



73	FIGURE 3B. Irrigation Water from Type A Agricultural Water Systems Sourced from Private Wells or Regulated Tertiary Treated Recycled Water Supplies.....	52	Deleted: 5450
75	FIGURE 3C. Irrigation Water from Type A Agricultural Water Systems Sourced from Private Wells or Regulated Tertiary Treated Recycled Water Supplies.....	53	Deleted: 5551
77	TABLE 2D. Irrigation Water from Treated Type B→A Agricultural Water Systems.....	56	Deleted: 2
78	FIGURE 4. Irrigation Water from Type B→A (Treated) Agricultural Water Systems.....	60	Deleted: 55
79	TABLE 2E. Irrigation Water from Type B Ag Water Systems intended for Overhead Irrigation prior to 21 days.....	58	Deleted: 6156
80	FIGURE 5. Irrigation Water from Type B Agricultural Water Systems intended for Overhead Irrigation.....	60	Deleted: 6358
81	TABLE 2F. Remedial Actions for Type A and B→A Agricultural Water Systems.....	61	Deleted: 6459
82	TABLE 2G. Harvest Direct Product Contact, Harvest Food-Contact Surfaces and Hand Wash Water.....	62	Deleted: 6560
83	FIGURE 6. Harvest Direct Product Contact, Harvest Food-Contact Surfaces and Hand Wash Water.....	67	Deleted: 2
84	7. Issue: Soil Amendments and Crop Inputs.....	68	Deleted: 3
85	The Best Practices for Soil Amendments:.....	65	Formatted: Indent: Left: 0"
86	The Best Practices for Crop Inputs:.....	70	Deleted: 6863
87	TABLE 3. Soil Amendments and Crop Inputs:.....	72	Deleted: 65
88	7A. Composted Soil Amendments and Crop Inputs.....	73	Deleted: 67
89	7B[1]. Composted NOT Containing Products of Animal Origin.....	75	Deleted: 67
90	7B[2]. Non-Composted, Solid and Liquid, Soil Amend. and Crop Inputs Not Conaing Products of Animal Origin.....	77	Deleted: 70
91	7C. Biological Soil Amendments and/or Crop Inputs that have gone through a Validadaed Treatment Process.....	78	Deleted: 72
92	7D. synthetic and/or Inorganic Soil Amenmdnt or Crop Inputs.....	80	Deleted: u
93	7E. Combined Components.....	80	Deleted: 73
94	FIGURE 7A. Decision Tree for Composted Biological Soil Amendments and Crop Inputs.....	82	Deleted: 75
95	FIGURE 7B. Decision Tree for Non-Composted Solid and Liquid Soil Amendments and Crop Imputs Not Containing Products of Animal Origin.....	83	Deleted: 77
97	FIGURE 7C. Decision Tree for Biological Soil Amendmens and Crop Inputs that have gone through a Validated Treatment Process.....	84	Deleted: 78
99	84	Formatted: Indent: Left: 0"
100	8. Issue: Harvest Equipment Sanitation & Design , Packaging Materials, and Buildings.....	85	Deleted: 79
101	TABLE 4A - Harvesting Equipment Cleaning and Sanitation Preparation	89	Deleted: Tools, Containers,
102	TABLE 4B - Harvesting Equipment Cleaning and Sanitation Best Practices, and 7 steps for cleaning and sanitation, and verification	90	Deleted: (Field Sanitation)
103	90	Deleted: 80
104	9. Issue: Harvest - Direct Contact with Soil and Contaminants during Harvest (Field Sanitation).....	92	Formatted: Normal
105	10. Issue: Field and Harvest Personnel - Transfer of Human Pathogens by Workers (Field Sanitation).....	93	Formatted: Check spelling and grammar
106	11. Issue: Field and Harvest - Transfer of Human Pathogens and Sanitary Facility Practices (Field Sanitation).....	94	Deleted: 8
107	12. Issue: On-Farm Equipment Facilitated Cross-Contamination (Field Sanitation).....	96	Deleted: 8
108	96	Deleted: 8
109	13. Issue: Flooding.....	96	Deleted: 8
110	The Best Practices For Product That Has Come Into Contact With Flood Water.....	97	Formatted: Indent: Left: 0"
111	TABLE 5. Flooding - When evidence of Flooding in a Production Block occurs.....	97	Deleted: 8
112	The Best Practices for Product in Proximity to a Flooded Area, But Not Contacted by Flood Water.....	98	Deleted: 88
			Deleted: 8



