C10.7; C10.8; C10.12. (The list is based on desk studies conducted in South Africa, New Zealand, UK and Brazil. The studies are available from FSC IC by request to forestmanagement@fsc.org).</p>	No change
	<p>INTERNATIONAL GENERIC INDICATORS FOR ALL HHPS</p> <p> INSTRUCTIONS FOR STANDARD DEVELOPERS:</p> <p>Standard Developers <i>shall*</i> determine, using <i>Best Available Information*</i>, whether <i>critical population density*</i> is an appropriate measure to determine <i>intervention threshold*</i> for a particular pest.</p>	No change
	<p>Standard Developers <i>shall*</i> develop indicators to ensure that where mobile HHPs are used and depending on application method, <i>buffer zones*</i> are established to protect environmental and social values.</p> <p>Exposure elements are types of values that may be negatively affected by chemical pesticide use.</p> <p>At a minimum the following environmental values, with specific components in brackets, shall be considered to identify and assess the risks of chemical pesticide use:</p> <ul style="list-style-type: none"> • Soil (erosion, degradation, biota, carbon storage). • Water (ground water, surface waters, water supplies). 	Deleted from the previous version.

	<ul style="list-style-type: none"> • Atmosphere (air quality, greenhouse gasses). • Non-target species (vegetation, wildlife, bees and other pollinators, pets). • Non-timber forest products (as FSC-STD-01-001 V5-2 FSC Principles and Criteria, criterion 5.1). • High Conservation Values (particularly HCV 1-4) • Landscape (aesthetics, cumulative impacts) • Ecosystem services (water, soil, carbon sequestration, tourism). <p>At a minimum the following social values, with specific components in brackets, shall be considered to identify and assess the risks of chemical pesticide use. These social values should be considered with regards to workers, including migrant and seasonal workers, workers' families, neighbours, local communities, Indigenous Peoples and visitors to the forest.</p> <ul style="list-style-type: none"> • High Conservation Values (especially HCV 5-6) • Health (fertility, reproductive health, respiratory health, dermatologic, neurological and gastrointestinal problems, cancer and hormonal imbalance); • Welfare; • Food and water; • Social infrastructure; (schools and hospitals, recreational infrastructure, infrastructure adjacent to the management unit), • Economic viability (agriculture, livestock, tourism); and • Rights (legal and customary). 	
		<p>Standard Developers <i>shall</i>* consider total formulations including active ingredient and inert or co-formulants (e.g. surfactant, wetter, adjuvant, additive).</p>

	Standard Developers <i>shall*</i> specify research, identify and test alternatives to replace FSC highly restricted HHPs and restricted HHPs with less hazardous alternatives, subject to <i>scale, intensity and risk*</i> .	
	1.1 A documented Integrated Pest Management (IPM) system, consistent with the 'FSC Guide to Integrated Pest, Disease and Weed Management' in FSC certified forests and plantations, is in place to avoid, or aim to eliminate, the use of chemical pesticides in management units (MU), and minimize risks to human health and the environment while maintaining economically viable management.	Revised to add more clarity.
	1.2 In addition to existing IGI 10.7.3 (proposed IGI 10.7.4) requirements, the following records of HHP usage and IPM implementation are maintained, subject to scale, intensity and risk of management activities	Revised to add more clarity.
	a) level of target pest infestation,	No change
	b) the decision process and rationale for selecting a Highly Restricted or Restricted HHP over a non HHP or <i>non-chemical pesticide*</i> or <i>non-chemical pesticide*</i> control method,	Statement: or <i>non-chemical pesticide*</i> added.
	c) risk assessment for operator safety, detailing the processes to be followed in carrying out the HHP application, following appropriate legislation or guidelines, d) assessment of economic impact caused by the pest and the HHP, e) application methodology, f) who made the application,	No change
	g) total annual volume of active ingredient used,	Revised from 'total annual volume used' to 'total annual volume of active ingredient used'.

	<ul style="list-style-type: none"> h) time and date of treatment, i) the weather conditions at time of application, j) any disposals or spillage, including action taken to prevent contamination and/or harm, k) evaluation and monitoring of the effectiveness of treatment, l) mapped boundaries of treatment area and pest affected area when relevant. 	No change
	<p>1.3 ESRA(s), site operational plans, and site-specific risk mitigation and monitoring measures for HHPs take account of <i>secondary or latent health impacts*</i>, <i>sublethal effects*</i> and/or <i>chronic toxicity*</i>.</p>	Newly added.
	<p>1.4 Control measures are proactively considered and/or implemented before <i>intervention threshold*</i>, and/or <i>critical population densities*</i> of the targeted pest are reached.</p> <p>1.5 A trend of replacement, reduction and/or removal of HHPs over time is demonstrated and/or otherwise justified.</p> <p>1.6 Use of HHPs is limited to the minimum effective dose based on the label and <i>Best Available Information*</i></p> <p>NOTE: In some cases, effective dose range rather than a single dose will need to be determined, depending on the pest.</p> <p>1.7 Directly or potentially <i>affected stakeholders*</i> are provided with safety information, through <i>culturally appropriate* engagement*</i>, before HHPs are used.</p> <ul style="list-style-type: none"> a) The safety information for the particular HHP is provided in a culturally appropriate and accessible format. 	No change

	b) The information complies with World Health Organization in Guidelines for personal protection in handling the pesticides.	
	c) An <i>exclusion zone*</i> is established where a HHP and/or application method requires one, as instructed by the label, or other applicable sources, to avoid <i>workers*</i> and <i>affected stakeholders*</i> from being exposed to harm.	Revised from the previous version. Below is the previous version: <i>An exclusion zone*</i> is established for the <i>period of re-entry*</i> , where a HHP and/or application method requires one, as instructed by the label, or other applicable sources, to avoid workers and <i>affected stakeholders*</i> from being exposed to harm.
	1.8 A <i>pesticides buffer zone*</i> is established where a HHP and/or application method requires one to ensure the protection of environmental and cultural values.	Revised from 'buffer zone' to 'pesticides buffer zone'.
	1.9 In the case of an emergency situation or by governmental order the use of Highly Restricted and Restricted HHPs conforms with the use of FSC prohibited HHPs specified in Annex 3 of FSC-POL-30-001 <i>FSC Pesticides Policy</i> .	No change
	<i>Previous version 1.9: Free, prior and informed consent*</i> is granted by <i>Indigenous Peoples*</i> and <i>local communities*</i> prior to HHPs use that affect their rights, resources, <i>lands and territories*</i> , wherever:	Deleted from the previous version.

	<p>a) it occurs adjacent to these <i>lands and territories*</i>, (see definition of <i>local communities*</i>)</p> <p>b) has a <i>secondary or latent impact*</i>,</p> <p>c) has the potential for <i>sublethal effects*</i> and/or chronic effects.</p>																			
	<p>1.10 Programmes are in place that have clear actions, timelines, targets and resources allocated to research, identify and test alternatives to replace FSC highly restricted HHPs and restricted HHPs with less hazardous alternatives.</p> <p>1.11 Training programmes for the use of HHPs include informing <i>workers*</i> of known risks to human health and environmental values; and mitigation measures identified in the ESRA</p>	Newly added.																		
	<p>H. INTERNATIONAL GENERIC INDICATORS FOR HAZARD CRITERIA</p> <table border="1"> <thead> <tr> <th>Hazard Groups</th> <th>Number</th> <th>Hazard Criteria</th> </tr> </thead> <tbody> <tr> <td>Relevant International Agreements or conventions</td> <td>1</td> <td>Relevant International Agreements or conventions</td> </tr> <tr> <td>Acute toxicity</td> <td>2</td> <td>Acute toxicity to mammals and birds</td> </tr> <tr> <td rowspan="4">Chronic toxicity</td> <td>3</td> <td>Carcinogenicity</td> </tr> <tr> <td>4</td> <td>Mutagenicity to mammals</td> </tr> <tr> <td>5</td> <td>Developmental and reproductive toxicity</td> </tr> <tr> <td>6</td> <td>Endocrine disrupting chemical (EDC)</td> </tr> </tbody> </table>	Hazard Groups	Number	Hazard Criteria	Relevant International Agreements or conventions	1	Relevant International Agreements or conventions	Acute toxicity	2	Acute toxicity to mammals and birds	Chronic toxicity	3	Carcinogenicity	4	Mutagenicity to mammals	5	Developmental and reproductive toxicity	6	Endocrine disrupting chemical (EDC)	No change
Hazard Groups	Number	Hazard Criteria																		
Relevant International Agreements or conventions	1	Relevant International Agreements or conventions																		
Acute toxicity	2	Acute toxicity to mammals and birds																		
Chronic toxicity	3	Carcinogenicity																		
	4	Mutagenicity to mammals																		
	5	Developmental and reproductive toxicity																		
	6	Endocrine disrupting chemical (EDC)																		

Environmental toxicity	7	Acute toxicity to aquatic organisms
	8	Persistence in soil or water and soil sorption potential and bio-magnification and bio-accumulation
Dioxins	9	Dioxins (residues or emissions)
Heavy metals	10	Heavy metals

Table 1. Hazard Groups and Criteria for the identification of highly hazardous pesticides (Source: FSC-POL-30-001 FSC Pesticides Policy).

1.Indicators for HHPs that meet Hazard Criterion 1 (Relevant international agreements or conventions)



INSTRUCTIONS FOR STANDARD DEVELOPERS:

Compliance with IGIs is required in Annex 3 of the FSC Pesticides Policy since these are prohibited HHPs.. This instruction is expected to be applied by those Standards Developers that choose to strengthen the requirements for prohibited HHPs.

No change


Standard Developers *shall** refer directly to the following documents where relevant to the HHPs in question or bring the relevant aspects into National Standards. Standard Developers *may** make use of any national interpretations of these documents in laws, regulations, codes of practice, and other governmental guidance

Revised from previous version.
Below is the previous version:
Standard Developers *shall** either reference or include the relevant aspects of the following documents or


		any national interpretation of these documents in National Standards and Interim National Standards.
	<ul style="list-style-type: none"> • FSC POL-30-001a FSC Lists of highly hazardous pesticides. • Global Harmonized System of Classification and Labelling of Chemicals (GHS) 8th Edition. United Nations (UN), New York & Geneva, 2019. Part 3, Chapters 3.1-, 3.5- 3.9 and Part 4 Chapter 4.2. • The WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification, 2009. World Health Organization (WHO), International Programme on Chemical Safety (IPCS) and Inter-Organization Programme for Sound Management of Chemicals (IOMC). Table 1, Table 6, Table 7. • International tools for preventing local pesticide problems: A consolidated guide to chemical codes and conventions. European Centre on Sustainable Policies for Human and Environmental Rights (ECSPHR), 2008. Section 3, Section 5.2.1. • International Code of Conduct on Pesticide Management. Guidelines for personal protection when handling and applying pesticides. 9th draft, 2019. FAO & WHO. Part 1, Sections 1.1, 1.3, 1.4 and Annex 6. <p>Standard Developers <i>shall</i>* consider total formulations including active ingredient and inert or co-formulants (e.g. surfactant, wetter, adjuvant, additive).</p>	No change
	NOTE: See Appendix 1 for GHS EDC toxicity category PPE	Removed from the previous version Instructions for Standard Developers. Now it's moved to indicator.
	Standard Developers <i>shall</i> * prioritize the development of indicators for the identification of harm and identify the required treatment before looking at compensation when it comes to human health.	Newly added.

