

**Forest Service Handbook
National Headquarters - Washington Office
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**Forest Service Handbook 2109.14 – Pesticide-Use Management and Coordination Handbook
Zero Code**

Amendment: 2109.14-2016-2

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Digest: Following is an explanation of the changes throughout the directive by section.

Zero Code: Revises chapter in its entirety.

Forest Service Handbook 2109.14 – Pesticide-Use Management and Coordination Handbook

Zero Code

Amendment: 2109.14-2016-2

Effective date: August 31, 2016

Table of Contents

01 - Authority 3

02 - Objective 3

03 - Policy..... 3

05 - Definitions..... 3

01 - Authority

For authorities relevant to this chapter, see FSM 2150.1.

02 - Objective

For objectives relative to this chapter, see FSM 2150.2.

03 - Policy

For policies relative to this chapter, see FSM 2150.3.

05 - Definitions

The following specialized terms and acronyms are provided in addition to those terms defined in FSM 2150.5.

Acid equivalent (a.e. or ae or AE). The portion of a compound or formulated product that theoretically could be converted back to its corresponding acid.

Active ingredient (a.i. or ai or AI). The chemical(s) in a formulated product that is (are) principally responsible for the pesticide's effect; listed as active ingredient(s) on the label.

Acute exposure. One or multiple exposures occurring within a short timeframe (typically 24 hours or less).

Acute toxicity. Any poisonous effect produced within a short period of time, up to 96 hours, following an exposure.

Adjuvants. Compounds which, when added to pesticides, act as wetting or spreading agents, stickers, penetrants, emulsifiers, drift control agents, and so forth, and make the pesticide easier to handle, mix, or apply, or increase its effectiveness. Surfactants are a broad class of adjuvants used to improve the ability of a pesticide to stick to and be absorbed by the target organism.

Adverse effect. A biochemical change, functional impairment, or pathologic lesion that affects performance of the whole organism, or reduces an organism's ability to respond to an environmental challenge.

Aerial application. Application of a pesticide from an airplane or helicopter to dispense the material most often in a broadcast pattern over the landscape.

Biochemical Reaction. A chemical reaction that occurs within a living organism.

Forest Service Handbook 2109.14 – Pesticide-Use Management and Coordination Handbook
Zero Code

Amendment: 2109.14-2016-2

Effective date: August 31, 2016

Biological control. The process of applying or favoring one biological organism in an attempt to control another. Also referred to as biocontrol.

Buffer strip. A strip left untreated at the edge of a treated area to reduce or prevent the impact of a treatment from affecting adjacent untreated resources.

Calibration. The process of adjusting the amount of material per unit area, or per pull of a triggering device, to achieve a known rate of application.

Carcinogen. A chemical capable of inducing cancer.

Carrier. A gas, liquid, or solid substance used to dilute, propel, or suspend a pesticide during its application.

CFR. Code of Federal Regulations.

Chemical control. The process of using a chemical pesticide to affect or determine the location or growth of pest organisms as defined by the applicator.

Chemical name. The systematic name of a chemical compound according to the rules of nomenclature of the International Union of Pure and Applied Chemistry as adapted for indexing in Chemical Abstracts.

Chemical Transportation Emergency Center (CHEMTREC). A chemical-industry supported service that offers two types of assistance during emergencies involving chemicals:

- a. Relays information regarding specific chemicals.
- b. Contacts the manufacturer or other experts for additional information or on-site assistance.

The CHEMTREC toll-free number (1-800-424-9300) provides assistance in the event of emergencies.

Chronic effect. An effect which occurs as a result of repeated or long term (chronic) exposures.

Chronic exposure. Multiple exposures occurring over an extended period of time, or a significant fraction of the animal's or the individual's lifetime; generally taken to mean a time span greater than half of the individual's expected life-span.

Chronic toxicity. The capacity of a substance to cause adverse human health effects as a result of chronic exposure.