147 The Best Practices for Formerly Flooded Production Ground.....98

148 14. Issue: Production Locations - Climatic Conditions and Environment99

149 15. Issue: Production Locations - Encroachment by Animals and Urban Settings100

150 Figure 9. Pre-Harvest and Harvest Assessment- Animal Hazard/Fecal Matter Decision Tree102

151 TABLE 6. Animal Hazard in Field(Wild/Domestic)103

152 16. Issue: Transportation105

153 17. Issue: Detailed Background Guidance Information105

154 References.....105

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- Deleted: 8
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155 GLOSSARY

Disclaimer: Please note the definitions presented here are simplified, functional definitions that have been derived from various resources for specific use in this document and may differ from definitions used in relevant federal, state, and local regulations.

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 degrees Celsius (122 degrees 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.
ADENOSINE TRI-PHOSPHATE (ATP)	A high-energy phosphate molecule required to provide energy for cellular function.
ADEQUATE / ADEQUATELY	That which is needed to accomplish the intended purpose in keeping with good public health practice.
ADJACENT SURFACES	<u>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.</u> <u>Examples: Outer surface of a conveyor belt, tarps above food-contact surfaces.</u>
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.

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	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.
CROSS-CONTAMINATION	The transfer of microorganisms, such as bacteria and viruses, from one place to another.
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.
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 LIMIT	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 <i>E. COLI</i> (EHEC)	Shiga toxin-producing <i>E. coli</i> clinically associated with bloody diarrhea.
<i>ESCHERICHIA COLI</i> (<i>E. COLI</i>)	<i>Escherichia coli</i> are common bacteria that live in the lower intestines of animals (including humans) and are generally not harmful. <i>E. coli</i> 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 PACK	Refers to the process of harvesting and packing lettuce and leafy greens in the field, and not intended for further processing. Product is harvested, sorted, and placed into packaging containers for distribution.
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 producer’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



	<p>food-contact surfaces of equipment and tools used during harvest, packing and holding.</p> <p>Examples: Conveyor belts, cutting boards, knives, baskets.</p>
FOOD MATERIAL	<p><i>Food Material</i> 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.</p>
FOOD SAFETY ASSESSMENT	<p>A standardized procedure that predicts the likelihood of harm resulting from exposure to chemical, microbial and physical agents in the diet.</p>
FOOD SAFETY PERSONNEL	<p>Person trained in basic food safety principals and/or working under the auspices of a food safety professional.</p>
FOOD SAFETY PROFESSIONAL	<p>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.</p>
FURTHER PROCESSING	<p>Refers to the additional steps taken at the field, after the initial harvesting of lettuce and leafy greens.</p> <p>Examples of further processing could include, but are not limited to: cleaning, coring, cutting, sorting, washing, or shredding.</p>
GEOMETRIC MEAN	<p>Mathematical def.: the n^{th} root of the product of n numbers, or: Geometric Mean = n^{th} root of $(X_1)(X_2)...(X_n)$, where X_1, X_2, etc. represent the individual data points, and n is the total number of data points used in the calculation.</p> <p>Practical def.: the average of the logarithmic values of a data set, converted back to a base 10 number.</p>
GRAZING LANDS	<p>Grazing Lands include grasslands, savannas, and shrub lands that are grazed by livestock.</p>
GREEN WASTE	<p>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</p>

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	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 media] These two words are considered synonymous throughout and for the purpose of the document.
GROUNDWATER	The supply of fresh water found beneath the earth’s surface, usually in aquifers, which supply wells and springs. Groundwater 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.
<u>HARD TO REACH AREAS</u>	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 small farm, or rural residence with 25 or fewer animals per acre that is operated without expectation of being the primary source of income.
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.



