

Supplemental Information and Detail

The information in this section outlines key details and recommendations for your consideration in vital areas of the GAP/GHP program that may be useful in your operation. Sections included are as follows:

<u>Topic Area of discussion</u>	<u>Page</u>
Wild Animal Management	2
Water Use	3
Sanitary Water Surveys and Remediation Guidelines	12
Worker Hygiene and Training	20
Toilet and Hand Washing Facilities	23
Pesticide Use on Produce Farms	25
Pest Control in Packing House	29
Manure Use on Farms	30
Compost Use on Farms	33
Packing House and Storage Cleaning Recommendations	35
Jewelry Policy	36
Storage and Transportation	37
Farm Bio-Security	39

Wild Animal Management

Growers should be aware that many human pathogens are also carried by wild animals. Transmission of E.coli o157:H7 has been documented in several wild animals, including rodents, deer, geese and even flies. While it is unreasonable to expect complete wild animal exclusion in the field and packinghouse, active controls and deterrents should be used wherever possible. Farm ponds can be a particular draw to these animals, requiring extra diligence, especially if you are using this water for irrigation. In packinghouses and produce wash areas, implement active animal monitoring and control practices. All good agricultural practices used in the field can be quickly reversed by poor animal control and lack of sanitation programs in the packinghouse.

This section is mean to highlight good agricultural practices that can be used to limit the risks created by wild animals. For example, screen doors and windows, seal cracks and trap rodents and other pests in the packing house. Keep garbage cans covered at all times. In addition, deter birds from roosting on overhead beams or structures in packing areas. Protect packing material from animals that might be looking for nesting, roosting or hiding places. Avoid storing boxes and finished products against the walls. Allow at least 18 inches of clearance between pallets and the wall, as well as between every other pallet to maintain rodent control programs. In the field, remove brush that provides cover for wild animals and attempt to prevent irrigation ponds from becoming home to flocks of birds. By developing a regular schedule for monitoring and recording your efforts to reduce wild animals in your fields and packing areas, you will be able to determine which strategies are most effective at controlling wild animals and reducing microbial risks. An active and monitored pest control program will help reduce the likelihood of pest infestations.

Water Use

Water can carry pathogens and contaminated water can cause illness. Using potable water for as many produce operations as possible is the best way to reduce, mitigate and minimize risks of microbial contamination. Using municipal or well water sources is often not feasible due to field location and size. Working with the local watershed committees to better understand watershed issues and concerns can promote stewardship of these waterways and improve surface water quality for all farms in the area.

Regardless of the water source, testing and keeping water test records is an important good agricultural practice. Municipal water test results can be requested from local municipalities or health departments. Well water should be tested yearly especially if it is the source of farm drinking water. Surface water testing presents a bigger challenge. The levels of microbial pathogens in surface water can vary with many factors, including time of year, upstream watershed activities, climatic events, turbidity of the water, and flow rates. A sample taken at one time does not represent the entire season's microbial water quality, so testing is recommended multiple times throughout the growing season. Multiple tests will allow you to identify the average microbial quality of the surface water you are using. If a particular water test is markedly higher than the average baseline, you should attempt to determine the cause and make modifications to your irrigation practices to reduce the risks. Testing surface water for E.coli as an indicator of fecal contamination is highly recommended. This method is not fool proof but currently is the best indicator. And remember; always keep water test records on file.

The type of irrigation method utilized also affects the risk. The best method to minimize risk is to use drip irrigation. This method minimizes the risk of crop contamination because the edible parts of most crops are not wetted directly. Plant disease levels may also be reduced and water use efficiency maximized with this irrigation method. If applying overhead irrigation, morning is the best time because it maximizes water use efficiency and reduces leaf drying time. Rapid drying and ultraviolet light will reduce survival of both plant and human pathogens on watermelon.

Water disinfection is also an important consideration for implementing an effective good agricultural practices program. If contamination occurs during production, it can be amplified in wash tanks by spreading contamination from one watermelon to all the others. Effectively disinfecting wash water will prevent this problem. There are many commercially available disinfectants to use, so contact your local extension service or other agricultural consultants to determine which system is best for your operation and is most affordable.

Water is a critical component in the production of watermelons. Its proper use is also critical in preventing contamination. Only use potable water in post harvest activities and be aware of the risks associated with the use of surface water. The need to utilize surface water is recognized and implementation of GAPs can reduce the existing risks.