Forest Service Handbook 2109.14 – Pesticide-Use Management and Coordination Handbook
Zero Code

Amendment: 2109.14-2016-2

Effective date: August 31, 2016

Common Name of Pesticide. The generic name accepted by the American National Standards Institute (ANSI), or other professional standards authority, to identify the active ingredient in a pesticide.

Concentration (of a pesticide). The amount of active ingredient or its acid equivalent in a quantity of diluent, expressed as ratio of the ai or ae per unit of volume of the product, for example pounds per gallon, or milliliters per liter.

Contaminant. For chemicals, impurities present in a commercial grade chemical. For biological agents, other agents that may be present in a commercial product.

Coverage. The spread or distribution of a pesticide over a surface or area.

Crop Advisor. As defined in the Worker Protection Standard, a crop advisor means any person who is assessing pest numbers or damage, pesticide distribution, or the status or requirements of agricultural plants. The term does not include any person who is performing hand labor tasks.

Degrade. The breaking down of a chemical to component parts by chemical or biological processes.

Dermal exposure. Exposure of an organism's skin to a pesticide or other substance.

Diluent. Any gas, liquid, or solid material used to reduce the concentration of an active ingredient in a formulation.

Dose. The amount of a chemical, physical, or biological agent which crosses the exchange boundary (skin, stomach, lungs, and so forth) of an organism; the amount of a foreign agent internalized by an organism.

Dose-Response Assessment. A determination of the relationship between the amount of an administered, applied, or internal foreign chemical and a specific biological reaction to the chemical.

Drift. The airborne movement of pesticide dust, spray, or vapor away from the intended treatment site.

Efficacy. The ability to produce the desired effect; effectiveness.

Endocrine System. The endocrine system consists of endocrine glands, hormones, and hormone receptors. This system participates in the control of metabolism and body composition, growth and development, reproduction, and many of the numerous physiological adjustments needed to maintain equilibrium of the internal environment.

EPA. United States Environmental Protection Agency.

Forest Service Handbook 2109.14 – Pesticide-Use Management and Coordination Handbook
Zero Code

Amendment: 2109.14-2016-2

Effective date: August 31, 2016

EPA Registration Number. The identification number assigned to a pesticide product by the EPA during registration.

Epidemiology Study. A study of a human population or human populations. In toxicology, a study which examines the relationship of exposures to one or more potentially toxic agent to adverse health effects in human populations.

Exposure. Contact made between a chemical, physical, or biological agent and the outer boundary of an organism; the amount of an agent available at the exchange boundary (stomach, skin, lungs, and so forth) of the organism.

Exposure analysis. The identification and evaluation of a population exposed to a toxic agent, describing its composition and size, as well as the type, magnitude, frequency, route, and duration of exposure.

FIFRA. The Federal Insecticide, Fungicide, and Rodenticide Act (of 1947) as amended; the principle Federal law regulating pesticide manufacture, sale, and use in the United States.

Flash Point. The lowest temperature at which a liquid gives off sufficient vapor to form an ignitable mixture with air near its surface or within a vessel.

Formulation. The form in which a pesticide is packaged or prepared for use. A chemical mixture that includes a certain percentage of active ingredient, often with one or more inert carriers.

Handler. From the Worker Protection Standard, a pesticide handler is anyone who: (1) is employed (including self-employed) for any type of compensation by an agricultural establishment or a commercial pesticide handling establishment that uses pesticides in the production of agricultural plants on a farm, forest, nursery, or greenhouse, and (2) is doing any of nine specific tasks listed in the standard. See also the definition of Worker.

Hazard. A potential source of harm; that which presents risk of danger or harm.

Hazard analysis. The process of determining whether exposure to an agent can cause an increase in the incidence of a particular adverse health effect and whether the effect is likely to occur in humans.

Hazard identification. The process of identifying the potential array of adverse effects that an agent might induce in an exposed population.

Hazard quotient (HQ). The ratio of the estimated level of exposure to the reference dose (RfD) or some other index of acceptable exposure.