HYGIENIC DESIGN	Hygienic design is the practice of designing equipment and spaces to be easy to clean and prevent contamination.
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, <i>E. coli</i> , <i>E.coli O157:H7</i> , 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 (<i>Listeria</i>) of small, gram-positive, rod-shaped bacteria that do not form spores and have a tendency to grow in chains and that include one (<i>Listeria monocytogenes</i>) 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.
MASTER SANITATION SCHEDULE (MSS)	The document that contains the list of cleaning tasks with frequencies. It includes routine equipment cleaning (REC), periodic equipment cleaning (PEC) tasks, and annual tasks such as hygienic design reviews.
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 producer’s control “monthly” for purposes of water sampling means within 35 days of the previous sample.
MORTALITY COMPOST	<i>Mortality Compost</i> 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.
<u>PERIODIC EQUIPMENT CLEANING (PEC)</u>	<p>Cleaning tasks for areas considered hard to reach (i.e., hard to see, touch, or sample), and therefore need disassembly to enable cleaning.</p> <p>Examples of these areas could include, but are not limited to the following:</p> <ul style="list-style-type: none"> • wear strips under belts. • sandwich spots (adjoined laminated surfaces such as support strips, flaps to chlorine tunnels). • hidden surfaces such as cutting board attachments and framework, mechanical drive and support rollers, bearings.
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	<i>Post-consumer waste</i> 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.
<u>POST-HARVEST PLANT DEBRIS</u>	Refers to the remnants of lettuce and leafy greens left in the field or on equipment after harvesting.
POTABLE WATER	Water that is safe to drink or to use for food preparation without risk of health problems.

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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: (a) 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. (2) "Ready-to-eat food" includes: (b) Raw fruits and vegetables that are washed as specified under § 3-302.15; (c) 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	A function of the likelihood (high, medium, low) of occurrence of an adverse health effect and the severity of that effect, consequential to a hazard(s).
RISK MITIGATION	Actions to reduce the severity/impact of a risk.
ROOT CAUSE ANALYSIS	A process for systematic investigation where incident-specific information is assembled, and problem-solving techniques are used to analyze and evaluate why an incident or event happened.
<u>ROUTINE EQUIPMENT CLEANING (REC)</u>	<u>Cleaning tasks that are performed daily using the 7 steps of cleaning and sanitation.</u>

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LIST OF APPENDICES

[Appendix A:](#) Agricultural Water System Assessment

[Appendix B:](#) Technical Basis Document

[Appendix C:](#) Crop Sampling Protocol (Version: September 5, 2019)

[Appendix D:](#) Kinetics of Microbial Inactivation for Alternative Food Processing Technologies

[Appendix E:](#) Environmental Health Standards for Composting Operations (California Code of Regulations)

