

SEPTEMBER 20, 2023

This document supersedes all previously published versions of the Commodity Specific Food Safety Guidelines for the Production and Harvest of Leafy Greens including those dated on or before March 30, 2023.

# GLOSSARY

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| **ACCREDITATION** | A rigorous assessment conducted by an independent science-based organization to assure the overall capability and competency of a laboratory and its quality management systems. |
| **ACTIVE COMPOST** | Compost feedstock that is in the process of being rapidly decomposed and is unstable. Active compost is generating temperatures of at least 50˚ Celsius (122˚ Fahrenheit) during decomposition; or is releasing carbon dioxide at a rate of at least 15 milligrams per gram of compost per day, or the equivalent of oxygen uptake. |
| **ADEQUATE / ADEQUATELY** | That which is needed to accomplish the intended purpose in keeping with good public health practice. |
| **ADJACENT SURFACES**  | Surfaces that are near food-contact surfaces but do not directly touch the food. The surfaces can still be a contamination source if human pathogens are transferred to the food or food-contact surfaces through drainage, drips, dirt or debris. Examples: Outer surface of a conveyor belt, tarps above food-contact surfaces |
| **ADJACENT / NEARBY LAND** | Land within a proximity that could potentially affect safe production of leafy greens. |
| **AERATED STATIC PILE** | Composting process where active ingredients are covered with an insulating material and air is forced through the product. The product is maintained at a minimum of 131 degrees Fahrenheit for 3 days. |
| **AERIAL APPLICATION** | Any application administered from above leafy greens where water may come in contact with the edible portion of the crop; may be delivered via aircraft, sprayer, sprinkler, etc. |
| **AEROSOLIZED** | The dispersion or discharge of a substance under pressure that generates a suspension of fine particles in air or other gas. |
| **AGRICULTURAL /** **COMPOST TEA** | A water extract of biological materials (such as compost, manure, non-fecal animal byproducts, peat moss, pre-consumer vegetative waste, table waste, or yard trimmings), excluding any form of human waste, produced to transfer microbial biomass, fine particulate organic matter, and soluble chemical components into an aqueous phase. Agricultural / Compost teas are held for longer than one hour before application and are considered non-synthetic crop inputs for the purposes of this document. |
| **AGRICULTURAL MATERIAL** | *Agricultural Material* means waste material of plant or animal origin, which results directly from the conduct of agriculture, animal husbandry, horticulture, aquaculture, silviculture, vermiculture, viticulture and similar activities undertaken for the production of food or fiber for human or animal consumption or use, which is separated at the point of generation, and which contains no other solid waste. With the exception of grape pomace or material generated during nut or grain hulling, shelling, and processing, agricultural material has not been processed except at its point of generation and has not been processed in a way that alters its essential character as a waste resulting from the production of food or fiber for human or animal consumption or use. Agricultural material includes, but is not limited to, manures, orchard and vineyard prunings, grape pomace, and crop residues. |
| **AGRICULTURAL TAILWATER** | Excess run off water which is generated and collected during the process of irrigation. |
| **AGRICULTURAL WATER** | Water used in activities covered in these guidelines where water is intended to, or is likely to, contact lettuce/leafy greens or food-contact surfaces, including water used in growing activities (including all irrigation water and water used for preparing crop sprays) and in harvesting, packing, and holding activities (including water used for washing or cooling harvested lettuce/leafy greens and water used for preventing dehydration of lettuce/leafy greens). |
| **AGRICULTURAL WATER SYSTEM** | Each distinct, separate combination of water source, conveyance, storage used to carry water from its primary source to its point of use; includes wells, irrigation canals, pumps, valves, storage tanks, reservoirs, meters, pipes, fittings, and sprinklers. |
| **AGRICULTURAL WATER TREATMENT SYSTEM** | An add-on to an agricultural water system that improves the quality (safety) of the water to make it more acceptable for a specific end- use. The agricultural water treatment system may treat multiple ranches, water sources or batches of water as defined by the water system description. |
| **ANCILLARY EQUIPMENT** | Temporary storage equipment for fertilizers such as third-party storage tanks, pony tanks, etc. |
| **ANIMAL****BY-PRODUCT/PRODUCT** | Parts of an animal including organ meat, nervous tissue, cartilage, bone, blood, feathers, and excrement. This also include worm castings, guano, and other animal-based products and excrements. |
| **ANIMAL FEED OPERATION (AFO)** | Animal Feeding Operation (AFO)- are agricultural operations where animals are kept and raised in confined situations. An AFO is a lot or facility (other than an aquatic animal production facility) where the following conditions are met: \*animals have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period, and\*crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility.Less than 1,000 animal units does not meet the requirements of a CAFO. |
| **ANIMAL HAZARD** | Feeding, skin, feathers, fecal matter, or signs of animal presence in an area to be harvested in sufficient number and quantity to suggest to a reasonable person the crop may be contaminated. |
| **ANIMAL UNIT** | There are three approaches to defining an animal unit: cow-calf unit, 1,000 pounds of live weight of any species, and on an energy basis. |
| **ANTIMICROBIAL WATER TREATMENT** | A physical, energetic, or chemical agent, applied alone, in combination, or as a sequential process, to achieve and maintain a defined microbiological water quality standard. |
| **ADENOSINE TRI-PHOSPHATE (ATP)** | A high-energy phosphate molecule required to provide energy for cellular function. |