	1.1	When HHPs that meet Hazard Criteria 1 are used, Annex 3. Procedure for the exceptional use of FSC prohibited HHPs in FSC-POL-30-001 FSC Pesticides Policy is applied.	No change
	1.2	Medical <i>biomonitoring*</i> of <i>workers*</i> exposed to HHPs that meet these Hazard Criteria is conducted following a methodology based on an analysis of current <i>Best Available Information*</i> .	Newly added & format (order of the indicators) changed.
	1.3	Appropriate actions are taken to avoid harm, as identified through the application of the identified <i>medical biomonitoring*</i> methodology.	Revised & format (order of the indicators) changed. Previous version: d) Pre-screening and post screening of workers exposed to HHPs listed that meet Hazard Criterion 1 is conducted and appropriate actions are taken to avoid harm. (See Textbox 1)
	1.4	Health and safety practices for <i>workers*</i> and <i>affected stakeholders*</i> are developed and implemented.	Revised. Previous version: Health and safety practices for <i>workers*</i> and <i>affected stakeholders*</i> are developed and implemented in accordance with the GHS toxicity categories chapter 3 and 4.
	1.5	Harm caused to <i>workers*</i> and <i>affected stakeholders*</i> by over-exposure to HHPs in these Hazard Criteria is treated and/or <i>fair compensation*</i> is provided.	No change

	<p>NOTE: Standards Developers shall refer to Appendix 1: Personal Protective Equipment (PPE), Medical Biomonitoring, and References By Hazard Groups where current international <i>Best Available Information</i>* for each of the relevant indicators can be found.</p>	<p>Newly added.</p>
	<p>Deleted indicators from the previous version:</p> <p>2.2 When required to use HHPs listed in Hazard Criterion 1 by governmental order, the government is informed of the risks, including the indicators for Hazard Criterion 1 and requests that non prohibited alternatives are used.</p> <div data-bbox="300 628 1393 1174" style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>Textbox 1: Biomonitoring for Hazard Criterion 1</p> <ol style="list-style-type: none"> 1. For organochlorines: <ol style="list-style-type: none"> 1.1 Whole blood test- 1cc anti-coagulated in sodium heparin (refrigerated). Taken before and after spraying. Analysed by Comet assay (Yusa et al., 2015) 1.2 Hair test – 50-200mg, cleaned and frozen (Yusa et al., 2015) 2. For organochlorines and POPs Breast milk test – 1-5cc, prepared and refrigerated. (Sannolo et al., 1999) 3. For HCH and methyl bromide Blood serum and blood plasma tests – 1cc anti-coagulated in sodium heparin (refrigerated). Tests for body burden. Determined by LC-MS and analysed by Comet assay (Doganlar et al., 2018) </div>	<p>Deleted from the previous version.</p> <p>Text boxes are moved to Annex 3.</p> <p><i>Guide to biomonitoring needed according to FSC Pesticides Policy Hazard Criterion</i> in the synopsis report.</p>
	<p>Hazard Group Acute toxicity</p> <p>1. Indicators for HHPs that meet Hazard Criterion 2 (Acute toxicity to mammals and birds)</p>	<p>Revised. Previous version: Standard Developers <i>shall</i>* either reference or include the relevant aspects of the following documents or any national</p>

	 <p>INSTRUCTIONS FOR STANDARD DEVELOPERS:</p> <p>Standard Developers <i>shall*</i> refer directly to the following documents where relevant to the HHPs in question or bring the relevant aspects into National Standards. Standard Developers <i>may*</i> make use of any national interpretations of these documents in laws, regulations, codes of practice, and other governmental guidance.</p>	<p>interpretation of these documents in National Standards and Interim National Standards.</p>
	<ul style="list-style-type: none"> • Severely Hazardous Pesticides formulations toolkit (sections 4 and 5) (UNEP FAO). • Safety and Health in Forestry work. International Labour Office (ILO), Geneva. ILO code of practice. 1998. Part III, Chapters 6, 7 and 9. • The WHO Recommended Classification of Pesticides by Hazard and guidelines to classification. 2009. World Health Organization (WHO), International Programme on Chemical Safety (IPCS) and Inter-Organization Programme for Sound Management of Chemicals (IOMC). Tables 1,2, 3 and 7. • International Code of Conduct on Pesticide Management. Guidelines on Highly Hazardous Pesticides FAO &WHO, 2016. Chapters 2,3 and 6. • Sound and Sustainable Management of Chemicals. A training manual for workers and trade unions. United Nations Environment Programme (UNEP).2008. Module 2. • Global Harmonized System of Classification and Labelling of Chemicals (GHS) 8th Edition. United Nations (UN), New York & Geneva, 2019. Part 3, Chapter 3.1. • Recognition and management of pesticide Poisonings.6th Edition. 2013. United States Environmental Protection Agency (EPA), Office of Pesticide Programmes. Section I Chapter 2, Section VI and Section VII. Cross reference with 2.1.3. These are the biomonitoring indicators and signs and symptoms of acute poisoning. • International Code of Conduct on Pesticide Management. Guidelines for personal protection when handling and applying pesticides. 9th draft. 2019. FAO & WHO. Part 1, Sections 1.1, 1.3, 1.4 and Annex 6. 	<p>No change</p>


	Standard Developers <i>shall*</i> consider total formulations including active ingredient and inert or co-formulants (e.g. surfactant, wetter, adjuvant, additive).	
	NOTE: See Appendix 1 for GHS EDC toxicity category PPE	Removed from the previous version. Now it's moved to indicator.
	Standard Developers <i>shall*</i> prioritize the development of indicators for the identification of harm and identify the required treatment before looking at compensation when it comes to human health.	Revised. Previous version: Standard Developers shall* prioritize indicators for the identification of the harm and required treatment before looking at compensation when it comes to human health.
	2.1 <i>Medical biomonitoring*</i> of workers* exposed to HHPs that meet these Hazard Criteria is conducted following a methodology based on an analysis of current <i>Best Available Information*</i> .	Revised. Previous version: Pre-screening for pesticides persistent* in humans, and regular medical biomonitoring of workers exposed to HHPs in Hazard Criterion 2 is conducted and appropriate actions are taken to avoid harm.
	2.2 Appropriate actions are taken to avoid harm, as identified through the application of the identified <i>medical biomonitoring*</i> methodology.	Newly added.

	2.3 Health and safety practices for <i>workers*</i> and <i>affected stakeholders*</i> are developed and implemented.	Revised. Previous version: 3.1 Health and safety practices for <i>workers*</i> and <i>affected stakeholders*</i> are developed and implemented in accordance with the GHS acute toxicity categories (see Textbox 2).
	NOTE: For Hazard Criterion 2, a preadolescent* is particularly at risk from the effects of these HHPs.	Newly added.
	2.4 Harm caused to <i>workers*</i> and <i>affected stakeholders*</i> by over-exposure to HHPs in these Hazard Criteria is treated and/or <i>fair compensation*</i> is provided.	No change
	NOTE: Standards Developers shall refer to Appendix 1: Personal Protective Equipment (PPE), Medical Biomonitoring, and References By Hazard Groups where current international <i>Best Available Information*</i> for each of the relevant indicators can be found.	Newly added.
	Hazard Group Chronic Toxicity	
	3. Indicators for HHPs that meet Hazard Criterion 3 (Carcinogenicity)	
	 INSTRUCTIONS FOR STANDARD DEVELOPERS:	
	Standard Developers <i>shall*</i> refer directly to the following documents where relevant to the HHPs in question or bring the relevant aspects into National Standards. Standard Developers <i>may*</i> make use of any national interpretations of these documents in laws, regulations, codes of practice, and other governmental guidance.	Revised. Previous version: Standard Developers <i>shall*</i> either reference or include the relevant aspects of the following documents or any national interpretation of these documents in National Standards and Interim National Standards.


	<ul style="list-style-type: none"> • Severely Hazardous Pesticides formulations toolkit (sections 4 and 5) (UNEP FAO). • FAO HHP protection of children in low to middle income countries (FAO 2015). • Global Harmonized System of Classification and Labelling of Chemicals (GHS) 8th Edition. United Nations (UN), New York & Geneva, 2019. Part 3, chapter 3.6. • International Code of Conduct on Pesticide Management. Guidelines for personal protection when handling and applying pesticides. 9th draft. 2019. FAO & WHO. Part 1, sections 1.1, 1.3, 1.4 and Annex 6. • Safety and Health in Forestry work. International Labour Office (ILO), Geneva. ILO code of practice. 1998. Part III, Chapters 6, 7 and 9. • The WHO Recommended Classification of Pesticides by Hazard and guidelines to classification. 2009. World Health Organization (WHO), International Programme on Chemical Safety (IPCS) and Inter-Organization Programme for Sound Management of Chemicals (IOMC). Tables 1,2, 3 and 7. • Understanding the Impacts of Pesticides on Children: A discussion paper. 2018. UNICEF. • Recognition and management of pesticide Poisonings.6th Edition. 2013. United States Environmental Protection Agency (EPA), Office of Pesticide Programmes. Chapter 1 deals with special populations and environmental justice (page 9) covering children's risk. • An NGO Guide to SAICM (The Strategic Approach to International Chemicals Management) 2008. Chapters 5.1.4 and 5.1.5 and 5.1.7 • International tools for preventing local pesticide problems: A consolidated guide to chemical codes and conventions. European Centre on Sustainable Policies for Human and Environmental Rights (ECSPHR), 2008. Chapter 3, section 4.2.5, 4.3.5 and Chapter 6. • Recognition and management of pesticide Poisonings.6th Edition. 2013. United States Environmental Protection Agency (EPA), Office of Pesticide Programmes. Section I chapter 2, section VI and section VII • Safety and Health in Forestry work. International Labour Office (ILO), Geneva. ILO code of practice. 1998. Part III, Chapters 6, 7 and 9. 	No change

	Standard Developers <i>shall*</i> consider total formulations including active ingredient and inert or co-formulants (e.g. surfactant, wetter, adjuvant, additive).	
	NOTE: See Appendix 1 for GHS EDC toxicity category PPE	Removed from the previous version. Now it's moved to indicator.
	Standard Developers <i>shall*</i> prioritize the development of indicators for the identification of harm and identify the required treatment before looking at compensation when it comes to human health.	Revised. Previous version: Standard Developers <i>shall*</i> consider that <i>children*</i> are more vulnerable to the carcinogenic effect of pesticides and need special consideration.
	3.1 <i>Medical biomonitoring*</i> of <i>workers*</i> exposed to HHPs that meet these Hazard Criteria is conducted following a methodology based on an analysis of current <i>Best Available Information*</i> .	Revised. Previous version: Regular medical biomonitoring (see Textbox 3) for acute and chronic pesticide indicators based on thresholds levels of workers regularly exposed to HHPs in Hazard Criterion 3 is conducted and appropriate actions are taken to avoid harm.
	3.2 Appropriate actions are taken to avoid harm, as identified through the application of the identified <i>medical biomonitoring*</i> methodology.	Newly added.
	3.3 Health and safety practices for <i>workers*</i> and <i>affected stakeholders*</i> are developed and implemented.	Revised. Previous version: Health and safety practices for <i>workers*</i> and <i>affected stakeholders*</i>

		(particularly <i>children</i> *) are developed and implemented.
	3.4 Harm caused to <i>workers</i> * and <i>affected stakeholders</i> * by over-exposure to HHPs in these Hazard Criteria is treated and/or <i>fair compensation</i> * is provided.	No change
	NOTE: Standards Developers shall refer to Appendix 1: Personal Protective Equipment (PPE), Medical Biomonitoring, and References By Hazard Groups where current international <i>Best Available Information</i> * for each of the relevant indicators can be found.	Newly added.
	<p>Textbox 3: Biomonitoring for Hazard Criterion 3</p> <p>Biomonitoring tests for Hazard Criterion 3 include (Yusa et al. 2015):</p> <ol style="list-style-type: none"> 1. Urine samples taken for carbamates, pyrethroids. <5ml 2. Urine samples taken for organophosphate insecticides. <5ml 3. Hair samples taken for organophosphate insecticides. 50 -200mg 4. Blood samples taken for organophosphate insecticides. 5cc anti-coagulated with sodium heparin (refrigerate) 5. Breast milk samples taken for organophosphate insecticides. <5ml 6. Meconium samples taken for organophosphate insecticides. Measures prenatal exposure. 0.5g dry weight needed 7. Sample analysis done using SPE methods. Analysis done using QuEChERS. <p>Erythrocyte acetylcholinesterase (AChE) testing before and after applications using Test-mate Model 400 device (EQM Research Inc). – for organophosphates and pyrethroids.</p>	Deleted from the previous version. Text boxes are moved to Annex 3. <i>Guide to biomonitoring needed according to FSC Pesticides Policy Hazard Criterion</i> in the synopsis report.