[Appendix F:](#) Considerations for Assessing Environmental Weather Conditions

[Appendix G:](#) Consideration for Growing Leafy Greens near CAFOs

[Appendix H:](#) *Risk Assessment Tool*

[Appendix R:](#) Root Cause Analysis

[Appendix S:](#) *Cleaning & Sanitation*

[Appendix T:](#) Training Guidance and Resources

[Appendix Z:](#) AZ Resource Agency Contacts



- 248 • Minimum training requirements must include:
- 249 • For all personnel who handle (contact) lettuce/leafy greens or supervise those who do so must receive
- 250 training that includes the following:
- 251 ○ Principles of food hygiene and safety.
- 252 ○ The importance of health and personal hygiene for all personnel and visitors including
- 253 recognizing symptoms of a health condition that is reasonably likely to result in contamination
- 254 of lettuce/leafy greens or food-contact surfaces with microorganisms of public health
- 255 significance.
- 256 ○ The standards established in these best practices that are applicable to the employee’s job
- 257 responsibilities.
- 258 • For harvest personnel, the training program must also address the following minimum requirements
- 259 related to harvesting activities:
- 260 ○ Recognizing lettuce/leafy greens that must not be harvested, including product that may be
- 261 contaminated with known or reasonably foreseeable hazards.
- 262 ○ Inspecting harvest containers, harvest equipment, and packaging materials to ensure that they
- 263 are functioning properly, clean, and maintained so as not to become a source of contamination
- 264 of lettuce/leafy greens with known or reasonably foreseeable hazards.
- 265 ○ Correcting problems with harvest containers, harvest equipment, or packaging materials or
- 266 reporting such problems to the supervisor (or other responsible party), as appropriate to the
- 267 person’s job responsibilities.
- 268 • For personnel conducting environmental hazard and risk assessments, training must be completed,
- 269 and the training program must address the following minimum requirements:
- 270 ○ When an environmental hazard or risk assessment should be completed
- 271 ○ How to conduct an environmental hazard or risk assessment
- 272 ○ Potential hazard and risk identification
- 273 ○ Recognizing product that may be contaminated with known or reasonably foreseeable hazards
- 274 ○ Mitigations and corrective actions
- 275 ○ When an environmental hazard or risk assessment deems pre-harvest product testing is
- 276 necessary
- 277 • Training requirements for harvesting equipment cleaning and sanitation, Issue 8:
- 278 ○ At least one individual from the shipper company must attend the LGMA training on Cleaning
- 279 & Sanitizing Harvesting Equipment and conducting a self-assessment against section 8.1. This
- 280 is a one-time training, and after this training, the company can adopt a train-the-trainer
- 281 approach for the following activities:
- 282 ○ Personnel conducting a sanitation program self-assessment against issue 8.1 must receive
- 283 adequate training and the training program must address the following minimum
- 284 requirements:
- 285 ▪ Developing a Master Sanitation Schedule (MSS).
- 286 ▪ Hygienic design of harvesting equipment.
- 287 ▪ Harvest sanitation preparation and PPE requirements.
- 288 ▪ 7 steps of cleaning and sanitation.
- 289 ▪ Location for harvesting equipment cleaning and sanitation to prevent cross-
- 290 contamination.

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- [Cleaning and sanitation verification activities.](#)
- [Labeling, storage & use of chemicals.](#)
- [Use and storage of sanitation tools.](#)
- [Corrective actions.](#)
- [Documentation and recordkeeping.](#)
- [Personnel conducting cleaning and sanitation activities must receive adequate training, as appropriate to the person’s duties, upon hiring, and periodically thereafter, at least once annually. The training must address the following minimum requirements:](#)
 - [Harvest sanitation preparation and PPE requirements.](#)
 - [7 steps of cleaning and sanitation.](#)
 - [Location for harvesting equipment cleaning and sanitation to prevent cross-contamination.](#)
 - [Labeling, storage & use of chemicals.](#)
 - [Instruments and activities used to measure chemical solutions.](#)
 - [Use and storage of sanitation tools.](#)
 - [Visual inspections.](#)

- At least one supervisor or responsible party (e.g., the food safety professional) for each producer 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 company’s SOP after the records are made, by a supervisor or responsible party.

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8. ISSUE : HARVEST EQUIPMENT SANITATION AND DESIGN, PACKAGING MATERIALS, AND BUILDINGS

This section addresses harvest and harvest aid equipment, tools, 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.