Management Area	Best Practice
Source of irrigation water for produce crops	Irrigation water is from a municipal, treated water source or from ground water obtained from a properly constructed, capped well, in good condition, that could be readily treated if indicator organisms were detected in periodic water tests
Source of water for topical sprays	Spray water is from a municipal, treated water source or from ground water obtained from a properly constructed, capped well, in good condition, that could be readily treated if indicator organisms were detected in periodic water tests
Water testing	All water sources are tested for indicator organisms such as thermotolerant coliforms or generic <i>E.coli</i> AND these records are kept on file
Awareness of watershed concerns	The findings and efforts of local watershed committees are known. It is also known if water is drawn from a low, medium or high priority watershed
Monitoring of sediment levels in surface water used for irrigation	Water is not used for irrigation when water is cloudy (high turbidity). Settling ponds are used to reduce sediment content of irrigation water prior to application to crops. Records are kept.
Irrigation method	Drip irrigation is used on produce crops OR furrow irrigation is used with no plant wetting.
Backflow prevention	Anti-backflow or check valve devices are installed on all plumbing systems, and no cross connections exist between water supplies.
Use of self assessments or consultants to reduce negative environmental impacts of farming practices	An assessment of farm environmental impacts has been conducted and changes have been made to farm practices to reduce risk of manure movement and soil erosion from fields or barnyards into water courses. These records are on file.

Management Area	Best Practice
Condition of casing and well cap (seal)	Well casing has no holes or cracks. Cap is tightly secured. Screened vent is in place. Casing height is more than 12" above grade. Grout seal exists between casing and soil.
Well casing depth (Verify recommended depths. With your local health department)	Cased greater than 25 feet and extends into bedrock.
Location and maintenance of on-farm septic systems	Municipal sewer systems serve the farm.
Position of well in relation to potential contamination sources	Well is upslope from all potential pollution sources (e.g. fertilizer or pesticide storage and handling areas, livestock yards, septic leach fields, manure piles, fuel storages). No surface water runoff reaches well. Surface water is diverted from well.
Distance between well and potential sources of contamination	More than 300 feet from any contamination source.
Backflow prevention	Anti-backflow or check valve devices are installed on all plumbing systems and no cross connections exist between water supplies.
Testing water quality of on-farm wells	Water quality is tested annually, for chemicals and microbial contaminants. Records of all water tests are on file.

Sanitary Water Surveys and Remediation Guidelines

When a water sample taken closest to the point-of-use has levels of generic E. coli above action levels, sanitary survey and remediation guidelines should be followed immediately.

For purpose of this section:

- Sanitary Survey is an inspection of the entire water system, including water source, facilities and equipment for the purpose of identifying pathogens of public health concern and microorganisms that indicate potential contamination with pathogens or fecal matter.
- Remediation Guidelines describe corrective actions corresponding to the conditions observed in the sanitary survey.

Sanitary surveys of water systems should be conducted periodically to prevent contamination. Sanitary surveys:

- Reduce the risk of waterborne disease
- Provide an opportunity to enhance your knowledge of your water system
- Identify and document system deficiencies.

The Sanitary Surveys and Remediation Guidelines described below are to be used as follow-up to situations encountered.

When water samples taken closest to the point-of-use result in generic E. coli levels above an action level, a sanitary survey is initiated to determine any potential sources of contamination. In general, when conducting a sanitary survey the reliability, quality and vulnerability of your water system are being investigated. To get started:

- Perform a generic E. coli test on a water sample taken at or as close to the source as practical. The result of this test will help to determine where the source of the contamination might reside. Depending on the results of this test, additional tests may be used to further narrow the exact location of the contamination entering the distribution system.
- Initiate a Sanitary Survey of your water system
 - Begin the Sanitary Survey process at the water source and continue surveying the water system between the water source and the site of the positive sample.
 - For specific water sources, follow the guidelines for conducting Sanitary Surveys and corresponding remediation outlined below.

Water Sources

Whenever possible, the sanitary survey should begin at the water system source as this is the first opportunity for controlling microbial contaminants. When investigating your water system source, you should identify the characteristics and activities that may lead to microbial contamination.

Sanitary Survey and Remediation Guidelines for Wells

Sanitary surveys of wells should focus on the integrity (meaning the state of repair) of the well components and the condition of the area surrounding the well. Inspect your wellhead on a regular basis and keep records of inspections and repairs.

Well Components

Survey of Well Components...