	<p>4. Indicators for HHPs that meet Hazard Criterion 4 (Mutagenicity)</p> <p> INSTRUCTIONS FOR STANDARD DEVELOPERS:</p> <p>Standard Developers <i>shall</i>* refer directly to the following documents where relevant to the HHPs in question or bring the relevant aspects into National Standards. Standard Developers <i>may</i>* make use of any national interpretations of these documents in laws, regulations, codes of practice, and other governmental guidance.</p>	<p>Revised. Previous version: Standard Developers <i>shall</i>* either reference or include the relevant aspects of the following documents or any national interpretation of these documents in National Standards and Interim National Standards.</p>
	<ul style="list-style-type: none"> • Severely Hazardous Pesticides formulations toolkit (sections 4 and 5) (UNEP FAO). • International tools for preventing local pesticide problems: A consolidated guide to chemical codes and conventions. European Centre on Sustainable Policies for Human and Environmental Rights (ECSPHR), 2008. Chapter 3, section 4.2.5, 4.3.5 and Chapter 6. • Recognition and management of pesticide Poisonings. 6th Edition. 2013. United States Environmental Protection Agency (EPA), Office of Pesticide Programmes. Section I chapter 2, section VI and section VII. • Global Harmonized System of Classification and Labelling of Chemicals (GHS) 8th Edition. United Nations (UN), New York & Geneva, 2019. Part 3, chapter 3.5. • International Code of Conduct on Pesticide Management. Guidelines for personal protection when handling and applying pesticides. 9th draft. 2019. FAO & WHO. Part 1, sections 1.1, 1.3, 1.4 and Annex 6. • Safety and Health in Forestry work. International Labour Office (ILO), Geneva. ILO code of practice. 1998. Part III, Chapters 6, 7 and 9. • The WHO Recommended Classification of Pesticides by Hazard and guidelines to classification. 2009. World Health Organization (WHO). International Programme on Chemical Safety (IPCS) and Inter-Organization Programme for Sound Management of Chemicals (IOMC). Tables 1,2,3 and 7. <p>Standard Developers <i>shall</i>* consider total formulations including active ingredient and inert or co-formulants (e.g. surfactant, wetter, adjuvant, additive).</p>	<p>No change</p>


	NOTE: See Appendix 1 for GHS EDC toxicity category PPE	Removed from the previous version. Now it's moved to indicator.
	Standard Developers <i>shall</i> * prioritize the development of indicators for the identification of harm and identify the required treatment before looking at compensation when it comes to human health.	Revised. Previous version: Women and their offspring are particularly vulnerable to the mutagenic effect of pesticides and need special consideration.
	4.1 <i>Medical biomonitoring*</i> of <i>workers*</i> exposed to HHPs that meet these Hazard Criteria is conducted following a methodology based on an analysis of current <i>Best Available Information*</i> .	Newly added.
	Deleted from the previous version: <i>Workers*</i> and <i>affected stakeholders*</i> are not exposed to and do not handle HHPs in Hazard Criterion 4.	Deleted from the previous version.
	4.2 Appropriate actions are taken to avoid harm, as identified through the application of the identified <i>medical biomonitoring*</i> methodology.	Newly added.
	4.3 Health and safety practices for <i>workers*</i> and <i>affected stakeholders*</i> are developed and implemented.	Revised. Previous version: Health and safety practices for <i>workers*</i> and <i>affected stakeholders*</i> are developed and implemented (see Textbox 4).
	4.4 Harm caused to <i>workers*</i> and <i>affected stakeholders*</i> by over-exposure to HHPs in these Hazard Criteria is treated and/or <i>fair compensation*</i> is provided.	No change

	<p>NOTE: Standards Developers shall refer to Appendix 1: Personal Protective Equipment (PPE), Medical Biomonitoring, and References By Hazard Groups where current international <i>Best Available Information*</i> for each of the relevant indicators can be found.</p>	<p>Newly added.</p>
	<p>Textbox 4: Biomonitoring for Hazard Criterion 4</p> <p>Biomonitoring tests for Hazard Criterion 4 include:</p> <ol style="list-style-type: none"> 1. Erythrocyte acetylcholinesterase (AChE) testing before and after applications using Test-mate Model 400 device (EQM Research Inc) 2. The urine matrix is representative of recent exposure as these are non-persistent pesticides that are rapidly metabolized and eliminated. Spot samples are easily collected, stored and transported. Sample preparation using SPE methods. Analysis is done using QuEChERS method. 5ml fresh samples required and refrigerated. (Yusa et al. 2015) 3. Serum levels of Mullerian hormone in women measured using spot hormone test (Burns & Pastoor, 2018) 4. Urinary metabolite 3-PBA tested using spot test to determine developmental disorders (childhood exposure) (Burns & Pastoor, 2018). 	<p>Deleted from the previous version. Text boxes are moved to Annex 3. <i>Guide to biomonitoring needed according to FSC Pesticides Policy Hazard Criterion</i> in the synopsis report.</p>
	<p>5. Indicators for HHPs that meet Hazard Criterion 5 (Developmental and reproductive toxicity)</p> <p> INSTRUCTIONS FOR STANDARD DEVELOPERS:</p> <p>Standard Developers <i>shall*</i> refer directly to the following documents where relevant to the HHPs in question or bring the relevant aspects into National Standards. Standard Developers</p>	<p>Revised. Previous version: Standard Developers <i>shall*</i> either reference or include the relevant aspects of the following documents or any national interpretation of these documents in National Standards and Interim National Standards.</p>

	<p><i>may*</i> make use of any national interpretations of these documents in laws, regulations, codes of practice, and other governmental guidance.</p>	
	<p>Note: Post 2018 product label will conform to GHS harmonized system of classification and labelling of chemicals (2019)</p> <ul style="list-style-type: none"> • Severely Hazardous Pesticides formulations toolkit (sections 4 and 5) (UNEP FAO). • Safety and Health in Forestry work. International Labour Office (ILO), Geneva. ILO code of practice. 1998. Part III, Chapters 6, 7 and 9. • The WHO Recommended Classification of Pesticides by Hazard and guidelines to classification. 2009. World Health Organization (WHO), International Programme on Chemical Safety (IPCS) and Inter-Organization Programme for Sound Management of Chemicals (IOMC). Tables 1,2, 3 and 7. • International Code of Conduct on Pesticide Management. Guidelines for personal protection when handling and applying pesticides. 9th draft. 2019. FAO & WHO. Part 1, sections 1.1, 1.3, 1.4 and Annex 6. • International Code of Conduct on Pesticide Management. Guidelines on Highly Hazardous f Pesticides FAO &WHO, 2016. Chapters 2,3 and 6. • Sound and Sustainable Management of Chemicals. A training manual for workers and trade unions. United Nations Environment Programme (UNEP).2008. Module 2. • Global Harmonized System of Classification and Labelling of Chemicals (GHS) 8th Edition. United Nations (UN), New York & Geneva, 2019. Part 3, Chapter 3.7. • Recognition and management of pesticide Poisonings.6th Edition. 2013. United States Environmental Protection Agency (EPA), Office of Pesticide Programmes. Section I chapter 2, section VI and section VII. <p>Standard Developers <i>shall*</i> consider total formulations including active ingredient and inert or co-formulants (e.g. surfactant, wetter, adjuvant, additive).</p>	<p>No change</p>


	NOTE: See Appendix 1 for GHS EDC toxicity category PPE	Removed from the previous version. Now it's moved to indicator.
	Standard Developers <i>shall*</i> prioritize the development of indicators for the identification of harm and identify the required treatment before looking at compensation when it comes to human health.	Revised. Previous version: Standard Developers <i>shall*</i> prioritize indicators for the identification of the harm and required treatment before looking at compensation when it comes to human health.
	5.1 <i>Medical biomonitoring*</i> of <i>workers*</i> exposed to HHPs that meet these Hazard Criteria is conducted following a methodology based on an analysis of current <i>Best Available Information*</i> .	Revised. Previous version: Pre-screening for HHPs <i>persistent*</i> in humans, and regular medical biomonitoring of workers exposed to HHPs that meet Hazard Criterion 5 is conducted and appropriate actions are taken to avoid harm (see Textbox 5).
	5.2 Appropriate actions are taken to avoid harm, as identified through the application of the identified <i>medical biomonitoring*</i> methodology.	Newly added.
	Deleted from the previous version: Pregnant women are not exposed to and do not handle HHPs that meets Hazard Criterion 5.	Deleted from the previous version.
	5.3 Health and safety practices for <i>workers*</i> and <i>affected stakeholders*</i> are developed and implemented.	Revised. Previous version: Health and safety practices for <i>workers*</i>

		and <i>affected stakeholders*</i> are developed and implemented in accordance with the GHS acute toxicity categories.
	5.4 Harm caused to <i>workers*</i> and <i>affected stakeholders*</i> by over-exposure to HHPs in these Hazard Criteria is treated and/or <i>fair compensation*</i> is provided.	No change
	NOTE: Standards Developers shall refer to Appendix 1: Personal Protective Equipment (PPE), Medical Biomonitoring, and References By Hazard Groups where current international <i>Best Available Information*</i> for each of the relevant indicators can be found.	Newly added.
	<p>Textbox 5: Biomonitoring for Hazard Criterion 5</p> <p>Biomonitoring tests for Hazard Criterion 5 include:</p> <ol style="list-style-type: none"> 1. Hair testing – 50-200mg, cleaned dried and frozen. (Esteban & Castano, 2009). 2. Breast milk test – 1-5cc, prepared and refrigerated. 3. AChE tests done regularly with Test-Mate Model 400 device. 4. Whole blood tests – 1cc anti-coagulated in sodium heparin (refrigerated). (Ungerer, Ewers & Wilhelm, 2007). Taken before and after spraying. Determined by LC-MS and analysed by Comet assay (Doganlar <i>et al.</i>, 2018). 	Deleted from the previous version. Text boxes are moved to Annex 3. <i>Guide to biomonitoring needed according to FSC Pesticides Policy Hazard Criterion</i> in the synopsis report.
	6. Indicators for HHPs that meet Hazard Criterion 6 (Endocrine disruption)	Revised. Previous version: Standard Developers <i>shall*</i> either reference or include the relevant aspects of the