THE BEST PRACTICES ARE:

8.1 Harvesting Equipment

Categorization of Harvesting Equipment

Harvesting equipment must be categorized into one of the following:

- Category 1: Equipment used to harvest lettuce and leafy greens for further processing (i.e., clean and core lettuce, top and tail romaine, and mechanical harvesting of leafy greens). Examples of food-contact surfaces include belts with/ without cleats, mechanical blades, coring rings, knives, and cutting boards.
- Category 2: Equipment used to harvest lettuce and leafy greens for field pack (i.e., whole head lettuce, romaine hearts). Examples of food-contact surfaces include those that are primarily used for conveyance, and knives.
- Category 3: Equipment that does not come in direct contact with produce. (i.e., tractors, trailers, forklifts, water tanks).

Harvesting Equipment Hygienic Design

The hygienic design of harvesting equipment is crucial to prevent contamination and ensure the safety of lettuce and leafy greens. Hygienic design focuses on minimizing the areas where pathogens can accumulate (hard-to-clean areas). The best practices for hygienic design are:

- Design or modify harvesting equipment and tools to facilitate cleaning. Harvest equipment must be constructed and maintained to ensure effective cleaning of the equipment over its lifespan. The equipment should be designed to prevent bacterial ingress, survival, growth, and reproduction on both food-contact and non-food-contact surfaces.
- For operations with Category 1 harvesting equipment, a harvesting equipment hygienic design program (i.e., an SOP) shall be implemented and shall minimally address the following:
 - At least annually, (a minimum of one piece from each differently designed group of equipment) and after designing, purchasing, or modifying harvesting equipment, conduct a hygienic design review for Category 1 harvesting equipment that evaluates areas of concern for food-contact surfaces and machine infrastructure.
 - For food-contact surfaces as applicable, minimally 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.

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Deleted: Mechanical or machine harvest has become increasingly prevalent and provides opportunity for increased surface contact exposure. This includes field-cored, topped and/or tailed, or other field-based lettuce and leafy greens operations that use various harvest equipment and aids. ¶

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- For machine infrastructure as applicable, minimally, 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 tubing or welds, temporary welds, adjoined flat surfaces “sandwich joints”).
- Document areas of concern that need corrective actions and develop and maintain a timeline for the completion of these. At the next annual review, review these to ensure they were effectively implemented.
- Based on the findings of the hygienic design review, consider the need for Periodic Equipment Cleaning (PEC) as well as documenting the frequency of PECs to be performed.

Sanitary Preparation and Operation

- Protect lettuce/leafy greens, and harvesting equipment, food-contact surfaces, and adjacent surfaces, from contamination.
- Equipment cleaning and sanitizing operations should take place away from unharvested product and other equipment to reduce the potential for cross-contamination.
- Clean and sanitize food-contact and adjacent surfaces on harvest equipment after daily use.
- Follow company SSOPs for alternative cleaning methods (e.g., dry cleaning and sanitizing) when moving between commodities and fields and when excessive soil has built up.
- 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 cleaning and sanitation event (e.g. containers, tools, etc.).
- 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 shall designate the maximum number of days that will be necessary for the review, dating and signing of records.
- 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.
- 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.

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Deleted: <#>Use equipment such as pallets, forklifts, tractors, and vehicles that may have contact with leafy greens in a manner that minimizes the potential for product or food-contact surface contamination. ¶

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- 1115 • Instruments or controls used to measure, regulate, or record temperatures, hydrogen ion concentration
- 1116 (pH), sanitizer efficacy, or other conditions must be:
- 1117 • Accurate and precise as necessary and appropriate for their intended use
- 1118 • Adequately maintained; and
- 1119 • Adequate in number for their designated uses.
- 1120 • Prepare an SOP for sanitary operation of equipment which addresses the following:
- 1121 • Spills and leaks
- 1122 • Inoperative water sprays
- 1123 • Exclusion of foreign objects (including glass, plastic, metal and other debris)
- 1124 • Establish and implement procedures for the storage and control of water tanks and equipment used
- 1125 for hydration when not in use
- 1126 • Maintain logs documenting cleaning and sanitation
- 1127 • Retention of these records for at least two years