Well Component	Survey Guidelines	Remediation Guidelines
Well Casing	<p>Listen for water running down the well. If you can hear water, there could be a crack or hole in the casing. If you can move the casing by pushing against it, you may also have a problem with the integrity of the casing.</p> <p>Well casing should extend at least 1 ft. above the ground</p>	<p>Contact a well contractor for well casing repair or construction of a new well</p>
Well Cap or Seal	<p>Well should be completely sealed against surface water, insects or other foreign matter.</p> <p>Look for holes, missing plugs, leaking water (artesian flow). If water is coming out, then contaminants can seep in.</p>	<p>Replace any missing plugs and seal any openings, gaps or cracks.</p> <p>Contact a well contractor to install anew cap and/or wellhead gasket.</p>

Well Vent	Check the cleanliness & integrity of the well vent screen. Look for tears or holes.	Vents must be covered with a screen. Replaced damaged vent screen.
Concrete Well Pad	Look for cracks that would allow water to enter well casing.	Seal cracks or re-pour a new concrete pad. Ground should slope away from well so that surface water cannot collect near the well.
Well Pump	Make sure pump is operating properly; check for corrosion.	Clean, repair or replace pump.

Condition of the Area Surrounding the Well

Issues to consider when surveying the surrounding area are:

- Proximity to livestock, including animal burial grounds, feedlots, manure pits/lagoons
- Proximity to sewers and septic systems
- Proximity to irrigation systems

Survey of the Area Surrounding the Well...

Issue	Survey Guidelines	Remediation Guidelines
Cleanliness	Look for weeds, leaves and debris where small rodents and pests could reside.	Manually remove weeds (do not use herbicides), leaves and debris.
Gradient	There is standing water around the well or water draining toward the well. Well is downstream from a potential contaminant source.	Re-grade around the well so the ground slopes away from your well. Move either the well or potential contaminant source.

Remediation: Well Sanitization

If generic E. coli level in well water samples above corresponding action levels, wells must be sanitized in order to remove the contamination. Follow the sanitizing steps outlined below and keep records of when, why and how sanitization was done.

Disinfection involves seven steps:

Steps	Detailed Sanitizing Instructions	Step Summary
1.	A chlorine solution containing at least 50 mg/L (or ppm – parts per million) available “free” chlorine, is added to the well. If bringing the well back into service quickly is desired (such as when wells have been repaired or when a pump has been repaired or replaced), the solution should contain at least 100 mg/L available chlorine.	Add the appropriate chlorine solution to the well based on the well dimensions or volume.
2	To avoid adding contamination to the well during sanitizing, first clean the work area around the top of the well. Remove grease and mineral deposits from accessible parts of the well head and flush the outside surfaces with chlorine solution (1/2 cup of laundry bleach in 5 gal of water). Turn off the pump. Remove the cap or the well plug on the rubber seal. There are many types of well caps and plugs. If you have questions, you should contact a licensed well driller. If you have a submersible pump, you may also want to contact a licensed well driller for advice on sanitizing procedures. Wash the pump column, drop pipe or anything inserted into the well with chlorine solution. Try to coat the sides of the casing as you pour.	Clean surrounding area & disinfect well head. Turn off the pump. Remove well cap. Wash sides of well casing, pump column and anything inserted into the well with chlorine solution.
3.	After it has been placed into position, turn the pump on and off several times so as to thoroughly mix the sanitizer with the water in the well. Repeat this procedure 3-5x's at 1 hour intervals. Test for the presence of free chlorine in well discharge with a residual chlorine test; if chlorine is not detected, the sanitizing process should be repeated.	Mix well water by turning pump on and off several times until discharge tests positive for residual free chlorine. Repeat 3-5x's at 1 hr intervals.

4.	The well shall be allowed to stand without pumping for 24 hours.	Let pump / well rest for 24 hours
5.	The water shall then be pumped to waste in a safe location such as a sanitary sewer (the water should be dechlorinated if a large volume has to be drained to a storm sewer or waterway) until the presence of chlorine is no longer detectable. The absence of chlorine is best determined by testing for available chlorine residual. Check for local regulations for collection and disposal. Heavily chlorinated water should not be discharged into any plumbing system that utilized individual sewage disposal systems (septic tanks). Such strong sanitizers could neutralize the bacteria needed to stabilize the sewage and also could damage the soil absorption system.	Pump water to a safe waste location until chlorine is no longer detected.
6.	A bacteriological sample shall be taken and submitted to a laboratory for examination. For individual wells, technical advice regarding the collection of bacteriological samples may be obtained from your local health departments or from the laboratories that will examine the sample. If no technical assistance is available, use the following procedure: Use a sterile sample bottle, preferably one provided by the lab, and before sampling ensure that the sample bottle is properly labeled with location, date and time of sampling. It is extremely important that nothing except the water to be analyzed come in contact with the inside of the bottle or the cap; the water must not be allowed to flow over an object (such as the hands) and into the bottle while it is being filled. If the water is collected from a sample tap, turn on the tap and allow the water to flow for 2 or 3 minutes before collecting the sample. Do not rinse the sample bottle. The sample should be delivered to the lab ASAP and in no case more than 30 hours after its collection. During delivery the sample must be kept as cool as possible (not frozen).	Take a water sample using sanitary techniques and submit it to a lab for testing.