	 <p>INSTRUCTIONS FOR STANDARD DEVELOPERS:</p> <p>Standard Developers <i>shall</i>* refer directly to the following documents where relevant to the HHPs in question or bring the relevant aspects into National Standards. Standard Developers <i>may</i>* make use of any national interpretations of these documents in laws, regulations, codes of practice, and other governmental guidance.</p>	<p>following documents or any national interpretation of these documents in National Standards and Interim National Standards.</p>
	<ul style="list-style-type: none"> • Severely Hazardous Pesticides formulations toolkit (sections 4 and 5) (UNEP FAO). • Safety and Health in Forestry work. International Labour Office (ILO), Geneva. ILO code of practice. 1998. Part III, Chapters 6, 7 and 9. • Sound and Sustainable Management of Chemicals. A training manual for workers and trade unions. United Nations Environment Programme (UNEP).2008. Module 2. • The WHO Recommended Classification of Pesticides by Hazard and guidelines to classification. 2009. World Health Organization (WHO), International Programme on Chemical Safety (IPCS) and Inter-Organization Programme for Sound Management of Chemicals (IOMC). Tables 1,2, 3, 4 and 7. • International Code of Conduct on Pesticide Management. Guidelines for personal protection when handling and applying pesticides. 9th draft. 2019. FAO & WHO. Part 1, sections 1.1, 1.3, 1.4 and Annex 6. • International Code of Conduct on Pesticide Management. Guidelines on Highly Hazardous Pesticides FAO &WHO, 2016. Chapters 2,3 and 6. • OECD work on Endocrine Disrupting Chemicals. OECD, 2018. http://oe.cd/endocrine-disrupters • IPCS International Program of Chemical Safety (WHO) -Integrated Risk Assessment document. • Global Harmonized System of Classification and Labelling of Chemicals (GHS) 8th Edition. United Nations (UN), New York & Geneva, 2019. Part 3, Chapter 3.9. • Recognition and management of pesticide Poisonings.6th Edition. 2013. United States Environmental Protection Agency (EPA), Office of Pesticide Programmes. Chapter 21. 	<p>No change</p>

	Standard Developers <i>shall*</i> consider total formulations including active ingredient and inert or co-formulants (e.g. surfactant, wetter, adjuvant, additive).	
	NOTE: See Appendix 1 for GHS EDC toxicity category PPE	Removed from the previous version. Now it's moved to indicator.
	Standard Developers <i>shall*</i> prioritize the development of indicators for the identification of harm and identify the required treatment before looking at compensation when it comes to human health.	Revised. Previous version: Standard Developers <i>shall*</i> prioritize indicators for the identification of the harm and required treatment before looking at compensation when it comes to human health.
	6.1 <i>Medical biomonitoring*</i> of <i>workers*</i> exposed to HHPs that meet these Hazard Criteria is conducted following a methodology based on an analysis of current <i>Best Available Information*</i> .	Revised. Previous version: Pre-screening for pesticides <i>persistent*</i> in humans, and regular medical biomonitoring (see Textbox 6) of workers exposed to HHPs in Hazard Criterion 6 is conducted and appropriate actions are taken to avoid harm.
	6.2 Appropriate actions are taken to avoid harm, as identified through the application of the identified <i>medical biomonitoring*</i> methodology.	Newly added.
	6.3 Health and safety practices for <i>workers*</i> and <i>affected stakeholders*</i> are developed and implemented.	Revised. Previous version:

		Health and safety practices for <i>workers*</i> and <i>affected stakeholders*</i> are developed and implemented in accordance with the GHS EDC toxicity categories.
	6.4 Harm caused to <i>workers*</i> and <i>affected stakeholders*</i> by over-exposure to HHPs in these Hazard Criteria is treated and/or <i>fair compensation*</i> is provided.	No change
	NOTE: Standards Developers shall refer to Appendix 1: Personal Protective Equipment (PPE), Medical Biomonitoring, and References By Hazard Groups where current international <i>Best Available Information*</i> for each of the relevant indicators can be found.	Newly added.
	<p>Textbox 6: Biomonitoring for Hazard Criterion 6</p> <p>Biomonitoring for Hazard Criterion 6 includes ((Yusa <i>et al</i>, 2015, Estaban & Castano, 2009):</p> <ol style="list-style-type: none"> 1. Organophosphates, carbamates and pyrethroids: Meconium samples taken from mother. Measures prenatal exposure. 0.5g dry weight needed. 2. Sample analysis done using SPE methods. Analysis done using QuEChERS. 3. AChE tests done with Test-Mate model 400 device before and after spraying (Vikkey <i>et al.</i>, 2017). This can be used to test all groups, including pregnant and lactating women. 4. Urine test – 60cc fresh urine sample needed for testing in children as non-invasive. (Calafat <i>et al.</i>, 2017). Tested using ELISA test. 	Deleted from the previous version. Text boxes are moved to Annex 3. <i>Guide to biomonitoring needed according to FSC Pesticides Policy Hazard Criterion</i> in the synopsis report.
	Hazard Group Environmental toxicity	Revised. Previous version: Standard Developers <i>shall*</i> either reference or

	<p>7. Indicators for HHPs that meet Hazard Criterion 7 (Acute toxicity to aquatic organisms)</p> <p> INSTRUCTIONS FOR STANDARD DEVELOPERS:</p> <p>Standard Developers <i>shall*</i> refer directly to the following documents where relevant to the HHPs in question or bring the relevant aspects into National Standards. Standard Developers <i>may*</i> make use of any national interpretations of these documents in laws, regulations, codes of practice, and other governmental guidance.</p> <ul style="list-style-type: none"> • Considerations of assessing the risks of combined exposure to multiple chemicals. Series on testing and assessment. No 296. OECD.2018. Chapter 7. • WHO IPCS Integrated Risk Assessment 2001. • Acute toxicity risk of pesticides in Hazard Criterion 7, as indicated in the table below: 	<p>include the relevant aspects of the following documents or any national interpretation of these documents in National Standards and Interim National Standards.</p>
	<ul style="list-style-type: none"> • Ecological monitoring methods for the assessment of pesticides impacts in the tropics. handbook (Grant and Tingle, DFID, CTA, NRI, 2002). Chapters 5-13. • EU commission regulation number 546/2011: Implementing regulation EC No 1107/2009 of the European Parliament and of the Council as regards uniform principles of evaluation and authorization of plant protection products. 2011. 	<p>Deleted from the previous version.</p>
	<ul style="list-style-type: none"> • Considerations of assessing the risks of combined exposure to multiple chemicals. Series on testing and assessment. No 296. OECD.2018. Chapter 7. • WHO IPCS Integrated Risk Assessment. 2001. • Acute toxicity risk of pesticides in Hazard Criterion 7, as indicated in the table below: 	<p>No change.</p>

Category	Insecticides	Organophosphate	Carbamate	Pyrethroid	Phenyl paraazoles	Herbicide	Integrated Growth Regulators	Fungicide
Algae	High	High	High	High	High	Mod	High	Low
Aquatic invertebrates	High	High	High	High	High	Mod	High	Low
Aquatic plants	High	High	High	High	High	High	High	Low
Fish	Mod	High	High	High	Mod-high	High	Low	Low-high
Non target arthropods	Mod	Mod-high	No-mod	Mod-high	Mod-high	Low-mod	Low-high	Low-mod
Earthworms	Low-high	High	High	High	Low-high	Mod	Low-high	Mod
Birds	Low-mod	Low-high	No-high	No-low	No-high	No-low	No	No-mod
Mammals	Mod	Low-high	No-high	Low	No-high	No-low	No	No-mod
Bees	Low-high	High	High	High	Low-high	Mod	Low-high	Mod

Table 2. Acute toxicity risk of pesticides in Hazard Criterion 7

Standard Developers *shall** consider total formulations including active ingredient and inert or co-formulants (e.g. surfactant, wetter, adjuvant, additive).

	<p>7.1 The relevant <i>trigger values</i>* are identified (see Table 3) that minimize harm to non-target species in aquatic ecosystems for HHPs under Hazard Criterion 7.</p> <table border="1" data-bbox="320 327 1451 742"> <thead> <tr> <th>Category</th> <th>EU Acute PEC trigger values</th> <th>Tropical Acute PEC trigger values</th> <th>EU TER trigger value</th> <th>Tropical TER trigger value</th> </tr> </thead> <tbody> <tr> <td>Algae</td> <td><0.1</td> <td><0.01</td> <td>100</td> <td>1000</td> </tr> <tr> <td>Aquatic plants</td> <td><0.01</td> <td><0.001</td> <td>10</td> <td>100</td> </tr> <tr> <td>Aquatic invertebrates</td> <td><0.01</td> <td><0.001</td> <td>10</td> <td>100</td> </tr> <tr> <td>Fish</td> <td><0.01</td> <td><0.001</td> <td>100</td> <td>1000</td> </tr> <tr> <td>Non-target arthropods</td> <td><0.001</td> <td><0.0001</td> <td>2</td> <td>20</td> </tr> <tr> <td>Earthworms</td> <td><0.001</td> <td><0.0001</td> <td>10</td> <td>100</td> </tr> <tr> <td>Birds</td> <td><0.001</td> <td><0.0001</td> <td>10</td> <td>100</td> </tr> <tr> <td>Mammals</td> <td><0.001</td> <td><0.0001</td> <td>10</td> <td>100</td> </tr> <tr> <td>Bees</td> <td><0.076</td> <td><0.0076</td> <td>50</td> <td>500</td> </tr> </tbody> </table> <p>Table 3. Relevant trigger values for Hazard Criterion 7 & 8.</p>	Category	EU Acute PEC trigger values	Tropical Acute PEC trigger values	EU TER trigger value	Tropical TER trigger value	Algae	<0.1	<0.01	100	1000	Aquatic plants	<0.01	<0.001	10	100	Aquatic invertebrates	<0.01	<0.001	10	100	Fish	<0.01	<0.001	100	1000	Non-target arthropods	<0.001	<0.0001	2	20	Earthworms	<0.001	<0.0001	10	100	Birds	<0.001	<0.0001	10	100	Mammals	<0.001	<0.0001	10	100	Bees	<0.076	<0.0076	50	500	<p>Revised. Previous version: The relevant <i>trigger values</i>* are identified (see Textbox 7) to avoid harm to aquatic organisms.</p>
	Category	EU Acute PEC trigger values	Tropical Acute PEC trigger values	EU TER trigger value	Tropical TER trigger value																																															
	Algae	<0.1	<0.01	100	1000																																															
	Aquatic plants	<0.01	<0.001	10	100																																															
	Aquatic invertebrates	<0.01	<0.001	10	100																																															
	Fish	<0.01	<0.001	100	1000																																															
	Non-target arthropods	<0.001	<0.0001	2	20																																															
	Earthworms	<0.001	<0.0001	10	100																																															
	Birds	<0.001	<0.0001	10	100																																															
	Mammals	<0.001	<0.0001	10	100																																															
Bees	<0.076	<0.0076	50	500																																																
	<p>7.2 Protection measures are implemented to avoid exceeding <i>trigger values</i>*.</p>	<p>No change.</p>																																																		
	<p>7.3 ESRA results are taken into account to implement an environmental biomonitoring program to ensure <i>trigger values</i>* are not exceeded and has sufficient scope, detail and frequency to detect changes, relative to the initial assessment and status of the <i>trigger values</i>*.</p>	<p>Revised. Previous version: A monitoring program is implemented to ensure <i>trigger values</i>* are not exceeded and has sufficient scope, detail and frequency to detect changes, relative to the initial assessment and status of the <i>trigger values</i>*.</p>																																																		
	<p>NOTE: If your country/region/climate has not developed a <i>trigger value</i>* (temperate and boreal versus tropical), use LD/LC50 of the relevant pesticides to determine exposure thresholds.</p> <p>NOTE: LD50 = The median lethal dose (or LD50) is defined as the dose of a test substance that is lethal for 50% of the animals in a dose group. LD50 values</p>	<p>Newly added.</p>																																																		

have been used to compare relative acute hazards of pesticides, especially when no other toxicology data are available for the pesticides.

Textbox 7: Calculating the *trigger values for Hazard Criterion 7 & 8**

The Toxicity Exposure ratio (TER) is a risk indicator for a risk assessment of pesticides and other plant protection products.