Routine Harvesting Equipment Cleaning and Sanitation

- 1129 • Prepare SOPs for all categories of harvesting equipment (example of equipment categories as noted in
- 1130 the “Categorization of Harvesting Equipment” section), and tools that addresses the following:
- 1131 • Frequency of cleaning and sanitation activities (i.e., after daily use, when moving between
- 1132 commodities and fields and when excessive soil has built up).
- 1133 • Documentation of cleaning and sanitation activities
- 1134 • Cleaning and sanitizing of harvesting equipment (i.e., Categories 1 & 2) to reduce and control the
- 1135 potential for microbial cross-contamination, follow the preparation steps in Table 4, and 7 steps of
- 1136 cleaning and sanitation in Table 5.
- 1137 • Cleaning and sanitizing of non-food contact surfaces (i.e., Category 3) to reduce and control the
- 1138 potential for microbial cross-contamination (i.e., tractors, trailers and other equipment utilized in
- 1139 harvest).
- 1140 • Cleaning and sanitizing of hand-harvest equipment (knives, scythes, etc.) that at a minimum address
- 1141 the following:
- 1142 • Conducting proper cleaning and sanitation after daily use.
- 1143 • Follow company SSOPs for alternative cleaning methods (e.g, sanitizer receptacles) when
- 1144 moving between commodities and fields, and if potential contamination occurs.
- 1145 • Rinsing and sanitizing at the beginning of every day.
- 1146 • A proper sanitizing solution should be readily available at the harvesting site. Receptacles
- 1147 with sanitizer solution should be provided to store and sanitize all hand-held harvesting tools
- 1148 during crew breaks and when not in use.
- 1149 • Water used should be safe and of adequate sanitary quality for its intended use.
- 1150 • If equipment, tools, and food-contact surfaces have contact with produce that is not covered by the
- 1151 Produce Safety Rule, adequately clean and sanitize before using this equipment to harvest
- 1152 lettuce/leafy greens.

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Deleted: <#>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.). ¶

Deleted: <#>Proper cleaning, sanitation and storage of hand-harvest equipment (knives, scythes, etc.).¶ Prior to harvest crews exiting for breaks, harvest tools should be placed in a receptacle.¶

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- 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 (i.e., containers scabbards, sheathes or other harvest equipment).

8.2 Food Packing Material, Containers, and Packaging

- Food packing materials, containers, and packaging must be of adequate food safety design and quality for their intended use, which includes:
 - 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, ground or soil 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 and packaging materials that addresses the following:
 - 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, soil, or post-harvest plant debris.
 - Container assembly (RPC, fiber bin, plastic bin, etc.)
 - Damaged containers
 - Use of containers only as intended

8.3 Buildings

- 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 tools and storage of harvest containers and food-packaging materials if applicable.
 - 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.

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Moved up [2]: <#>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 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¶

Moved up [1]: <#>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.¶

Moved up [3]: <#>Develop and implement Sanitation Standard Operating Procedures (SSOPs) to address frequency of cleaning and sanitizing of non-food-contact surfaces and food-contact surfaces to reduce and control the potential for microbial cross-contamination¶

Moved up [4]: <#>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. ¶

Deleted: <#>Develop and implement a sanitation schedule for machine harvest operations (e.g., transportation tarps, conveyor belts, etc.) ¶
Develop and implement appropriate cleaning, sanitizing, storage, and handling procedures of all equipment and food-contact surfaces ¶

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TABLE 4A – Harvesting Equipment Cleaning and Sanitation Preparation – Personnel, personal protection equipment, sanitation tools, chemicals, and Instruments.