Hazardous material(s) (HAZMAT). Umbrella term that includes OSHA hazardous chemicals, Resource Conservation and Recovery Act (RCRA)-defined hazardous waste,

Forest Service Handbook 2109.14 – Pesticide-Use Management and Coordination Handbook
Zero Code

Amendment: 2109.14-2016-2

Effective date: August 31, 2016

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-defined hazardous substances, and used oil. (FSM 2160.5; FSM 2160.1, ex. 1)

Hazardous Waste (HAZWASTE). Unusable, discarded, to-be-disposed of, or to be recycled, waste that poses a threat to human health or the environment. This excludes waste from the extraction, identification, and processing of ores and minerals (FSM 2160.5; FSM 2160.1, ex. 1)

Incidental Release of Pesticide (unintentional). Non-emergency, accidental release of a small amount of pesticide within a facility or into the environment where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by appropriately trained, equipped and authorized personnel in the immediate release area (see 29 CFR 1910.120 (a)(3)). The case-by-case evaluation of whether a spill is an emergency situation depends upon the specific pesticide hazards, amount released, environmental setting, and potential for human exposure.

Inert ingredients. All ingredients in a formulated pesticide product which are not classified as active ingredients. Note: Inert as used here is a defined usage of the word; many chemicals which are ‘inert’ under this definition are biologically active.

Integrated Pest Management (IPM). An ecologically based process for selecting strategies to regulate pests to achieve resource management objectives. It is the planned and systematic use of detection, evaluation, and monitoring techniques; and all appropriate silvicultural, biological, chemical, genetic, and mechanical tactics needed to prevent or reduce pest-caused damage and losses to levels that are economically, environmentally, and aesthetically acceptable.

Invasive Species. A species non-native to an ecosystem into which it is introduced where it does, or is likely to cause, economic or environmental harm or harm to human health.

Inversion. A weather condition resulting when the temperature rises with elevation from the earth’s surface. During an inversion, mixing of droplets or particulates in the air is suppressed allowing the fine droplets that are not rapidly deposited by gravity to remain concentrated, aloft and susceptible to drift.

Label. The written, printed, or graphic matter on, or attached to, a pesticide container that includes information on the formulation, on instructions governing use, and on restrictions, signal words, and precautions. The label is a legal document; FIFRA section 12(a)(2)(G) makes it a violation of federal law to use any registered pesticide in a manner inconsistent with its labelling (40 CFR 156.10(i)(2)(ii)). By extension, “County Bulletin” information posted on the internet by EPA becomes part of the enforceable label requirements.

LC₅₀ or LC50. A measure of toxicity, known as the median lethal concentration. The concentration of a substance in an environmental medium (generally air or water) that produces death in 50 percent of a population of test animals exposed to that concentration

Forest Service Handbook 2109.14 – Pesticide-Use Management and Coordination Handbook
Zero Code

Amendment: 2109.14-2016-2

Effective date: August 31, 2016

for a specified period of time. This is normally expressed as milligrams of the substance per liter of air or water (mg/L), or as parts per million (ppm) or parts per billion (ppb).

LD₅₀ or LD50. A measure of toxicity, known as the median lethal dose. The amount (dose) of a substance which produces death in 50 percent of a population of test animals to which it is administered by any of a variety of methods. Expressed as milligrams of the substance per kilogram of animal body weight (mg/kg).

Leaching. The translocation of a substance downward or out of the soil resulting from water movement.

Lowest Observable Adverse Effect Level (LOAEL). The lowest exposure level at which there are statistically or biologically significant increases in frequency or severity of adverse effects between exposed populations and non-exposed (control) populations.

Metabolite. A chemical derived from plant or animal metabolic breakdown or environmental transformation of another chemical.

Mitigation measure. Any action taken to lessen adverse impacts or enhance beneficial effects; any action designed to change an effect.

Model. A mathematical formula or set of formulae with data inputs (parameters) that can be adjusted so that the mathematical expression(s) closely describe a set of empirical data.

Mutagen. A substance capable of permanently altering the structure of genetic material in a cell.

Names (of a pesticide product). Refer to Chemical name and Common name.

NEPA. National Environmental Policy Act of 1969 as amended.

Neurotoxicity. The ability to damage nerve tissue.