| **APPLICATION INTERVAL** | Means the time between application of an agricultural input (such as a soil amendment) to a growing area and harvest of leafy greens from the growing area where the agricultural input was applied. |
| **ATP TEST METHODS** | Exploits knowledge of the concentration of ATP as related to viable biomass or metabolic activity; provides an estimate of cleanliness. |
| **BIOFERTILIZERS** | Fertilizer materials/products that contain microorganisms such as bacteria, fungi, and cyanobacteria that shall promote soil biological activities. |
| **BIOLOGICALS** | Biologicals are products that contain beneficial, naturally occurring microorganisms or microbial derivatives as active ingredients. |
| **BIORATIONALS** | Biorationals are non-synthetic input materials in agriculture that are derived from natural sources such as microorganisms, biochemicals, minerals, organic materials, and plant extracts |
| **BIOSOLIDS** | Solid, semisolid, or liquid residues generated during primary, secondary, or advanced treatment of domestic sanitary sewage through one or more controlled processes.**Class A:** Class A biosolids undergo a “Process to Further Reduce Pathogens (PFRP).” Pathogens are reduced to a level similar to the native soil and environment. Class A biosolids products can be used on hand golf courses, and other places where public contact is likely. Class A biosolids products include composted biosolids, lime pasteurized biosolids, and fertilizer pellets. Class A biosolids products are soil amendments, potting soils, and slow-release fertilizers.**Class B:** Class B biosolids undergo a “Process to Significantly Reduce Pathogens (PSRP).” This means that while pathogens are significantly reduced to levels which are often below those found in animal manure, management practices (BMPs) are required at the site where they are used. Class B biosolids are used in bulk as fertilizers in agriculture and forestry and to reclaim barren lands. Site permits are required. |
| **BLUE VALVE** | Pipes which are used as a closed conveyance system for moving agricultural surface water from water source to irrigation systems or reservoirs for agricultural use. |
| **BREAKPOINT** | The point at which the disinfection demand has been met. |
| **BUILDINGS** | Any fully or partially enclosed building on the farm that is used for storing of food-contact surfaces and packaging materials, including minimal structures that have a roof but no walls. |
| **CARBOHYDRATE** | Ingredient for soil amendments and crop inputs that could improve growth of bacteria. |
| **CLOSED DELIVERY SYSTEM** | A water storage or conveyance system which is fully enclosed and protected such that water is not exposed to the environment from the water source to the point of use. |
| **COLONY FORMING UNITS (CFU)** | Viable microorganisms (bacteria, yeasts & mold) either consisting of single cells or groups of cells, capable of growth under the prescribed conditions (medium, atmosphere, time and temperature) to develop into visible colonies (colony forming units) which are counted. |
| **COLIFORMS** | Gram-negative, non-spore-forming, rod-shaped bacteria that ferment lactose to gas. They are frequently used as indicators of process control but exist broadly in nature. |
| **CO-MANAGEMENT** | An approach to conserving soil, water, air, wildlife, and other natural resources while simultaneously minimizing microbiological hazards associated with food production. |
| **COMPOST/MATURE COMPOST** | C*ompost* is the product manufactured through the controlled aerobic, biological decomposition of biodegradable materials. The product has undergone mesophilic and thermophilic temperatures, which significantly reduces the viability of pathogens and weed seeds and stabilizes the carbon such that it is beneficial to plant growth. Compost is typically used as a soil amendment but may also contribute plant nutrients. |
| **COMPOST FEEDSTOCK** | “Feedstock” means any compostable material used in the production of compost or chipped and ground material including, but not limited to, agricultural material, green material, vegetative food material, food material, biosolids, digestate, and mixed material. Feedstocks shall not be considered as either additives or amendments. |
| **COMPOSTING** | Means a process to produce compost in which organic material is decomposed by the actions of microorganisms under thermophilic conditions for a designated time period (for example, 3 days) at a designated temperature (for example, 131 °F (55 °C)), followed by a curing stage under cooler conditions. |
| **CONCENTRATED ANIMAL FEEDING OPERATION (CAFO)** | A lot or facility where animals have been, are or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period and crops, vegetation forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility. In addition, there must be more than 1,000 'animal units' (as defined in 40 CFR 122.23) confined at the facility; or more than 300 animal units confined at the facility if either one of the following conditions are met: pollutants are discharged into navigable waters through a man-made ditch, flushing system or other similar man-made device; or pollutants are discharged directly into waters of the United States which originate outside of and pass over, across, or through the facility or otherwise come into direct contact with the animals confined in the operation. |
| **COVERED PRODUCE** | Commodities that FDA has identified as typically consumed raw. For our purposes this is for lettuce and leafy greens. |
| **CROP INPUT** | Crop inputs are materials that are commonly applied post-emergence for pest and disease control, greening, and to provide organic and inorganic nutrients to the plant during the growth cycle. |
| **CROSS-CONTAMINATION** | The transfer of microorganisms, such as bacteria and viruses, from one place to another. |
| **CURING** | The secondary phase of the composting process. As the active phase slows down and the temperature drops, mesophilic microorganisms recolonize and continue to breakdown the remaining organic matter. This process is also known as or referred to as the maturation step. |
| **DETECTION LIMIIT** | A detection limit is the lowest quantity of a substance or measurable target that can be distinguished from the absence of that substance or measurable target. |