Item	Description
Personnel and Resources	<ul style="list-style-type: none"> • <u>Ensure you have the appropriate resources (including trained personnel) to conduct harvesting equipment cleaning and sanitation.</u>
Personal Protection Equipment (PPE)	<ul style="list-style-type: none"> • <u>Ensure all staff have and use appropriate PPE for the safety and repeatability of sanitation work</u>
Sanitation Tools	<ul style="list-style-type: none"> • <u>Check tools availability and condition.</u> • <u>Use single-use scrub pads and designated brush colors for food-contact and nonfood-contact surfaces.</u>
Chemicals (Cleaning and Sanitation)	<ul style="list-style-type: none"> • <u>Check cleaning and sanitizing chemicals are used according to manufacturer’s specifications</u>
Instruments	<ul style="list-style-type: none"> • <u>Instruments or controls used to measure, regulate, or record temperatures, hydrogen ion concentration (pH), sanitizer efficacy, or other conditions must be:</u> <ul style="list-style-type: none"> ○ <u>Accurate and precise as necessary and appropriate for their intended use</u> ○ <u>Adequately maintained, and</u> ○ <u>Adequate in number for their designated uses</u>

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TABLE 4B– Harvesting equipment cleaning and sanitation best practices, and 7 Steps for cleaning and sanitation, and verification.



Harvesting Equipment Sanitation Best Practices	
<ul style="list-style-type: none"> 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 for 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. 	
Documentation Requirements	Step Details
<p>Sanitation preparation step:</p> <p><u>Document and report abnormal conditions prior to cleaning and follow-up as necessary</u></p>	<ul style="list-style-type: none"> 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.
<p>Step 1:</p> <p><u>Dry cleaning</u></p>	<ul style="list-style-type: none"> 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.
<p>Step 2:</p> <p><u>Pre-rinse; remove all visible soils and debris</u></p>	<ul style="list-style-type: none"> 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.
<p>Step 3:</p> <p><u>Detergent application, removal of remaining soils</u></p>	<ul style="list-style-type: none"> 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.
<p>Step 4:</p> <p><u>Scrubbing</u></p>	<ul style="list-style-type: none"> 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-contact surfaces and are for single-use only.
<p>Step 5:</p> <p><u>Detergent rinse, removal of detergents and remaining Soils</u></p>	<ul style="list-style-type: none"> 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.



	<ul style="list-style-type: none"> • 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.
<p>Step 6:</p> <p>Post-cleaning Self-inspection and approval for sanitation Document cleaning date and time, equipment identification and inspection results.</p> <ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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. • Release equipment for sanitizing when visual results and equipment conditions are acceptable.
<p>Step 7: Sanitize</p> <p>Verify strength of sanitizing solution. Complete remaining sanitation documentation.</p>	<ul style="list-style-type: none"> • 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. • Release equipment for harvesting.
<p>Day of Harvest Steps:</p> <p>Prior to beginning harvest, conduct a daily inspection that addresses cleaning and sanitation or noticeable change in conditions since prior sanitation. Based on the daily inspection, it may be necessary to re-clean or re-rinse and re-sanitize food-contact surfaces and adjacent surfaces on harvest equipment (i.e., accumulation of dirt, debris, dust, droppings, etc.)</p>	
<p>Verification requirements</p>	

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- [Handlers/shippers must perform and document at least once per season a sanitation program self-assessment against issue 8.1 to ensure that cleaning and sanitation of the harvesting equipment is performed as described by the company’s SSOPs.](#)
 - [Personnel conducting the self-assessment against issue 8.1 must comply with the training requirements in Issue 4.](#)
 - [At least once each season conduct one SSOP verification on the highest category of harvesting equipment within your operation. Use a quantitative method \(i.e., ATP, rapid detection of residuals, microbial swabs†, etc.\). Perform this verification using pre- and post-sanitation results, if available also perform verification against historical data.](#)
- †Use of microbial swabs is recommended for indicator organisms. If testing for pathogens, do it cautiously (refer to Appendix S).