No observed adverse effect level (NOAEL). The highest exposure level at which there are no statistically nor biologically significant increases in frequency or severity of adverse effects between exposed populations and non-exposed (control) populations. Effects may be produced at this dose, but they are not considered to be adverse.

No observed effect level (NOEL). The highest exposure level at which there are no statistically or biologically significant increases in frequency or severity of any observable effects between exposed populations and non-exposed (control) populations.

Nontarget. Any plant, animal, or other organism that a method of application is not aimed to affect, but which may be accidentally injured during application.

Forest Service Handbook 2109.14 – Pesticide-Use Management and Coordination Handbook
Zero Code

Amendment: 2109.14-2016-2

Effective date: August 31, 2016

Noxious weed. A weed regulated or specified by law as being especially undesirable, troublesome, and difficult to control.

Oil. A liquid aromatic or paraffinic hydrocarbon compound. Oil may be used as an active ingredient (dormant oil) but is more commonly used as an inert diluent or carrier for other pesticides.

OSHA or O.S.H.A. Occupational Safety and Health Administration or Occupational Safety and Health Act of 1970 as amended. Meaning is determined by context (see also FSM 2160.1).

Overpack. To place a (defective or potentially defective) container into another (slightly larger) sound container to prevent leakage of the contents of the interior container into the environment.

Personal Protective Equipment (PPE). Apparel and devices worn to protect the body from contact with pesticides or pesticide residues, including: coveralls; chemical-resistant suits; gloves; chemical resistant footwear; aprons; headgear; protective eyewear; and, respirators. PPE requirements are stated on the pesticide label, and must be followed in accordance with 40 CFR 156.10(i)(2)(ii). Note that pesticide labels may require long sleeved shirts, long pants, shoes and socks, and other items which, although required to be worn, are not considered PPE (40 CFR 170.240(b)).

Pest. Any organism that is situated where it has, or could have, unacceptable adverse impacts on humans, resources, or the environment.

Pesticide. Any substance, or mixture of substances, intended to prevent, destroy, repel, or mitigate any pest; or any substance, or mixture of substances, intended for use as a plant growth regulator, defoliant, or desiccant (see also FIFRA Section 2(u), and 40 CFR 152.6, 152.8, 152.10, and 152.15). Note – some States may have definitions of pesticides that involve additional materials (for example, adjuvants).

Pesticide-Use Management and Coordination. All activities involving pesticides and their appropriate use.

Poison. Any chemical or agent which is capable of causing damage, illness or death when eaten, absorbed through the skin, inhaled, or otherwise absorbed by man, animals or plants; substances are poisonous with respect to specific organisms, few, if any, are universally poisonous. For pesticide regulatory purposes, a poison is defined as any pesticide meeting the definition of highly acute oral, respiratory, or dermal acute toxicity (40 CFR 156.64). Pesticides fitting this regulatory definition are required by law to clearly display a skull and crossbones icon along with the words “Danger” and “Poison” on their package labels.

Product name. The trade or brand name of a pesticide; found on the pesticide container. Multiple trade names may be used under a given EPA registration number.

Forest Service Handbook 2109.14 – Pesticide-Use Management and Coordination Handbook
Zero Code

Amendment: 2109.14-2016-2

Effective date: August 31, 2016

Rate (of pesticide use). The quantity of active ingredient (ai) or acid equivalent (ae) expressed as mass per unit area (surface or volume) treated; for example pounds of ai per acre or grams ae per milliliter.

Reference dose (RfD). An estimate of daily oral exposure, over a lifetime, to the human population (including sensitive subgroups) that is likely to be without deleterious effects. Uncertainty associated with this estimate may span an order of magnitude; uncertainty factors are generally applied to these estimates to reflect the limitations of the data used to derive the estimates.

Registered Pesticide. A pesticide that has been registered by EPA under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended.