| **DIRECT WATER APPLICATION** | Using agricultural water in a manner whereby the water is intended to, or is likely to, contact leafy greens or food-contact surfaces during use of the water. |
| **ENTEROHEMORRHAGIC *E. COLI* (EHEC)** | Shiga toxin-producing *E. coli* clinically associated with bloody diarrhea. |
| ***ESCHERICHIA COLI* (*E. COLI*)** | *Escherichia coli* are common bacteria that live in the lower intestines of animals (including humans) and are generally not harmful. *E. coli* are frequently used as an indicator of fecal contamination but can be found in nature from non-fecal sources. |
| **FECAL COLIFORMS** | Coliform bacteria that grow at elevated temperatures and may or may not be of fecal origin. Useful to monitor effectiveness of composting processes. Also called “thermotolerant coliforms.” |
| **FIELD EQUIPMENT** | Equipment used to: prepare the production area and plant, cultivate, fertilize, treat or any other pre-harvest in-field activities. |
| **FLOODING** | The flowing or overflowing of a field with water outside a grower’s control that is reasonably likely to contain microorganisms of significant public health concern and is reasonably likely to cause adulteration of edible portions of fresh produce in that field. |
| **FOOD-CONTACT SURFACE** | Those surfaces that contact human food and those surfaces from which drainage, or other transfer, onto the food or onto surfaces that contact the food ordinarily occurs during the normal course of operations. ‘‘Food-contact surfaces’’ includes food-contact surfaces of equipment and tools used during harvest, packing and holding.Examples: Conveyor belts, cutting boards, knives, baskets.  |
| **FOOD MATERIAL** | *Food Material* means a waste material of plant or animal origin that results from the preparation or processing of food for animal or human consumption and that is separated from the municipal solid waste stream. Food material includes, but is not limited to, food waste from food facilities, food processing establishments, grocery stores, institutional cafeterias (such as prisons, schools and hospitals), and residential food scrap collection. Material that is defined as “food material” is not agricultural material. |
| **FOOD SAFETY ASSESSMENT** | A standardized procedure that predicts the likelihood of harm resulting from exposure to chemical, microbial and physical agents in the diet. |
| **FOOD SAFETY PERSONNEL** | Person trained in basic food safety principals and/or working under the auspices of a food safety professional. |
| **FOOD SAFETY PROFESSIONAL** | Person entrusted with management level responsibility for conducting food safety assessments before food reaches consumers; requires documented training in scientific principles and a solid understanding of the principles of food safety as applied to agricultural production; in addition this individual must have successfully completed food safety training at least equivalent to that received under standardized curriculum recognized as adequate by the Food and Drug Administration (See Appendix B for more details). |
| **GEOMETRIC MEAN** | Mathematical def.: the nth root of the product of n numbers, or:Geometric Mean = nth root of (X1)(X2)...(Xn), where X1, X2, etc. represent the individual data points, and n is the total number of data points used in the calculation.Practical def.: the average of the logarithmic values of a data set, converted back to a base 10 number. |
| **GRAZING LANDS** | Grazing Lands include grasslands, savannas, and shrublands that are grazed by livestock. |
| **GREEN WASTE** | Any plant material that is separated at the point of generation contains no greater than 1.0 percent of physical contaminants by weight. Green material includes, but is not limited to, yard trimmings ("Yard Trimmings" means any wastes generated from the maintenance or alteration of public, commercial or residential landscapes including, but not limited to, yard clippings, leaves, tree trimmings, prunings, brush, and weeds), untreated wood wastes, natural fiber products, and construction and demolition wood waste. Green material does not include food material, biosolids, mixed solid waste, material processed from commingled collection, wood containing lead-based paint or wood preservative, mixed construction or mixed demolition debris. "Separated At The Point of Generation" includes material separated from the solid waste stream by the generator of that material. It may also include material from a centralized facility as long as that material was kept separate from the waste stream prior to receipt by that facility and the material was not commingled with other materials during handling. 1 |
| **GROUND/SOIL** | Ground – solid surface of the Earth.Soil – upper layer of the Earth in which plants grow. [growing mediaThese two words are considered synonymous throughout and for the purpose of the document. |
| **GROUND WATER** | The supply of fresh water found beneath the earth’s surface, usually in aquifers, which supply wells and springs. Ground water does not include any water that meets the definition of surface water. |
| **HABITAT** | The natural home or environment of an animal, plant, or other organism. |
| **HARD TO REACH AREAS** | Parts of the harvesting equipment that are difficult to access for cleaning, sanitation, and inspection due to location, design, or obstruction of components. Ensuring that these areas are properly cleaned and sanitized is important to prevent contamination.  |
| **HARVESTING** | Activities that are traditionally performed on farms for the purpose of removing leafy greens from the field and preparing them for use as food; does not include activities that transform a raw agricultural commodity into a processed food. Examples of harvesting include cutting (or otherwise separating) the edible portion of the leafy greens from the crop plant and removing or trimming parts, cooling, field coring, gathering, hulling, removing stems, trimming of outer leaves of, and washing. |
| **HARVEST EQUIPMENT** | Any kind of equipment which is used during or to assist with the harvesting process including but not limited to harvesting machines, food-contact tables, belts, knives, etc. |
| **HAZARD** | Any biological, physical, or chemical agent that has the potential to cause illness or injury in the absence of its control. |