The TER indicates the ratio of harmful concentration of a pesticide (acute toxicity value) to the estimated concentration of exposure (PEC) for an organism (acute or chronic). The former generally used the EC50 or NOEC while the latter uses the PEC (predicted environmental exposure).

The predicted no effected concentration (PNEC) indicates the safe concentration of the pesticide for the aquatic environment. The Exposure Toxicity Ratio (ETR) is the inverse of this. The TER is also sometimes referred to as the risk quotient (RQ).

TER = Acute toxicity (PNEC) /exposure (PEC)


ETR= Exposure (PEC)/Toxicity (PNEC)


If the ETR >100 there is an acute risk (RED),
 if the ETR is 10> ETR>1 then there is a medium risk (YELLOW) and
 if the ETR is <1 then the ETR is low (GREEN).

Category	Acute PEC trigger values	EU TER trigger value
Algae	<0.1	100
Aquatic invertebrates	<0.01	10
Fish	<0.01	100


The extrapolation for tropical environments is generally by a factor of 10 for each category.

Deleted from the previous version.
 Text boxes are moved to Annex 3.
Guide to biomonitoring needed according to FSC Pesticides Policy Hazard Criterion in the synopsis report.

	<p>8. Indicators for HHPs that meet Hazard Criterion 8 (Persistence in soil and water/ biomagnification and bioaccumulation)</p> <p> INSTRUCTIONS FOR STANDARD DEVELOPERS:</p> <p>Standard Developers <i>shall</i>* refer directly to the following documents where relevant to the HHPs in question or bring the relevant aspects into National Standards. Standard Developers <i>may</i>* make use of any national interpretations of these documents in laws, regulations, codes of practice, and other governmental guidance.</p>	<p>Revised. Previous version: Standard Developers <i>shall</i>* either reference or include the relevant aspects of the following documents or any national interpretation of these documents in National Standards and Interim National Standards.</p>
	<ul style="list-style-type: none"> • Metabolites impact on non – target arthropods and pollinators • Ecological monitoring methods for the assessment of pesticides impacts (Grant and Tingle, DFID). • Considerations of assessing the risks of combined exposures to multiple chemicals. Series on testing and assessment. No 296. OECD, 2018 • WHO IPCS Integrated Risk Assessment, 2001 Chapter 7. • FOCUS (the forum for co-ordination of pesticide fate models and their use) database – environmental fate – surface and ground water- https://esdac.irc.ec.europa.eu/projects/focus-dg-sante • The European soil database v2.0. <p>Standard Developers <i>shall</i>* consider total formulations including active ingredient and inert or co-formulants (e.g. surfactant, wetter, adjuvant, additive).</p>	<p>No change.</p>
	<p>NOTE: For the Boreal zone refer to the same advice as for the Temperate zone</p>	<p>Newly added.</p>
	<p>8.1 The relevant <i>trigger values</i>* are identified (see Table 3).to detect persistence in soil and water/ biomagnification and bioaccumulation for HHPs under Hazard Criterion 8.</p>	<p>Revised. Previous version: The relevant <i>trigger values</i>* are identified to detect persistence in soil and water/ biomagnification and bioaccumulation (see Textbox 7).</p>

	8.2 Protection measures are implemented to avoid exceeding <i>trigger values</i> *.	No change.
	8.3 ESRA results are taken into account to implement an environmental biomonitoring program to ensure <i>trigger values</i> * are not exceeded and has sufficient scope, detail and frequency to detect changes, relative to the initial assessment and status of the <i>trigger values</i> *.	Revised. Previous version A monitoring program is implemented to ensure <i>trigger values</i> * are not exceeded and has sufficient scope, detail and frequency to detect changes, relative to the initial assessment and status of the <i>trigger values</i> *.
	<p>Hazard Group Dioxins</p> <p>9. Indicators for HHPs that meet Hazard Criterion 9 (Dioxins (residues or emissions))</p> <p> INSTRUCTIONS FOR STANDARD DEVELOPERS:</p> <p>Standard Developers <i>shall</i>* refer directly to the following documents where relevant to the HHPs in question or bring the relevant aspects into National Standards. Standard Developers <i>may</i>* make use of any national interpretations of these documents in laws, regulations, codes of practice, and other governmental guidance.</p>	Revised. Previous version: Standard Developers <i>shall</i> * either reference or include the relevant aspects of the following documents or any national interpretation of these documents in National Standards and Interim National Standards.
	<ul style="list-style-type: none"> • Severely Hazardous Pesticides formulations toolkit (sections 4 and 5) (UNEP FAO). • ILO Safety in the use of chemicals at work • IPCS International Program of Chemical Safety (WHO) -Integrated Risk Assessment document • International Code of Practice for use of pesticides (WHO) • Strategic Approach to International Chemicals management (UNEP) • Global Harmonized System of Classification and Labelling of Chemicals (GHS) 8th Edition. United Nations (UN), New York & Geneva, 2019. Part 3, Chapter 3.8 	No change.

	<ul style="list-style-type: none"> Recognition and management of pesticide Poisonings.6th Edition. 2013. United States Environmental Protection Agency (EPA), Office of Pesticide Programmes. Chapter 21 <p>Standard Developers <i>shall*</i> consider total formulations including active ingredient and inert or co-formulants (e.g. surfactant, wetter, adjuvant, additive).</p>	
	Standard Developers <i>shall*</i> prioritize the development of indicators for the identification of harm and identify the required treatment before looking at compensation when it comes to human health.	Newly added.
	9.1 When HHPs that meet Hazard Criteria 9 are used, Annex 3. Procedure for the exceptional use of FSC prohibited HHPs in FSC-POL-30-001 FSC Pesticides Policy is applied.	No change.
	9.2 <i>Medical biomonitoring*</i> of <i>workers*</i> exposed to HHPs that meet these Hazard Criteria is conducted following a methodology based on an analysis of current <i>Best Available Information*</i> .	Revised. Previous version: Pre-screening and post screening of workers exposed to HHPs listed that meet Hazard Criterion 9 is conducted and appropriate actions are taken to avoid harm.
	9.3 Appropriate actions are taken to avoid harm, as identified through the application of the identified <i>medical biomonitoring*</i> methodology.	Newly added.
	9.4 Health and safety practices for <i>workers*</i> and <i>affected stakeholders*</i> are developed and implemented.	Revised. Previous version: Health and safety practices for <i>workers*</i> and <i>affected stakeholders*</i> are developed and implemented in accordance with the GHS toxicity categories chapter 3 and 4.
	9.5 Harm caused to <i>workers*</i> and <i>affected stakeholders*</i> by over-exposure to HHPs in these Hazard Criteria is treated and/or <i>fair compensation*</i> is provided.	No change

	<p>NOTE: Standards Developers shall refer to Appendix 1: Personal Protective Equipment (PPE), Medical Biomonitoring, and References By Hazard Groups where current international <i>Best Available Information</i>* for each of the relevant indicators can be found.</p>	<p>Newly added.</p>
	<p>Deleted indicator from the previous version: When required to use HHPs listed in Hazard Criterion 9 by governmental order, the government is informed of the risks, including the indicators for Hazard Criterion 9 and requests that non prohibited alternatives are used.</p>	<p>Deleted from the previous version</p>
	<p>Hazard Group Heavy Metals</p> <p>10. Indicators for HHPs that meet Hazard Criterion 10 (Heavy metals (arsenic, cadmium, lead, and mercury))</p> <p> INSTRUCTIONS FOR STANDARD DEVELOPERS:</p> <p>Standard Developers <i>shall</i>* refer directly to the following documents where relevant to the HHPs in question or bring the relevant aspects into National Standards. Standard Developers <i>may</i>* make use of any national interpretations of these documents in laws, regulations, codes of practice, and other governmental guidance.</p>	<p>Revised. Previous version: Standard Developers <i>shall</i>* either reference or include the relevant aspects of the following documents or any national interpretation of these documents in National Standards and Interim National Standards.</p>
	<ul style="list-style-type: none"> • ILO Safety in the use of chemicals at work • IPCS International Program of Chemical Safety (WHO) Integrated Risk Assessment document • International Code of Practice for use of pesticides (WHO) • Strategic Approach to International Chemicals management (UNEP) • Global Harmonized System of Classification and Labelling of Chemicals (GHS) 8th Edition. United Nations (UN), New York & Geneva, 2019. Part 3, Part 4 	<p>No change.</p>

	<ul style="list-style-type: none"> • Recognition and management of pesticide Poisonings.6th Edition. 2013. United States Environmental Protection Agency (EPA), Office of Pesticide Programmes. Section I and Chapter 21. • FOCUS (the forum for co-ordination of pesticide fate models and their use) database – environmental fate – surface and ground water- https://esdac.jrc.ec.europa.eu/projects/focus-dg-sante • The European soil database v2.0. <p>Standard Developers <i>shall*</i> consider total formulations including active ingredient and inert or co-formulants (e.g. surfactant, wetter, adjuvant, additive).</p>	
	Standard Developers <i>shall*</i> prioritize the development of indicators for the identification of harm and identify the required treatment before looking at compensation when it comes to human health.	Newly added.
	10.1 When HHPs that meet Hazard Criteria 10 are used, Annex 3. Procedure for the exceptional use of FSC prohibited HHPs in FSC-POL-30-001 FSC Pesticides Policy is applied.	No change.
	10.2 <i>Medical biomonitoring*</i> of <i>workers*</i> exposed to HHPs that meet these Hazard Criteria is conducted following a methodology based on an analysis of current <i>Best Available Information*</i> .	Revised. Previous version: Pre-screening and post screening of workers exposed to HHPs listed that meet Hazard Criterion 10 is conducted and appropriate actions are taken to avoid harm.
	10.3 Appropriate actions are taken to avoid harm, as identified through the application of the identified <i>medical biomonitoring*</i> methodology.	Newly added.





	<p>10.4 Health and safety practices for <i>workers*</i> and <i>affected stakeholders*</i> are developed and implemented.</p>	<p>Revised. Previous version: Health and safety practices for <i>workers*</i> and <i>affected stakeholders*</i> are developed and implemented in accordance with the GHS toxicity categories chapter 3 and 4.</p>
	<p>10.5 Harm caused to <i>workers*</i> and <i>affected stakeholders*</i> by over-exposure to HHPs in these Hazard Criteria is treated and/or <i>fair compensation*</i> is provided.</p>	<p>No change</p>
	<p>NOTE: Standards Developers shall refer to Appendix 1: Personal Protective Equipment (PPE), Medical Biomonitoring, and References By Hazard Groups where current international <i>Best Available Information*</i> for each of the relevant indicators can be found.</p>	<p>Newly added.</p>
	<p>Deleted indicator from the previous version: When required to use HHPs listed in Hazard Criterion 10 by governmental order, the government is informed of the risks, including the indicators for Hazard Criterion 10 and requests that non prohibited alternatives are used.</p>	<p>Deleted from the previous version</p>








Appendix 1: PERSONAL PROTECTIVE EQUIPMENT (PPE), MEDICAL BIOMONITORING, AND REFERENCES BY HAZARD GROUPS	Title changed.
<p>This table provides summary information by Hazard Group/Criterion and is intended to be a “Quick Reference” for determining PPE needs for chemical use. Standard Development Groups shall use this information for developing the national indicators to the target HHPs. Medical Biomonitoring information is also provided for that purpose.</p> <p>Column titles and explanations: “Sub-set of Chemicals in Hazard Group” is a partial listing of chemical in a Hazard Group. For a full and complete list of chemicals in any Hazard Group see the most current version of FSC-POL-30-001a. Hazard Group and Criterion are as described in FSC-POL-30-001. Personal Protective Equipment (PPE) is compiled from literature cited in the “References” column. Classification is from FAO & WHO International Code of Conduct on Pesticide Management: Guidelines for Personal Protection when Handling and Applying Pesticides, 2020. “Medical Biomonitoring” and “Frequency and Duration” are from “WHO Human Biomonitoring Guide for Exposure in the Workplace, Vol.1, 1996” and various others including the listed references.</p> <p>NOTE: Frequency and Duration</p> <ol style="list-style-type: none"> 1. <u>How the hours worked are calculated.</u> The hours are based on a 5-day working week (averaging 8 hours per day) and an average of 21 working days a month resulting in approximately 220 working days per year. The hours worked are based on working those hours consistently in those categories to facilitate the ADI to be exceeded, only then the exposure to the pesticide will need to be tested and monitored to ensure human health is protected. 2. <u>Before and after spraying.</u> Before spraying means when the spray operator is new to the spray programme and before they apply the first pesticide for any CH, they need to be tested to calculate a baseline of what pesticide load already exists in their body. These results need to be kept on file to compare any future results to. If the spray operator works for multiple CH's, they need to keep their biomonitoring file with them so that they can notify each CH that they have been tested. They need to keep track of their hours sprayed and notify and relevant CH of the hours they have already sprayed. They do not need to get initial testing at the CH, only the first CH. Once they get to the next threshold where they need to be tested, they need to notify the relevant CH that they need to be tested 	Newly added.



prior to starting the spray programme at the relevant CH. For example, they are spraying an organophosphate and they are reaching 115 hours in one month, they will need to go for an additional test. After spraying means once the spray operator has decided that they no longer want to be active in any spray operations (they retire, change job categories or work opportunities) they need to be tested so that their closing pesticide load is measured. These records/tests need to be kept on file for 5-10 years.