Restricted-Use Pesticide. Pesticide with certain properties with the potential to cause unreasonable adverse effects to the environment, and/or injury to the applicator. Restricted use pesticides or "RUPs" are pesticides not available to the general public in the United States. The "Restricted Use" classification restricts a product, or its uses, to use by a certified pesticide applicator or under the direct supervision of a certified applicator. Purchase of Restricted Use Pesticide is restricted to certified applicators. Applicator certification programs are administered by the Federal Government, and individual States with requirements that vary from State to State (see also: 40 CFR Subpart I, 152.160-175).

Risk. The likelihood that the presence or lack of a substance, an action, or some other stimulus will produce harm under specified conditions.

Risk assessment (in the context of human health). The determination of potential adverse health effects from exposure to chemicals, which includes both quantitative and qualitative expressions of risk. The term applies to both the process of evaluating risk and the written documentation produced.

Risk management (in the context of human health). A decision making process that accounts for political, social, economic and engineering implications together with risk-related information in order to develop, analyze, and compare management options and select the appropriate managerial response to a potential chronic health hazard.

Safety Data Sheet (SDS). A key document listing the contents and characteristics of a pesticide or other chemical formulation, including: hazardous ingredients; physical data; fire and explosion hazard data; health hazard data; reactivity data; spill or leak response procedures; special protection information; and other special precautions.

Site. As defined in FIFRA, the area(s) of land or water defined on the product label to which a pesticide may be applied. Under FIFRA the site of application must be present on the label in order for an applicator to legally apply that pesticide on that site.

Spot treatment. Pesticide application to restricted portions (or spots) within a larger unit.

Forest Service Handbook 2109.14 – Pesticide-Use Management and Coordination Handbook
Zero Code

Amendment: 2109.14-2016-2

Effective date: August 31, 2016

Subchronic exposure. Exposure to a substance spanning about 10 percent of the lifespan of an organism. (Exposures of longer duration than acute or short-term, and shorter than chronic).

Swath. A strip of treated area the width of a single pass of sprayer boom.

Tank mix. A combination of two or more formulated pesticides mixed together after purchase and prior to application.

Teratogenic. Structural-defect-causing agent which generally acts during the development of individual organs; capable of causing birth defects.

Toxicity. The inherent ability of a substance to produce injury to an organism; may vary by route of exposure.

Toxicology. The study of harmful interactions between chemicals and biological systems.

Toxic substance. A chemical substance or agent which may cause an adverse effect or effects to biological systems.

Uncertainty factor (UF). A factor used to derive an RfD from experimental data. Uncertainty factors are intended to account for (1) the variation in sensitivity among the members of the human population (intraspecies variation); (2) the uncertainty in extrapolating animal data to humans (interspecies variability); (3) the uncertainty in extrapolating from data obtained in a study with less than lifetime exposure to project lifetime exposure; (4) the uncertainty from extrapolating from a LOAEL rather than from a NOAEL; and, (5) the uncertainty associated with extrapolating from an incomplete data base (incomplete or unavailable data).

Volatility. The tendency of a solid or liquid to evaporate at normal temperature and pressure; readily vaporized.

Weed. Any plant that is objectionable or interferes with the activities or welfare of man; any plant that is 'out of place' by the observers definition.

Wetting agent. A chemical that helps a pesticide spread and coat (wet) a surface more evenly. Wetting agents reduce the amount of a spray that rolls off smooth or waxy leaves, and helps sprays to spread out on hairy leaves. Detergents are sometimes used as wetting agents.

Worker. As defined in the Worker Protection Standard, a worker is anyone who: (1) is employed (including self-employed) for any type of compensation and (2) is doing tasks such as harvesting, weeding, or watering, relating to the production of agricultural plants on a farm, forest, nursery, or greenhouse. The term does NOT include persons who are employed by a commercial establishment to perform tasks as crop advisors. See also Crop Advisor and Handler.

Forest Service Handbook 2109.14 – Pesticide-Use Management and Coordination Handbook
Zero Code

Amendment: 2109.14-2016-2

Effective date: August 31, 2016

Worker Protection Standard (WPS). EPA regulations intended to protect workers at agricultural establishments (including farms, nurseries, greenhouses, and forests) from exposure to pesticides, as specified in 40 CFR Part 170.