| **HEAT TREATED SOIL AMENDMENTS AND CROP INPUTS** | Soil amendments and crop inputs that have been physically heat treated and dried in accordance to standards issued by the USDA. |
| **HOBBY FARM** | A noncommercial farming operation or a farm where the primary source of income is not obtained by the sale of its products. |
| **HOLDING** | Storage of leafy greens in warehouses, cold storage, etc. including activities performed incidental to storage (*e.g.,* activities performed for safe or effective leafy green storage) as well as activities performed as a practical necessity for leafy green distribution (such as blending and breaking down pallets) but does not include activities that transform the raw commodity into a processed food. |
| **HYDROPONIC** | The growing of plants in nutrient solutions with or without an inert medium (as soil) to provide mechanical support. |
| **INCOMPLETELY COMPOSTED MANURE /IMMATURE COMPOST** | Any form of compost that has not gone through a complete, validated, composting process approved by the LGMA and does not have tests showing that Fecal Coliforms, *E. coli*, *E. coli O157:H7, Listeria*, and *Salmonella* have been eliminated. |
| **INDICATOR MICROORGANISMS** | An organism that when present suggests the possibility of contamination or under processing. |
| **IRRIGATION WATER TREATMENT** | Any system used to treat agricultural water, so it makes the quality adequate for its intended use |
| **KNOWN OR REASONABLY FORESEEABLE HAZARD** | Known or reasonably foreseeable hazard means a biological, chemical, and physical hazard that is known to be, or has the potential to be, associated with the farm or the food. |
| **LETTUCE AND LEAFY GREENS** | Iceberg lettuce, romaine lettuce, green leaf lettuce, red leaf lettuce, butter lettuce, baby leaf lettuce (i.e., immature lettuce or leafy greens), escarole, endive, spring mix, spinach, cabbage (green, red and savoy), kale, arugula and chard. |
| ***LISTERIA*** | Any of a genus (*Listeria*) of small, gram-positive, rod-shaped bacteria that do not form spores and have a tendency to grow in chains and that include one (*Listeria monocytogenes*) that causes listeriosis. |
| **LOT**(Pertaining to soil amendments and crop inputs other than compost) | Lot means a specific quantity of a finished product or other material that is intended to have uniform character and quality, within specified limits, and is produced according to a single manufacturing order during the same cycle of manufacture. |
| **MANURE** | Animal excreta, alone or in combination with litter (such as straw and feathers used for animal bedding) for use as a soil amendment. |
| **MICROORGANISMS** | Yeasts, molds, bacteria, viruses, protozoa, and microscopic parasites and includes species having public health significance and those subjecting leafy greens to decomposition or that otherwise may cause leafy greens to be adulterated. |
| **MONITOR** | To conduct a planned sequence of observations or measurements to assess whether a process, point or procedure is under control and, when required, to produce an accurate record of the observation or measurement. |
| **MONTHLY** | Because irrigation schedules and delivery of water is not always in a grower’s control “monthly” for purposes of water sampling means within 35 days of the previous sample. |
| **MORTALITY COMPOST** | *Mortality Compost* is compost created through a process to manage livestock mortalities. The use of crop inputs, made from mortality composting processes, shall follow all local, state and federal regulations. |
| **MOST PROBABLE NUMBER (MPN)** | Estimated values that are statistical in nature; a method for enumeration of microbes in a sample, particularly when present in small numbers. |
| **MUNICIPAL WATER** | Water that is processed and treated by a municipality to meet USEPA drinking water standards. |
| **NON-DETECT** | Non-detect means not present but consideration should be given to the limit of detection of the approved laboratory method used for biological or chemical analysis. |
| **NON-SYNTHETIC SOIL AMENDMENTS AND CROP INPUTS OF ANIMAL ORIGIN** | Any soil amendment and/or crop input that contains animal manure, an animal product, and/or an animal by-product that is reasonably likely to contain human pathogens. Includes agricultural or compost teas for the purposes of these guidelines. |
| **OPEN DELIVERY SYSTEM** | A water storage or conveyance system which is partially or fully open and unprotected such that water is exposed to the environment at any point from the water source to the point of use. |
| **PACKING** | Placing leafy greens into a container other than packaging them and also includes activities performed incidental to packing (*e.g.,* activities performed for the safe or effective packing of leafy greens (such as sorting, culling, grading, and weighing or conveying incidental to packing or repacking)). |
| **PARTS PER MILLION (PPM)** | Usually describes the concentration of something in water or soil; one particle of a given substance for every 999,999 other particles. |
| **PATHOGEN** | A disease-causing agent such as a virus, parasite, or bacteria. |
| **PEST** | Any objectionable animals or insects, including birds, rodents, flies, and larvae. |
| **POOLED WATER** | An accumulation of standing water; not free flowing. |
| **POST-CONSUMER WASTE** | *Post-consumer waste* is a waste type produced by the end consumer of a material stream. Generally, this is discarded materials after something has been used. Post-consumer waste can include items such as packaging and unconsumed food. |
| **POTABLE WATER** | Water that is safe to drink or to use for food preparation without risk of health problems. |
| **PRE-CONSUMER WASTE** | A food item that was produced for consumption but that was never purchased, consumed or used. |
| **PROCESS AUTHORITY** | A regulatory body, person, or organization that has specific responsibility and knowledge regarding a particular process or method; these authorities publish standards, metrics, or guidance for these processes and/or methods. |
| **READY-TO-EAT (RTE) FOOD*****(EXCERPTED FROM USFDA 2005 MODEL FOOD CODE)*** | 1. "Ready-to-eat food" means FOOD that:
	1. Is in a form that is edible without additional preparation to achieve FOOD safety, as specified under one of the following: 3-401.11(A) or (B), § 3-401.12, or § 3-402.11, or as specified in 3-401.11(C); or