NOTE








- Revised column: Medical biomonitoring
- Newly added column: Sub-set of Chemicals in Hazard Group & Frequency and Duration








Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)	Classification	Medical Biomonitoring*	Frequency and Duration	References
Organochlorines/ chlorinated hydrocarbons (DDT, Endosulfan, Atrazine, Vinclozolin, TBT, Aldrin, Chlordane, Endrin, Heptachlor, Chlordecone,	1	Relevant International Agreements or Conventions GHS06 DANGER  H300, H301	1. Butyl rubber gloves  2. Type 3 protective clothing (liquid tight)  Type 4 protective 	EN 374:2016 EN 14605:2005 EN 14605:2005	NOTE: These are the least expensive/most accessible options.	Organochlorines, CHC's & PICS: Using whole blood 1. Before the beginning of the spraying for all groups a blood sample needs to be taken :	Yusa <i>et al.</i> , 2015 (https://dx.doi.org/10.1016/j.aca.2015.05.032) Sannolo <i>et al.</i> , 1999 (https://doi.org/10.1002/(SICI)1096-9888(199910)34:10%3c)




Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)	Classification	Medical Biomonitoring*	Frequency and Duration	References	
Lindane, Toxaphene, Hexachlorobenzene, Mirex)		H310, H311, H330, H331, GHS05 DANGER	clothing (spray tight) 		Analyse with Comet Assay Or use field-based test kit	a. If the worker sprays less than 40 hours per month – additional testing not necessary	1028::AID-JMS861%3e3.0.CO:2-H)	
PICS (Annexure III) (2,4,5-T, Aldrin, Benomyl, Binapacryl, Captafol, Carbofuran, Chlordane, Chlorobenzilate, DDT, Dieldrin, Dinoseb, DNOC, DNOC ammonium salt, DNOC potassium salt, DNOC sodium salt, Ethylene dibromide, Ethylene	1	 H290, H314, H318 GHS07 WARNING  Ozone depleting H420	Type 5 protective clothing (airborne particles)  Type 6 protective clothing (chemical splash)  3.Safety boots	 	BS EN ISO 13982:2004 EN 13034 EN 345:1993 EN ISO 20345 EN 136 EN 141:2000	Hair test 50-200mg hair sample, cleaned and frozen Analyse with GC-LS	b. If the worker sprays between 40 and 115 hours per month (1h/d) – additional testing not necessary c. If the worker sprays between 115 and 575 hours per month (5h/d) then additional testing is required once per year d. If the worker sprays between 575 and 920 hours per month (8h/d) then additional	Doganlar <i>et al.</i> , 2018 (https://doi.org/10.1007/s00244-018-0545-7) WHO, 1996. Biological monitoring of chemical exposure in the workplace. Guidelines, volume 1, Chapter 5.1. https://apps.who.int/iris/bitstream/handle/10665/41856/WHO_HPR_OCH_96.1.pdf?sequence=1&isAllowed=y










Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)		Classification	Medical Biomonitoring*	Frequency and Duration	References
dichloride, Ethylene oxide, Fluoroacetamide, Heptachlor, Hexachlorobenzene, Hexachlorocyclohexane, Lindane, Mercury, Methamidophos, Monocrotophos, Paraquat dichloride, Parathion-methyl, PCP, Phosphamidon, Thiram, Toxaphene, Z-Phosphamidon)			4. Full face respirators Full face respirators for vapours and gases. 5. Particulate air filters for respirators. 6. Apron	 	P95, P99, P100 EN 467:1995	NOTE: These are the least expensive/most accessible options.	testing is required every 3-6 months 2. All workers active in the spraying programme need test once they leave the spray programme or are no longer active in the spray programme Methyl bromide: 1. Hair sample to be taken before spraying commences- before the worker is active in the spray programme 2. Hair sample to be taken when the worker leaves or is no longer active in the spray programme	<u>WHO, 2012. Biomonitoring-based indicators of exposure to chemical pollutants. Pg 20, 22,</u>
Methyl bromide	1							




Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)		Classification	Medical Biomonitoring*	Frequency and Duration	References
Bupryridyls (Paraquat, Paraquat dibromide, Diquat, Diquat dibromide)	2	<p>Acute toxicity to mammals and birds</p> <p>GHS06 DANGER</p>  <p>H330, H301 H310, H311 H330, H331</p> <p>GHS07 WARNING</p>  <p>H302, H312 H332, H315 H317, H319</p> <p>GHS05 DANGER</p>	<p>1. Chemically resistant nitrile gloves</p> <p>2. Type 3 and type 4 protective clothing</p> <p>3. Safety boots</p> <p>4. Face and Eye protection (safety goggles)</p>	    	<p>EN 374:2016</p> <p>EN14605:2005</p> <p>EN 345:1993 N ISO 20345</p> <p>EN 166: 2001 EN 140, EN 149 EN 143: 2000</p>	<p>Urine tests 5cc fresh urine sample, refrigerated. Tested using ELIZA test. – dipstick test (field-tests available)</p> <p>AChE tests (done on urine) Test done as indicated with unit - mobile field unit- AChE check Control unit from Securetec : www.securetec.net</p>	<p>Urine tests:</p> <p>1. Before the spraying a urine test needs to be taken for all groups:</p> <p>a. If the worker sprays less than 40 hours per month – an additional test is not necessary</p> <p>b. If the worker sprays between 40 and 115 hours per month (1h/d) – an additional test is not necessary</p> <p>c. If a worker sprays between 115 and 575 hours per month (5h/d) an additional test is not necessary</p>	<p>Yusa <i>et al.</i>, 2015 (https://dx.doi.org/10.1016/j.aca.2015.05.032)</p> <p>WHO, 1996. Biological monitoring of chemical exposure in the workplace. Guidelines, volume 1, Chapter 5.1. https://apps.who.int/iris/bitstream/handle/10665/41856/WHO_HPR_OCH_96.1.pdf?sequence=1&isAllowed=y</p> <p>WHO, 2012. <u>Biomonitoring-based indicators of exposure to chemical pollutants.</u> Pg 20, 22,</p>







Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)		Classification	Medical Biomonitoring*	Frequency and Duration	References
		 H314, H318	5. Half face respirators 6. Particulate air filters for respirators 7. Apron		R95, R99, R100 EN 467: 1995	Testmate-400	d. If a worker sprays between 575 and 920 hours per month (8h/d) – an additional test is needed once a year 2. All workers active in the spraying programme need test once they leave the spray programme or are	
Neonicotinoids (Acetamiprid, Clothianidin, Dinotefuran, Imidacloprid, Desmethy acetamiprid, Nitenpyram,	2	<u>Acute toxicity to mammals and birds</u> GHS05 DANGER  H314, H318	1. Neoprene glove 2. Type 3 & Type 4 protective clothing  	 	EN 374:2016 EN14605:2005	Urine tests 5cc fresh urine sample refrigerated. Tested in laboratory using Nexera liquid	Urine tests: 1. Before the spraying a urine test needs to be taken for all groups: a. If the worker sprays less than 40 hours per month – an	Calderon-Segura et al., 2011. https://dx.doi.org/10.1155/2012/612647 Yusa et al., 2015 https://dx.doi.org/10.1016/j.aca.2015.05.032







Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)		Classification	Medical Biomonitoring*	Frequency and Duration	References
Thiacloprid, Thiamethoxam)	4	<p>GHS06 DANGER</p>  <p>H300, H301 H310, H311 H330, H331</p> <p>GHS07 WARNING</p>  <p>H302, H312 H332, H315 H317, H319</p> <p><u>Mutagenicity to mammals</u></p> <p>GHS08 DANGER</p>	<p>Type 5 protective clothing</p>  <p>3. Safety boots</p> <p>4. Face & eye protection</p> <p>5. Half respirator</p> <p>6. Particulate filters for respirators</p> <p>7. Apron</p>	   	<p>BS EN ISO 13982: 2004</p> <p>EN 345:1993 EN ISO 20345</p> <p>EN 166:2001</p> <p>EN 140 EN149 EN143: 2000</p> <p>R95, R99, R100</p>	<p>chromatography system coupled with Triple Quad 6500 mass spectrometer</p>	<p>additional test is not necessary</p> <p>b. If the worker sprays between 40 and 115 hours per month (1h/d) – an additional test is not necessary</p> <p>c. If a worker sprays between 115 and 575 hours per month (5h/d) an additional test is not necessary</p> <p>d. If a worker sprays between 575 and 920 hours per month (8h/d) – an additional test is needed once a year</p> <p>2. All workers active in the spraying</p>	<p>Vikkey et al., 2017 (https://dx.doi.org/10.1177.1178630217704659)</p> <p>Jakubowski 2012 (https://dx.doi.org/10.1039/c1em10706b)</p> <p>Harada <i>et al.</i>, 2016. (https://dx.doi.org/10.1371/journal.pone.0146335)</p> <p>WHO, 1996. Biological monitoring of chemical exposure in the workplace. Guidelines, volume 1, Chapter 5.1. https://apps.who.int/iris/bitstream/handle/10665/41856/WHO_H</p>








Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)	Classification	Medical Biomonitoring*	Frequency and Duration	References	
	8	 <p>H340, H341</p> <p><u>Persistence in soil/water and soil absorption potential & biomagnification & bioaccumulation</u></p> <p>GHS09 WARNING</p>  <p>H410, H411 H412, 4413 Environment</p>			EN 467: 1995		<p>programme need test once they leave the spray programme or are</p> <p>*if acetamiprid or imidacloprid are used, then testing will be needed for c. as the excretion rate is very slow thus bioaccumulation may occur</p>	<p>PR_OCH_96.1.pdf?sequence=1&isAllowed=y</p> <p>WHO, 2012. Biomonitoring-based indicators of exposure to chemical pollutants. Pg 20, 22,</p>
Pyrethroids (Cyfluthrin, Cypermethrin,	2	<u>Acute toxicity to mammals and birds</u>	1. Neoprene gloves/chemically		EN 374:2016	Urine tests 5cc fresh urine sample	Urine tests for Pyrethroids,	Ungerer, Ewers & Wilhelm, 2007








Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)	Classification	Medical Biomonitoring*	Frequency and Duration	References	
Deltamethrin, Permethrin, Phenoxyalkyl acids Amides (Acetachlor, Alachlor, Amicarbazone, Asulam, beflubutamid, Butachlor, Chlorthiamid, Diflufenicam, Dimetachlor, Dimethenamid, Etabenzanid, Fentrazamide, Flufenacet, Metazachlor, Metolachlor, Propachlor, Propanid, Tebutam)	3	GHS06 DANGER  H300, H301, H310, H311, H330, H331 GHS07 WARNING  H302, H312, H332, H315, H317, H319 GHS05 DANGER  H314, H318	resistant gloves 2.Type 3 & 4 protective clothing  3.Safety boots 4.Face & eye protection (safety goggles) 5.Half-face respirators	    	EN 14605: 2005 EN 345:1993 EN ISO 20345 EN 166:2001 EN 140 EN 149 EN 143:2000 R95, R99, R100	refrigerated. Tested using ELISA test (dipstick test) 60cc needed for testing in children. (dip stick) AChE tests AChE tests done when necessary with Test-Mate model 400 device or field testing with AChE check Control device from Securetec obtainable	Phenoxyalkyl acids & amides: 1.Before the spraying a urine test needs to be taken for all groups: a.If the worker sprays less than 40 hours per month – an additional test is not necessary b. If the worker sprays between 40 and 115 hours per month (1h/d) – an additional test is not necessary c. If a worker sprays between 115 and 575 hours per month (5h/d) an additional	https://doi.org/10.1016/j.ijheh.2007.01.024 Calafat <i>et al.</i> , 2017 https://doi.org/10.1016/j.ijheh.2016.10.008 Yusa <i>et al.</i> , 2015 https://dx.doi.org/10.1016/j.aca.2015.05.032 Esteban & Castano, 2009 https://doi.org/10.1016/i.entint.2008.09.003 CDC National Biomonitoring Programme




Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)	Classification	Medical Biomonitoring* NOTE: These are the least expensive/most accessible options.	Frequency and Duration	References
	4	<u>Carcinogenicity</u> GHS07 WARNING  H335, H336 GHS08 DANGER  H334, H350 H350i, H350I	6.Particulate air filters for respirators 7.Apron	EN 467: 1995	from www.securetec.net	test is needed every 2 years d. If a worker sprays between 575 and 920 hours per month (8h/d) – an additional test is needed once a year 2. All workers active in the spraying programme need to be tested once they leave the spray programme or are no longer active in the spraying programme	https://www.cdc.gov/biomonitoring/Cyfluthrin_Cypermethrin_Permethrin_BiomonitoringSummary.html# Leng <i>et al.</i> , 1997. (PII S0048-9697(97)05493-4)
	6	<u>Mutagenicity to humans</u> GHS08 DANGER  H340, H341					









Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)	Classification	Medical Biomonitoring*	Frequency and Duration	References
		Endocrine Disrupting Chemicals (EDC) GHS08 DANGER  H370, H371 H372, H373					
Carbamates 1. Thiocarbamates	3	<u>Carcinogenicity</u> GHS07 WARNING  H335, H336 GHS08 DANGER  H334, H350	1. Neoprene gloves/chemically resistant gloves  2. Type 3 & 4 protective clothing  	EN 374:2016 EN 14605:2005 EN 345:1993 EN ISO 20345	Urine tests 5cc fresh urine sample refrigerated. Tested using ELISA test – dipstick test 60cc needed for testing in children. (dipstick)	Urine tests for Carbamates: 1. Before the spraying a urine test needs to be taken for all groups: a. If the worker sprays less than 40 hours per month – an additional test is not necessary	Calderon-Segura et al., 2011. https://dx.doi.org/10.1155/2012/612647 Ungerer, Ewers & Wilhelm, 2007 https://doi.org/10.1016/j.ijheh.2007.01.024 Calafat et al., 2017






Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)		Classification	Medical Biomonitoring*	Frequency and Duration	References
	7	H350i, H350I <u>Acute toxicity to aquatic organisms</u> GHS09 WARNING  H400 Environment	 3.Safety boots 4.Face & eye protection (safety goggles) 5.Half-face respirators 6.Particulate air filters for respirators 7.Apron	   	EN 166:2001 EN 140 EN 149 EN 143:2000 R95, R99, R100 EN 467: 1995	AChE tests AChE tests done when needed with Test-Mate model 400 device or field testing with AChE check Control device from Securetec obtainable from www.securetec.net	b. If the worker sprays between 40 and 115 hours per month (1h/d) – an additional test is not necessary c. If a worker sprays between 115 and 575 hours per month (5h/d) an additional test is needed every year d. If a worker sprays between 575 and 920 hours per month (8h/d) – an additional test is needed every 3-6 months 2. All workers active in the spraying programme need to	https://doi.org/10.1-16/j.ijheh.2016.10.008) Yusa <i>et al.</i> , 2015 (https://dx.doi.org/10.1016/j.aca.2015.05.032) Esteban & Castano, 2009 (https://doi.org/10.1016/i.entint.2008.09.003) Vikkey et al., 2017 (https://dx.doi.org/10/1177.1178630217704659) WHO, 1996. Biological monitoring of chemical exposure in the workplace.



Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)		Classification	Medical Biomonitoring*	Frequency and Duration	References
						NOTE: These are the least expensive/most accessible options.	be tested once they leave the spray programme or are no longer active in the spraying programme	Guidelines, volume 1, Chapter 5.1. https://apps.who.int/iris/bitstream/handle/10665/41856/WHO_HPR_OCH_96.1.pdf?sequence=1&isAllowed=y
Organophosphates	2	<p><u>Acute toxicity to mammals and birds</u></p> <p>GHS05 DANGER</p>  <p>H314, H318</p> <p>GHS06 DANGER</p>  <p>H300, H301 H310, H311</p>	<p>1. Neoprene gloves / chemically resistant nitrile gloves</p> <p>2. Type 3 & Type 4 protective clothing</p>  <p>Type 5 protective clothing</p> 	  	<p>EN 374:2016</p> <p>EN 14605:2005 EN 345:1993</p> <p>EN ISO 20345</p>	<p>Urine tests</p> <p>5cc fresh urine sample refrigerated. Tested using ELISA test. – dipstick test</p> <p>60cc needed for testing in children. (dip stick)</p> <p>AChE tests for blood samples</p>	<p>Urine tests for Organophosphates:</p> <p>1. Before the spraying a urine test needs to be taken for all groups:</p> <p>a. If the worker sprays less than 40 hours per month – an additional test is not necessary</p> <p>b. If the worker sprays between 40 and 115</p>	<p>Yusa <i>et al.</i>, 2015 (https://dx.doi.org/10.1016/j.aca.2015.05.032)</p> <p>Esteban & Castano, 2009 (https://doi.org/10.1016/i.entint.2008.09.003)</p> <p>Ungerer, Ewers & Wilhelm, 2007 (https://doi.org/10.1016/j.ijheh.2007.01.024)</p>














Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)	Classification	Medical Biomonitoring*	Frequency and Duration	References
	3	<p>H330, H331</p> <p>GHS07 WARNING</p>  <p>H302, H312 H332, H315 H317, H319</p> <p><u>Carcinogenicity</u></p> <p>GHS07 WARNING</p>  <p>H335, H336</p> <p>GHS08 DANGER</p>	 <p>3.Safety boots</p>  <p>4.Face & eye protection</p>  <p>5.Half respirator</p>  <p>6.Particulate filters for respirators</p>  <p>7.Apron</p>	<p>EN 166:2001</p> <p>EN 140 EN 149</p> <p>EN 143:2000</p> <p>R95, R99, R100</p> <p>EN 467: 1995</p>	<p>AChE tests done when necessary with Test-Mate model 400 device or field testing with AChE check Control device from Securetec obtainable from www.securetec.net</p>	<p>hours per month (1h/d) – an additional test is not necessary</p> <p>c. If a worker sprays between 115 and 575 hours per month (5h/d) an additional test is needed every year</p> <p>d. If a worker sprays between 575 and 920 hours per month (8h/d) – an additional test is needed every 3-6 months</p> <p>2. All workers active in the spraying programme need to be tested once they leave the spray programme or are no</p>	<p>Doganlar et al., 2018 (https://doi.org/10.1007/s00244-018-0545-7)</p> <p>Calafat <i>et al.</i>, 2017 (https://doi.org/10.1-16/j.ijheh.2016.10.008)</p> <p>Calderon-Segura et al., 2011. (https://dx.doi.org/10.1155/2012/612647)</p> <p>Vikkey et al., 2017 (https://dx.doi.org/10/1177.1178630217704659)</p>





Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)		Classification	Medical Biomonitoring*	Frequency and Duration	References
	4	 <p>H334, H350, H350i, H350I</p> <p><u>Mutagenicity to mammals</u></p> <p>GHS08 DANGER</p>					longer active in the spraying programme	WHO, 1996. Biological monitoring of chemical exposure in the workplace. Guidelines, volume 1, Chapter 5.1. https://apps.who.int/iris/bitstream/handle/10665/41856/WHO_HPR_OCH_96.1.pdf?sequence=1&isAllowed=y
	5	 <p>H340, H341</p> <p><u>Developmental and Reproductive toxicity</u></p> <p>GHS08 DANGER</p>						
		 <p>H360, H360F</p>						









Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)		Classification	Medical Biomonitoring*	Frequency and Duration	References
		 H400 Environment						
Carbamates 2.Dithiocarbamates	2	<p>Acute toxicity to mammals and birds</p> <p>GHS05 DANGER</p>  H314, H318 <p>GHS06 DANGER</p>  H300, H301 H310, H311 H330, H331	<p>1. Neoprene gloves / chemically resistant nitrile gloves</p> <p>2. Type 3 & Type 4 protective clothing</p>     <p>Type 5 protective clothing</p> 		EN 374:2016 EN 14605:2005 EN 345:1993 EN ISO 20345 EN 166:2001	<p>Urine tests 5cc fresh urine sample refrigerated. Tested using ELISA test. – dipstick test</p> <p>60cc needed for testing in children. (dip stick)</p> <p>AChE tests AChE tests done when necessary with Test-Mate model 400 device or</p>	<p>Urine tests for carbamates:</p> <p>1. Before the spraying a urine test needs to be taken for all groups:</p> <p>a. If the worker sprays less than 40 hours per month – an additional test is not necessary</p> <p>b. If the worker sprays between 40 and 115 hours per month (1h/d) – an additional test is not necessary</p>	<p>Yusa <i>et al.</i>, 2015 (https://dx.doi.org/10.1016/j.aca.2015.05.032)</p> <p>Esteban & Castano, 2009 (https://doi.org/10.1016/j.entint.2008.09.003)</p> <p>Ungerer, Ewers & Wilhelm, 2007 (https://doi.org/10.1016/j.ijheh.2007.01.024)</p> <p>Doganlar <i>et al.</i>, 2018</p>



Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)	Classification	Medical Biomonitoring*	Frequency and Duration	References	
	5	<p>GHS07 WARNING</p>  <p>H302, H312 H332, H315 H317, H319</p> <p><u>Developmental and Reproductive toxicity</u></p>	<p>3.Safety boots</p> <p>4.Face & eye protection</p> <p>5.Half respirator</p> <p>6.Particulate filters for respirators</p> <p>7.Apron</p>	  	<p>EN 140 EN 149</p> <p>EN 143:2000</p> <p>R95, R99, R100</p> <p>EN 467: 1995</p>	<p>field testing with AChE check Control device from Securetec obtainable from www.securetec.net</p>	<p>c. If a worker sprays between 115 and 575 hours per month (5h/d) an additional test is needed every year</p> <p>d. If a worker sprays between 575 and 920 hours per month (8h/d) – an additional test is needed every 3-6 months</p> <p>2. All workers active in the spraying programme need to be tested once they leave the spray programme or are no longer active in the spraying programme</p>	<p>(https://doi.org/10.1007/s00244-018-0545-7)</p> <p>Calafat <i>et al.</i>, 2017 (https://doi.org/10.116/j.ijheh.2016.10.008)</p> <p>Calderon-Segura <i>et al.</i>, 2011. (https://dx.doi.org/10.1155/2012/612647)</p> <p>Vikkey <i>et al.</i>, 2017 (https://dx.doi.org/10/1177.1178630217704659)</p> <p>WHO, 1996. Biological monitoring of chemical exposure in the workplace.</p>
	6	<p>GHS08 DANGER</p>  <p>H360, H360F H360D, H360FD H361, H361f, H361d, H361d H362</p>						





Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)	Classification	Medical Biomonitoring*	Frequency and Duration	References
	7	<p>Endocrine Disrupting Chemicals (EDC)</p> <p>GHS08 DANGER</p>  <p>H370, H371 H372, H373</p> <p>Acute toxicity to aquatic organisms</p> <p>GHS09 WARNING</p>  <p>H400</p>					<p>Guidelines, volume 1, Chapter 5.1. https://apps.who.int/iris/bitstream/handle/10665/41856/WHO_HPR_OCH_96.1.pdf?sequence=1&isAllowed=y</p>

Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)	Classification	Medical Biomonitoring*	Frequency and Duration	References									
		Environment														
Di-nitro anilines (Benfluralin, Butralin, Chlornidine, Dipropalin, Ethalfuralin, Fluchloralin, Isopropalin, Methalpropalin, Nitralin, Oryzalin, Pendimethalin, Prodiamine, Profluralin, Trifluralin)	3	<u>Carcinogenicity</u> GHS07 WARNING  H335, H336 GHS08 DANGER	1. Neoprene gloves / chemically resistant nitrile gloves  H334, H350 H350i, H350j <u>Endocrine Disrupting Chemicals (EDC)</u> GHS08 DANGER	 H410 GHS09 DANGER	 H314 GHS05 DANGER	 H228 GHS02 DANGER	 H229 GHS03 DANGER	 H335, H336 GHS07 WARNING	 H334, H350 H350i, H350j GHS08 DANGER	 H410 GHS09 DANGER	 H314 GHS05 DANGER	 H228 GHS02 DANGER	 H229 GHS03 DANGER	 H335, H336 GHS07 WARNING	 H334, H350 H350i, H350j GHS08 DANGER	 H410 GHS09 DANGER
	6	<u>Endocrine Disrupting Chemicals (EDC)</u> GHS08 DANGER	2. Type 3 & Type 4 protective clothing  H334, H350 H350i, H350j GHS08 DANGER	3. Safety boots  H334, H350 H350i, H350j GHS08 DANGER	EN 374:2016 EN 14605:2005 EN 345:1993 EN ISO 20345 EN 166:2001 EN 140	Urine tests 5cc fresh urine sample refrigerated. ELIZA dipstick test 60cc needed for testing in children. (dip stick) AChE tests AChE tests done when necessary with Test-Mate model 400 device or field testing with AChE check	Urine tests for Di-nitro anilines: 1. Before the spraying a urine test needs to be taken for all groups: a. If the worker sprays less than 40 hours per month – an additional test is not necessary b. If the worker sprays between 40 and 115 hours per month (1h/d) – an additional test is not necessary c. If a worker sprays between 115 and 575	Ungerer, Ewers & Wilhelm, 2007 https://doi.org/10.1016/j.ijheh.2007.01.024 Doganlar et al., 2018 https://doi.org/10.1007/s00244-018-0545-7 Calafat et al., 2017 https://doi.org/10.116/j.ijheh.2016.10.008 Calderon-Segura et al., 2011. https://dx.doi.org/10.1155/2012/612647 Vikkey et al., 2017								






Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)		Classification	Medical Biomonitoring*	Frequency and Duration	References
	8	 <p>H370, H371 H372, H373</p> <p><u>Persistence in soil/water and soil absorption potential & biomagnification & bioaccumulation</u></p> <p>GHS09 WARNING</p>  <p>H410, H411 H412, 4413 Environment</p>	<p>4.Face & eye protection</p> <p>5.Half respirator</p> <p>6.Particulate filters for respirators</p> <p>7.Apron</p>	 	<p>EN 149</p> <p>EN 143:2000</p> <p>R95, R99, R100</p> <p>EN 467: 1995</p>	<p>Control device from Securetec obtainable from www.securetec.net</p>	<p>hours per month (5h/d) an additional test is needed every 2 years</p> <p>d. If a worker sprays between 575 and 920 hours per month (8h/d) – an additional test is needed once a year</p> <p>2. All workers active in the spraying programme need to be tested once they leave the spray programme or are no longer active in the spraying programme</p>	<p>(https://dx.doi.org/10.1177.1178630217704659)</p> <p>Yusa <i>et al.</i>, 2015 (https://dx.doi.org/10.1016/j.aca.2015.05.032)</p> <p>Esteban & Castano, 2009 (https://doi.org/10.1016/i.entint.2008.09.003)</p> <p>Ungerer, Ewers & Wilhelm, 2007 (https://doi.org/10.1016/j.ijheh.2007.01.024)</p>


Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)	Classification	Medical Biomonitoring*	Frequency and Duration	References
Glycines (Glyphosate)	3	<u>Carcinogenicity</u> GHS07 WARNING  H335, H336 GHS08 DANGER  H334, H350 H350i, H350I	1. Neoprene gloves / chemically resistant nitrile gloves  2. Type 3 & Type 4 protective clothing   3. Safety boots  4. Face & eye protection  5. FFP3 masks 6. Apron 	EN 374:2016 EN 14605:2005 EN 345:1993 EN 166:2001 EN 140 EN 149 EN 149:2001 EN 467: 1995	Whole blood tests 1cc blood anti-coagulated in sodium heparin (refrigerated) . Analyse with Comet Assay Or use field-based test kit	1. Before the beginning of the spraying for all groups a blood sample needs to be taken : a. If the worker sprays less than 40 hours per month – additional testing not necessary b. If the worker sprays between 40 and 115 hours per month (1h/d) – additional testing not necessary c. If the worker sprays between 115 and 575 hours per month (5h/d) then additional testing not necessary	CDC National Biomonitoring Programme https://www.cdc.gov/biomonitoring/biomonitoring_summaries_3.html

Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)		Classification	Medical Biomonitoring* NOTE: These are the least expensive/most accessible options.	Frequency and Duration	References
							<p>d. If the worker sprays between 575 and 920 hours per month (8h/d) then additional testing is required every year</p> <p>2. All workers active in the spraying programme need test once they leave the spray programme or are no longer active in the spray programme</p>	
Dioxins	9	<u>Dioxins (residues/emissions)</u> GHS06 DANGER 	1. Butyl rubber gloves 2. Type 3 & Type 4 protective clothing 		EN 374:2016 EN 14605:2005	Hair tests 50-200g cleaned, dried and frozen. Tests done once off.	Hair tests for Dioxins: 1. Hair sample to be taken before spraying commences- before the worker is active in the spray programme	Esteban & Castano, 2009 https://doi.org/10.1016/i.entint.2008.09.003 Ungerer, Ewers & Wilhelm, 2007

Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)	Classification	Medical Biomonitoring*	Frequency and Duration	References
		H300, H301, H310, H311, H330, H331 GHS08 DANGER  H304, H334, H370, H371, H372, H373 GHS09 WARNING  H400, H410, H411, H412, H413 Environment	 Type 5 protective clothing  3. Safety boots 4. Full face respirators for gases and vapours 5. Particulate filters for respirators 6. Apron	BS EN ISO 13982: 2004 EN 345:1993 EN ISO 20345 EN 136 EN 141:2000 P95, P99, P100 EN 467: 1995	Whole blood tests 1cc anti-coagulated in sodium heparin (refrigerated) . Analysed by Comet assay.	2. Hair sample to be taken when the worker leaves or is no longer active in the spray programme Blood tests for Dioxins: 1. Before the beginning of the spraying for all groups a blood sample needs to be taken : a. If the worker sprays less than 40 hours per month – additional testing not necessary b. If the worker sprays between 40 and 115 hours per month	https://doi.org/10.1016/j.ijheh.2007.01.024 CDC National Biomonitoring Programme https://www.cdc.gov/biomonitoring/biomonitoring_summaries_3.html

Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)		Classification	Medical Biomonitoring* NOTE: These are the least expensive/most accessible options.	Frequency and Duration	References
							<p>(1h/d) – additional testing not necessary</p> <p>c. If the worker sprays between 115 and 575 hours per month (5h/d) then additional testing is required once per year</p> <p>d. If the worker sprays between 575 and 920 hours per month (8h/d) then additional testing is required every 3-6 months</p> <p>2. All workers active in the spraying programme need test once they leave the spray programme or are no longer active in the spray programme</p>	

Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)	Classification	Medical Biomonitoring*	Frequency and Duration	References
Heavy metals	10	<p><u>Heavy Metals</u></p> <p>GHS06 DANGER</p>  <p>H300, H310, H330, H331</p> <p>GHS08 DANGER</p>  <p>H304, H334, H340, H341, H350, H351, H360, H361, H362, H370, H370, H371, H372</p>	<p>1. Butyl rubber gloves</p> <p>2. Type 3 & Type 4 protective clothing</p>   <p>Type 5 protective clothing</p>  <p>3. Safety boots</p> <p>4. Full face respirators for gases and vapours</p>	<p>EN 374:2016</p> <p>EN 14605: 2005</p> <p>BS EN ISO 13982: 2004</p> <p>EN 345:1993 EN ISO 20345</p> <p>EN 136 EN 141:2000</p>	<p>Hair tests 50-200g cleaned, dried and frozen. Tests done once off.</p> <p>Urine tests 5cc fresh urine sample refrigerated. Regularly taken. Tested using ELISA test. 60cc needed for testing in children. (dip stick) Regularly taken.</p>	<p>Hair tests for Heavy metals:</p> <p>1. Hair sample to be taken before spraying commences- before the worker is active in the spray programme</p> <p>2. Hair sample to be taken when the worker leaves or is no longer active in the spray programme</p> <p>Blood tests for heavy metals:</p> <p>1. Before the beginning of the spraying for all groups a blood sample needs to be taken :</p>	<p>Esteban & Castano, 2009 (https://doi.org/10.1016/i.entint.2008.09.003)</p> <p>CDC National Biomonitoring Programme (https://www.cdc.gov/biomonitoring/biomonitoring_summaries_3.html)</p>

Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)		Classification	Medical Biomonitoring*	Frequency and Duration	References
		GHS09 WARNING  H400, H410, H411, H412, H413 Environment	5.Particulate filters for respirators	6.Apron	P95, P99, P100 EN 467: 1995	NOTE: These are the least expensive/most accessible options.	a. If the worker sprays less than 40 hours per month – additional testing not necessary b. If the worker sprays between 40 and 115 hours per month (1h/d) – additional testing not necessary c. If the worker sprays between 115 and 575 hours per month (5h/d) then additional testing is required once per year d. If the worker sprays between 575 and 920 hours per month (8h/d) then additional	

Sub-set of Chemicals in Hazard Group	Hazard Group	Hazard Criterion	Personal Protective Equipment (PPE)		Classification	Medical Biomonitoring* NOTE: These are the least expensive/most accessible options.	Frequency and Duration	References
							<p>testing is required every 3-6 months</p> <p>2. All workers active in the spraying programme need test once they leave the spray programme or are no longer active in the spray programme</p>	