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9. ISSUE: HARVEST - DIRECT CONTACT WITH SOIL AND CONTAMINANTS DURING HARVEST (FIELD SANITATION)

After manual harvest of lettuce/leafy greens, placing or stacking product on the ground, soil, or post-harvest plant debris before the product is placed into a container may expose the product to human pathogens if the ground, soil, or post-harvest plant debris is contaminated. Research has demonstrated that microbes, including human pathogens, can readily attach to cut lettuce/leafy green surfaces ((Rock/Suslow, unpublished; Takeuchi et al. 2001).

THE BEST PRACTICES ARE:

- 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.
- Cut surfaces are vulnerable to microbial contamination. Prepare an SOP that addresses the following:
 - Prohibit ground or soil contact to avoid cross-contamination and minimizes the potential introduction of contamination during and after harvest operations (mechanical, hand, etc.).
- Ensure employees have been trained on the importance of minimizing the potential of cut product to contact the ground or soil.
- Evaluate the field for conditions that are likely to increase the risk of ground, soil, or post-harvest plant debris contact with harvest containers or cut product, and employ measures to minimize the potential introduction of human pathogens through ground or soil contact of cut product surface after harvest (e.g. frequency of knife sanitation, no placement of cut surfaces of harvested product on the ground or soil, container sanitation, single-use container lining, etc.).
- Discard and do not pack any lettuce/leafy greens dropped on the ground or soil during harvest.
- Packaging material should not have direct contact with the ground or soil. Physical barriers (i.e. liners, covers, existing plant material or other clean barriers) should be used to separate from ground or soil.
- Establish and implement a SOP for handling in-field trash and other debris including transporting it out of the field in a manner that does not pose a contamination risk.



10. ISSUE: FIELD AND HARVEST PERSONNEL - TRANSFER OF HUMAN PATHOGENS BY WORKERS (FIELD SANITATION)

It is possible for persons in the field to transfer microorganisms of significant public health concern to produce during pre-harvest and harvest activities. Establish and implement preventive measures to minimize potential contamination of leafy greens especially during harvest activities when each lettuce/leafy greens plant is touched/handled by harvest crews.

THE BEST PRACTICES ARE:

- Use appropriate preventive measures outlined in GAPs such as training in effective hand-washing, glove use and replacement, and mandatory use of sanitary facilities to reduce and control potential contamination.
- Establish and implement a written worker practices program (i.e., an SOP) for verifying employee compliance with company food safety policies. This program shall establish the following practices for field and harvest employees as well as visitors.
- During growing and harvesting operations, there must be at least one individual designated as responsible for food safety in compliance with these best practices.
- Use, storage, recordkeeping, and proper labeling of chemicals.
- Follow and be trained in proper hygiene practices and policies including:
 - Requirements for workers to wash their hands with soap and running water before beginning or returning to work, before putting on gloves, after using the toilet, as soon as practical after touching animals or any waste of animal origin, and at any other time when hands may have become contaminated.
 - Use of antiseptic/sanitizer or wipes, as a substitute for soap and water, is not permitted.
 - Requirement for workers' clothing to be clean at the start of the day and appropriate for the operation.
 - If gloves are used in handling or harvesting lettuce/leafy greens, maintain gloves in an intact and sanitary condition and replace them when no longer able to do so. [If gloves are worn under food-contact gloves, maintain in a sanitary condition.](#)
 - Prohibit use of personal [food-contact](#) gloves and taking [food-contact](#) gloves home. [If personal glove use is allowed under food-contact gloves, then follow company SOP addressing the use and maintenance of these gloves.](#)
 - Avoiding contact with any animals.
 - Confinement smoking, eating, and drinking of beverages other than water to designated areas.
 - Prohibitions on spitting, urinating, or defecating in the field.
 - Advise visitors of policies and procedures to protect lettuce/leafy greens and food-contact surfaces from contamination by people and take all steps reasonably necessary to ensure that visitors comply with such policies and procedures.
- Develop and implement a written program for leafy green products that are intended for further processing. The program must address the following:
 - Head coverings and hair restraints.