(d) May receive additional preparation for palatability or aesthetic, epicurean, gastronomic, or culinary purposes.1. "Ready-to-eat food" includes:
	1. Raw fruits and vegetables that are washed as specified under § 3- 302.15;
	2. Fruits and vegetables that are cooked for hot holding, as specified under § 3-401.13;

(e) Plant FOOD for which further washing, cooking, or other processing is not required for FOOD safety, and from which rinds, peels, husks, or shells, if naturally present are removed. |
| **RECONDITIONED/RE- PROCESSED** | Finished product that is added to a new production lot and goes through the entire validated production process. The old, finished product is now part of the new lot and testing of the new lot must follow all current requirements for LGMA testing before the product is used. |
| **RESPONSIBLE PARTY** | The signatory is deemed to be the responsible party for purposes of the Commodity-Specific Food Safety Guidelines for the Production and Harvest of Lettuce and Leafy Greens. The signatory must assign or identify personnel to supervise or otherwise be responsible for food safety SOPs requiring responsible party oversight. |
| **RIPARIAN AREA** | A vegetated ecosystem along a waterbody through which energy, materials, and water pass. Riparian areas characteristically have a high-water table and are subject to periodic flooding and influence from the adjacent waterbody. These systems encompass wetlands, uplands, or some combination of those two landforms. They will sometimes, but not in all cases, have all the characteristics necessary for them to be also classified as wetlands (USEPA 2005) |
| **RISK MITIGATION** | Actions to reduce the severity/impact of a risk. |
| ***SALMONELLA*** | *Salmonella* is a Gram-negative facultative rod-shaped bacterium in the same proteobacterial family as Escherichia coli, the family Enterobacteriaceae, trivially known as "enteric" bacteria. Salmonellae live in the intestinal tracts of warm, and cold blooded, animals. In humans, Salmonella is the cause of two diseases called salmonellosis: enteric fever (typhoid), resulting from bacterial invasion of the bloodstream, and acute gastroenteritis, resulting from a foodborne infection/intoxication. |
| **SANITARY FACILITY** | Includes both toilet and hand-washing stations. |
| **SANITIZE** | To adequately treat cleaned surfaces by a process that is effective in destroying vegetative cells of microorganisms of public health significance, and in substantially reducing numbers of other undesirable microorganisms, but without adversely affecting the product or its safety for the consumer. |
| **SEDIMENT** | Undissolved organic and inorganic material transported or deposited by water. |
| **SHIGA-TOXIN PRODUCING *E. COLI*** | Bacteria found in the environment, foods, and animal and human intestines that produce a potent disease-causing toxin. The serogroup most commonly identified and associated with severe illness and hospitalization in the United States is *E. coli* O157; however, there are over 50 other serogroups that can also cause illness. |
| **SHIPPING UNIT/ EQUIPMENT** | Any cargo area used to transport leafy greens on the farm or from the farm to cooling, packing, or processing facilities. |
| **SOIL AMENDMENT** | Elements added to the soil, such as compost, peat moss, or fertilizer, to improve its capacity to support plant life. |
| **SURFACE WATER** | Water either stored or conveyed on the surface and open to the environment (e.g., rivers, lakes, streams, reservoirs, etc.). |
| **SYNTHETIC SOIL AMENDMENTS AND CROP INPUTS****(CHEMICAL FERTILIZERS)** | Any soil amendments and/or crop inputs that may be refined, and/or chemically synthesized and/or transformed through a chemical process (e.g., gypsum, lime, sulfur, potash, ammonium sulfate, etc.). |
| **TOTAL COLIFORMS** | Total coliforms are a group of related bacteria that are (with few exceptions) not harmful to humans. This family of bacteria are found in soil and water. The EPA considers total coliforms to be a useful indicator of the possible presence of other pathogens for drinking water. Total coliforms are used to determine the adequacy of water treatment and the integrity of a water distribution system. |
| **TRANSPORTER** | The entity responsible for transporting product from the field; LGMA guidelines apply only to handlers and cover production through harvesting. |
| **ULTRAVIOLET INDEX (UV INDEX)** | A measure of the solar ultraviolet intensity at the Earth's surface; indicates the day's exposure to ultraviolet rays. The UV index is measured around noon for a one-hour period and rated on a scale of 0-15. |
| **VALIDATED PROCESS** | A process that has been demonstrated to be effective though a statistically based study, literature, or regulatory guidance. |
| **VALIDATION** | The act of determining whether products or services conform to meet specific requirements. |
| **VEGETATIVE MATERIAL** | *Vegetative material* means food material resulting from the production or processing of food for animal or human consumption, but is no longer intended for such consumption, that is derived solely from plants and is separated from the municipal solid waste stream. |
| **VERIFICATION** | The act of confirming a product or service meets the requirements for which it was intended. |
| **VESSEL COMPOST PROCESS** | Enclosed composting process where ingredients are maintained at a minimum of 131˚Fahrenheit for at least 3 days. |
| **VISITOR** | Any person (other than personnel) who enters your field/operations with your permission. |
| **WATER DISTRIBUTION SYSTEM** | Distribution systems -- consisting of pipes, pumps, valves, storage tanks, reservoirs, meters, fittings, and other hydraulic appurtenances - to carry water from its primary source to a lettuce and leafy green crop. |
| **WATER SOURCE** | The location from which water originates; water sources can be municipal, well or surface water such as rivers, lakes, or streams. |
| **WATER TREATMENT** | Any process that improves the quality (safety) of the water to make it more acceptable for a specific end-use. |
| **WATER USE** | The method by which water is being used in the agricultural process. |
| **WELL** | An artificial excavation put down by any method for the purposes of withdrawing water from the underground aquifers. A bored, drilled, or driven shaft, or a dug hole whose depth is greater than the largest surface dimension and whose purpose is to reach underground water supplies |

# 4. PERSONNEL QUALIFICATIONS AND TRAINING

1. **PERSONNEL QUALIFICATIONS AND TRAINING**
2. **PERSONNEL QUALIFICATIONS AND TRAINING**
3. **PERSONNEL QUALIFICATIONS AND TRAINING**

Adequate training of on-farm and handler personnel is a critically important element in a successful food safety program. In order to align with federal requirements under the Food Safety Modernization Act (FSMA) and to ensure that all activities prescribed in this document are effectively and adequately implemented, the following minimum training requirements must be maintained and documented:

## The Best Practices Are:

* All personnel (including temporary, part time, seasonal, and contracted personnel) who handle lettuce / leafy greens or who have contact with food-contact surfaces, or who are engaged in the supervision thereof, must:
	+ Receive adequate training, as appropriate to the person’s duties, upon hiring, and periodically thereafter, at least once annually.
	+ Have a combination of education, training, and experience necessary to perform the person’s assigned duties in a manner that ensures compliance with these best practices.
* Training must be:
	+ Conducted in a manner easily understood by personnel being trained.
	+ Repeated as necessary and appropriate based on observations or information indicating that personnel are not meeting standards outlined in these best practices.
* Minimum training requirements must include:
	+ For all personnel who handle (contact) lettuce/leafy greens or supervise those who do so must receive training that includes the following:
		- Principles of food hygiene and safety.
		- The importance of health and personal hygiene for all personnel and visitors including recognizing symptoms of a health condition that is reasonably likely to result in contamination of lettuce/leafy greens or food-contact surfaces with microorganisms of public health significance.
		- The standards established in these best practices that are applicable to the employee’s job responsibilities.
	+ For harvest personnel, the training program must also address the following minimum requirements related to harvesting activities:
		- Recognizing lettuce/leafy greens that must not be harvested, including product that may be contaminated with known or reasonably foreseeable hazards.
		- Inspecting harvest containers, harvest equipment, and packaging materials to ensure that they are functioning properly, clean, and maintained so as not to become a source of contamination of lettuce/leafy greens with known or reasonably foreseeable hazards.
		- Correcting problems with harvest containers, harvest equipment, or packaging materials or reporting such problems to the supervisor (or other responsible party), as appropriate to the person’s job responsibilities.
	+ For personnel conducting environmental hazard and risk assessments, training must be completed, and the training program must address the following minimum requirements:
		- When an environmental hazard or risk assessment should be completed.
		- How to conduct an environmental hazard or risk assessment.
		- Potential hazard and risk identification.
		- Recognizing product that may be contaminated with known or reasonably foreseeable hazards.
		- Mitigations and corrective actions.
		- When an environmental hazard or risk assessment deems pre‐harvest product testing is necessary.
	+ For personnel conducting a sanitation program self-assessment against section 8, training must be completed, and the training program must address the following requirements: (This section was added to require training to verify sanitation program self-assessment against section 8)
		- How to develop a master cleaning schedule
		- Harvest sanitation preparation and PPE requirements.
		- 7 steps of cleaning and sanitation
		- Cleaning and sanitation verification activities
		- Labeling, storage & use of chemicals
		- Hygienic design of harvesting equipment
		- Corrective actions
		- Documentation and recordkeeping
	+ For personnel conducting cleaning and sanitation activities training must be completed and training must address
		- Harvest sanitation preparation and PPE requirements.
		- 7 steps of cleaning and sanitation
		- Labeling, storage & use of chemicals
		- Instruments used to measure chemical solutions.
		- Visual inspections.
* At least one supervisor or responsible party (e.g., the food safety professional) for each grower providing leafy green products must have successfully completed food safety training at least equivalent to that received under standardized curriculum recognized as adequate by the FDA.
* Establish and keep records of training that document required training of personnel, including the date of training, topics covered, and the person(s) trained. Records must be reviewed, dated, and signed, within a reasonable time per companies’ SOP after the records are made, by a supervisor or responsible party.

# 8. ISSUE: HARVESTING EQUIPMENT SANITATION AND DESIGN, PACKAGING MATERIALS, AND INFRASTRUCTURE ~~(FIELD SANITATION)~~

1. **PERSONNEL QUALIFICATIONS AND TRAINING**
2. **PERSONNEL QUALIFICATIONS AND TRAINING**
3. **PERSONNEL QUALIFICATIONS AND TRAINING**

This section addresses harvest and harvest aid equipment and packaging materials used for lettuce/leafy greens as well as any fully or partially enclosed buildings used to store food-contact surfaces and packaging materials.

~~Mechanical or machine harvest has become increasingly prevalent and provides opportunity for increased surface contact exposure. This includes field-cored lettuce operations that use various harvest equipment and aids.~~ (Deleted as working group considered statement not necessary)

## The Best Practices Are:

**8.1 Harvesting Equipment**

***Harvesting Equipment Hygienic Design***

* Design harvest equipment and tools to facilitate cleaning. Food-contact equipment must be constructed and maintained to ensure effective cleaning of the equipment over its lifespan. The equipment should be designed as to prevent bacterial ingress, survival, growth, and reproduction on both food-contact and non- food-contact surfaces. (Moved up from line 1064- 1067, AZ Alignment)
* At least annually, conduct a hygienic design review for harvesting equipment. Document areas of concern and develop and maintain a timeline for the completion of corrective actions. Conduct a corrective action review two times a year. (This adds requirements for an annual review of harvesting equipment hygienic design of to the metrics)
	+ For food-contact surfaces, evaluate whether (or not):
		- They are accessible for cleaning.
		- They are resistant to corrosion, non-toxic, and non-absorbent.
		- They are properly painted or coated.
		- They are ripped, torn, or damaged (e.g., belts and tarps)
		- Belts can be adjusted or removed to allow cleaning of unexposed areas.
		- They are rust-free, and adjacent areas are also rust-free.
	+ For machine infrastructure, evaluate whether (or not):
		- Hydraulic fluid, motors, trash, or oil pans drip, drain or are drawn to food-contact surfaces.
		- Drives, chain guards, control boxes, or bearings are located over open food-contact surfaces.
		- Standing water accumulates, drips, or drains onto food-contact surfaces during operation.
		- Unique features on the harvesting equipment could affect its cleanability or allow for bacterial ingress, survival, growth, and reproduction (e.g., cracks or holes in square tubbing or welds, temporary welds, adjoined flat surfaces “sandwich joints”).

***Sanitary Preparation and Operation***

* Protect lettuce/leafy greens and harvesting equipment food-contact and adjacent surfaces~~, production areas, and agricultural water sources and distribution systems~~ from contamination. (Moved up from line 1062, AZ Alignment, removal of production areas, water sources, and distribution systems as do not correspond to issue 8)
* Equipment cleaning and sanitizing operations should take place away from unharvested product and other equipment to reduce the potential for cross-contamination. (Moved up from line 1008, AZ Alignment)
* Clean and sanitize food-contact surfaces and adjacent surfaces on harvest equipment after ~~at end of each~~ daily use ~~harvest~~ or when moving between commodities and fields and when excessive soil has built up. (Moved down from line 1006-1007, AZ Alignment)
* Harvester sanitation personnel must utilize PPE equipment such as gloves, aprons, boots, face shields, respirators (if required) in such a way as to prevent cross-contamination of harvest equipment, tools, etc.
* Harvest sanitation crew must store all cleaning and sanitation chemicals in a secure and designated location.
* All water utilized in cleaning and sanitizing of equipment must meet harvest water acceptance criteria [see Table 2G].
* Documentation (logs or records) must be maintained for each harvest equipment (e.g., container, tools, etc.) cleaning and sanitation event.
* Records must be reviewed, dated, and signed by a supervisor or responsible party within a reasonable time after the records are made. FDA guidance suggests review within a week, but time can be lessened or increased on occasion. The company’s documentation control SOPs must designate the maximum ~~amount~~ number of days that will be necessary for the review, dating, and signing of records. (AZ Alignment)
* Establish and implement equipment and tool storage and control procedures to minimize the potential for contamination and to prevent it from attracting and harboring pests when not in use. (Moved up from line 1086-1087, AZ Alignment)
* If re-circulated rinse or antioxidant solutions are used on the cut surface, ensure that water used meets requirements in Table 2G. Take all practicable precautions to prevent rinses and solutions from becoming a source of contamination.
* Instruments or controls used to measure, regulate, or record temperatures, hydrogen ion concentration (pH), sanitizer efficacy, or other conditions must be:
	+ Accurate and precise as necessary and appropriate for their intended use
	+ Adequately maintained, and
	+ Adequate in number for their designated uses
* Prepare an SOP for sanitary operation of equipment which addresses the following:
	+ Spills and leaks
	+ Inoperative water sprays
	+ Exclusion of foreign objects (including glass, plastic, metal, trash, and other debris)
	+ Establish and implement procedures for the storage and control of water tanks and equipment used for hydration when not in use.
	+ Maintain logs documenting cleaning and sanitation.
	+ Retention of these records for at least two years. (Line 1051 was split, AZ alignment.)

***Harvesting Equipment Cleaning and Sanitation SOPs***

* Prepare ~~an~~ SOPs for harvest equipment, and tools that address the following:
	+ ~~Cleaning and sanitation of harvesting equipment when moving between commodities and fields.~~ (Removed to address redundant language)
	+ Following the preparation steps in Table 5, and the 7 steps of cleaning and sanitation in Table 6, develop and implement Sanitation Standard Operating Procedures (SSOPs) to address ~~frequency of~~ cleaning and sanitizing of ~~non-food contact surfaces and food contact surfaces~~ harvesting equipment to reduce and control the potential or microbial cross-contamination. (Section was moved up from lines 1068-1076. In addition, section was modified to address the inclusion of 7 steps of cleaning and sanitation)
	+ If equipment, tools, and food-contact surfaces have contact with produce that is not covered by the Produce Safety Rule, adequately clean and sanitize before using this equipment to harvest lettuce/leafy greens. (Moved from lines 1075-1076)
	+ Develop and implement Sanitation Standard Operating Procedures (SSOPs) to address frequency of cleaning and sanitizing of non‐food‐contact surfaces to reduce and control the potential for microbial cross-contamination (e.g., tractors, trailers and other equipment utilized in harvest). (Added to address equipment that is does not have food contact surfaces)
	+ ~~Prior to beginning harvest, conduct a daily inspection that addresses cleaning and sanitation or noticeable change in conditions since prior sanitation. If necessary, rinse and sanitize food-contact surfaces on harvest equipment (i.e., accumulation of dirt, debris, dust, droppings, etc.)~~ (Moved to 7 steps table under day of harvest requirements)
	+ For hand-harvest equipment (knives, scythes, etc.).
		- Conduct proper cleaning and sanitation at the end of every day, and if potential contamination occurs.
		- Rinse and sanitize at the beginning of every day.
		- A proper sanitizing solution should be readily available at the harvesting site. Receptacles with a sanitizer solution should be provided to store and sanitize all hand-held harvesting tools that are not in use.
		- Prior to harvest crews exiting for breaks, harvest tools should be placed in a clean receptacle filled with sanitizer solution.
		- Water used should be safe and of adequate sanitary quality for its intended use.
	+ Consider routine quantitative methods that aid in sanitation verification beyond the seasonal SSOP verification (i.e., ATP, rapid detection of residuals, microbial swabs, etc.).
	+ Maintenance, cleaning, and sanitation schedules for equipment used in hydration must be maintained.
	+ Management procedures for when equipment is not in use (i.e., end of season). To include a policy for removal of equipment from the work area (e.g., containers, scabbards, sheathes, or other harvest equipment).
* ~~Develop and implement a sanitation schedule for machine harvest operations (e.g., transportation tarps, conveyor belts, etc.).~~ (Removed as addressed above)
* ~~Develop and implement appropriate cleaning, sanitizing, storage, and handling procedures of all equipment and food-contact surfaces.~~
* ~~Convey, store, and dispose of trash, litter, and waste to:~~ (AZ alignment, removed)
	+ ~~Minimize the potential to attract and harbor pests.~~

**8.2 Food Packing Materials, Containers and Packaging**

* Food packing materials, containers, and packaging must be of adequate food safety design and quality for their intended use, which includes: (AZ alignment, removed packaging redundancy)
	+ Cleanable and/or designed for single use to prevent the possible growth or transfer of pathogens.
	+ Store packing containers and packaging materials off the floor or ground and protected to the degree possible to prevent contamination.
	+ If containers or packaging materials are re-used, ensure that food-contact surfaces are clean or lined with a new liner.
	+ Consider obtaining a letter of guarantee for reusable containers if not cleaned in-house.
* Prepare an SOP for handling and storage of harvest containers that addresses the following: (Moved from above lines 1035-1044 AZ alignment)
	+ Daily pre-operational inspection
	+ Proper cleaning and sanitation – routine cleaning and for changes in conditions of materials (i.e., weather events, pest activity, etc.)
	+ Overnight storage
	+ Contact with the floor ground or soil, post-harvest plant debris. (AZ alignment)
	+ Container assembly (RPC, fiber bin, plastic bin, etc.)
	+ Damaged containers
	+ Use of containers only as intended.
* ~~Packaging containers shall be adequate for their intended use.~~ (Removed, AZ alignment)
* ~~Allow adequate distance for the turning and manipulation of harvest equipment to prevent cross-contamination from areas or adjacent and nearby land that may pose a risk.~~ (Needs to be moved to Issue 9, AZ alignment)

**8.3 Infrastructure**

* Buildings must be suitable in size, construction, and design to facilitate building maintenance and sanitary operations to reduce the potential for contamination of food-contact surfaces with known or reasonably foreseeable hazards. Buildings must:
	+ Provide sufficient space for placement of equipment and storage of packaging materials.
	+ Reduce the potential for contamination of food-contact surfaces by effective building design including the separations of operations in which contamination is likely to occur. Considerations for location, time, partition, enclosed systems, or other effective means.
	+ Provide adequate drainage in all areas where water or other liquid waste is discharged on the ground or floor of the building.
	+ Prevent contamination of food-contact surfaces and packaging materials by protecting them from drips or condensate and excluding pests and animals.
	+ Maintain and document pest control prevention steps.

**Table 5 – Harvesting Equipment Cleaning and Sanitation Preparation – Personnel, personal protection equipment, sanitation tools, chemicals, and Instruments.**

| **Item** | **Description** |
| --- | --- |
| Personnel and Resources | * Ensure you have the appropriate resources (including personnel) to conduct harvesting equipment sanitation
 |
| Personal Protection Equipment (PPE) | * Ensure all staff have and use appropriate PPE for safety and repeatability of sanitation work
 |
| Sanitation Tools | * Check tools availability and condition
* Use single-use scrub pads and designated brush colors for food-contact and nonfood-contact surfaces.
 |
| Chemicals (Cleaning and Sanitation) | * Check cleaning and sanitizing chemicals are used according to manufacturer’s specifications
 |
| Instruments | * Instruments or controls used to measure, regulate, or record temperatures, hydrogen ion concentration (pH), sanitizer efficacy, or other conditions must be:
	+ Accurate and precise as necessary and appropriate for their intended use
	+ Adequately maintained, and
	+ Adequate in number for their designated uses
 |

**Table 6– Harvesting equipment cleaning and sanitation best practices, and 7 Steps for cleaning and sanitation, and verification.**

|  |
| --- |
| **Harvesting Equipment Sanitation Best Practices** |
| * Conduct steps 1 through 7 after daily equipment use.
* On the day of harvest follow the “day of harvest steps” in this table.
* Avoid creation of excess mud.
* Ensure proper lighting for cleaning.
* Ensure a safe working environment to the crew (equipment access).
* Do not place clean equipment or equipment parts on the ground. Take precautions to avoid cross-contamination of product and/or equipment from high pressure water sprays. *moved from step 2*
 |
| **Step** | **Step Details** |
| Sanitation preparation | * Have harvest crew remove product, harvesting supplies, and waste from equipment and cleaning area.
* Move the harvester to a location away from unharvested product to avoid cross-contamination from spray and run-off. Cleaning and sanitizing chemicals should not reach unharvested product.
* Stay on walking surfaces. Never walk or step on food-contact surfaces.
* Document and report abnormal conditions prior to cleaning and follow-up as necessary
 |
| Step 1:Dry cleaning | * Prepare equipment to facilitate accessibility to “hard to reach areas.”
* Remove gross soils from food-contact surfaces and adjacent surfaces.
* Wipe excess grease from motors and bearings.
* Slowly run conveyers to aid in removal of gross soils as necessary.
 |
| Step 2:Pre-rinse; remove all visible soils and debris  | * Rinse and pay attention to “hard to reach” areas.
* Remove all visible soils and debris (top to bottom).
* Rinse food-contact and adjacent surfaces.
* Slowly run conveyers to aid in removal of debris during rinsing as necessary.
 |
| Step 3:Detergent application, removal of remaining soils | * Select a detergent that can be applied in field conditions to remove soil and debris
* Apply detergent solution to ensure coverage of food-contact and adjacent surfaces.
* Do not allow detergent solutions to dry before scrubbing and rinsing.
 |
| Step 4: Scrubbing | * All areas should be scrubbed with hygienic color-coded brushes for food and non-food contact surfaces.
* Scrub pads are designated for food and non-food contacts surfaces and are for single use only.
 |
| Step 5:Detergent rinse, removal of detergents and remaining Soils | * Rinse equipment top to bottom in the order detergents were applied, to ensure no chemical residues, soils and debris are evident.
* Be sure to rinse “hard to reach areas.”
* Slowly run conveyers to aid the removal of soap and detergent.
* Avoid spraying on the ground to avoid splashing and cross-contamination of clean equipment.
 |
| Step 6: Post-cleaningSelf-inspection and approval for sanitation  | * Prior to putting cleaning materials away, the operator or lead must self-inspect equipment to make sure it is visibly clean (e.g. removal of chemical residues, soils, and debris).
* If observed during the self-inspection, remove the identified chemical residues, soils, and debris and re-clean as necessary.
* Document cleaning date and time, equipment identification and inspection results.
	+ Identify any damage or items that may need further maintenance (frayed belts, table condition, hoses, corrosion, chipping paint, excessive lubricant); document and address these items.
	+ Document deficiencies and corrective actions including recleaning and follow-up inspection results.
	+ If any items represent a food safety risk, equipment must not be placed back into service until corrected.
* Release equipment for sanitizing when visual results and equipment conditions are acceptable.
 |
| Step 7: Sanitize | * Verify strength of sanitizing solution.
* Thoroughly sanitize food-contact and adjacent surfaces
* Upon completion, place cleaning equipment and supplies in designated locations.
* Reassemble conveyers and other components.
* Clean, wrap and store hoses.
* Complete remaining sanitation documentation.
* Release equipment for harvesting.
 |
| Day of Harvest Steps: | * Prior to beginning harvest, conduct a daily inspection that addresses cleaning and sanitation or noticeable change in conditions since prior sanitation. If necessary, re-rinse and re-sanitize food-contact surfaces and adjacent surfaces on harvest equipment (i.e., accumulation of dirt, debris, dust, droppings, etc.).
 |
| **Verification requirements** |
| * Handlers/shippers must perform and document at least once per season a sanitation program self-assessment against section 8.1 to ensure that cleaning and sanitation of the harvesting equipment is performed as described by the company’s SSOPs.
* At least once per season conduct a harvester specific SSOP verification using a quantitative method. (i.e., ATP, rapid detection of residuals, microbial swabs, etc.).
* Personnel conducting the sanitation program self-assessment against section 8.1 must comply with the training requirements identified in Issue 4.
 |