7.	If the laboratory analysis shows the water is not free of bacterial contamination, the sanitization procedure should be repeated. Depending on the level of contamination, it may be necessary to use a higher concentration chlorine solution. The water should then be retested. If repeated attempts to disinfect the well are unsuccessful, a detailed investigation to determine the cause of the contamination should be undertaken.	If testing shows microbial levels are still above acceptable action levels, repeat the disinfection process.
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Sanitary Survey and Remediation Guidelines for Surface Water

Sanitary surveys of canals, laterals and ditches should focus on the integrity of surrounding bank systems focusing on potential point source and non-point source confluences (e.g. drainage into these systems). Inspections should occur on a regular basis. Keep records of the date of inspection and any observations made.

Guidelines for Assessment of Surface Water...

Issues	Survey Guidelines	Remediation Guidelines
Animal intrusion	Look for evidence of animals (observed animal in canal, fecal deposits or animal carcasses).	Remove animal debris; if animal intrusion is a regular occurrence, investigate the potential cause for intrusion.
Contaminating waters	Look for dirty / contaminated water that may be draining into the canal.	Redirect contaminating water with diversions dikes, gradients, inlet/outlet control structures, etc.
Surrounding vegetation	Trees, bushes, & tall weeds along canal banks may attract wild animals, rodents or fowl	<p>Keep tree branches trimmed away from canal waters.</p> <p>Remove tall weeds, brush and bushes from canal banks</p> <p>Management of canal banks should incorporate vegetation that is easy to maintain and support water quality</p>

Cleanliness	Look for trash and debris accumulation	Remove and dispose of trash and debris from water
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Remediation by Disinfection

Management of microbial contamination in flowing water is difficult. If water source is not from a managed irrigation district, sanitizing may not be an option. If water source is from a managed irrigation district, contact the irrigation district manager.

Sanitary Survey and Remediation Guidelines for Well Reservoirs

Sanitary surveys of well reservoirs should focus on the condition of the source water, the integrity of the reservoir's surrounding bank system and potential for contamination from both point source (e.g. animals) and non-point source (e.g. influent). Inspections should occur on a regular basis. Keep records of the date of inspection and any observations made.

Guidelines for Assessment of Well Reservoirs

Issues	Survey Guidelines	Remediation Guidelines
Contaminated well (source) water	Biannual or pre-production testing of source or well water reveals contamination.	Options: <ul style="list-style-type: none"> • Drain reservoir to dry; disinfect connection system before refilling reservoir with disinfected well water • Treat water as it is taken from the reservoir • Use an air-gap between fill pipe from well to reservoir to avoid potential back-flow
Animal intrusion	Look for evidence of animals (observed animal in reservoir, fecal deposits, carcasses).	Remove animal debris; if animal intrusion is a regular occurrence consider isolating reservoir and/or animals

Contaminating influent	Look for dirty/contaminated water that may be draining into reservoir	Redirect water with diversion dikes, gradients, drainage pipes, inlet control structures, etc. A managed grassed buffer zone around reservoir (but not on banks) helps prevent contamination
Surrounding vegetation	Look for encroachment of trees. Bushes & tall weeds may attract wild animals, rodents or fowl	Keep tree branches trimmed behind reservoir parameter. Remove tall weeds, brush and bushes. Reservoir banks should include vegetation that is easy to maintain and supports water quality.
Overflow pipe	Observe whether opening is clean and free of weeds and debris	Cover opening with a mesh screen

Irrigation Systems

Contamination of irrigation systems can be avoided with proper maintenance and storage. Documented inspections should occur on a routine basis and additionally when microbial levels of irrigation water are above acceptable levels.

Sanitary Survey for Irrigation Systems

- Mechanical components
 - Check primary and secondary filtration equipment for cleanliness and proper function
 - Check for leaks on seals, gaskets and fittings
- Water lines
 - Check water lines for visual evidence of microbial growth
 - Check for leaks on seals, gaskets and fittings
- For drip irrigation systems, use of chlorination treatment is advised if water source is not chlorinated
 - Because bacteria can grow in filters, inject chlorine upstream from filter units.
 - Chlorine may be injected continuously (at concentration of 1-2 ppm) or as a shock treatment (at concentrations of 10-30ppm).

A general formula for calculating the amount of chlorine for injection:

$$IR = Q \times C \times 0.006/S$$

Where IR = injection rate (gal/hr); Q=irrigation system flow rate (gal/min; C=the desired chlorine concentration (ppm); and S = strength of chlorine solution used (percent).

Chlorine materials commonly used and their corresponding strength:

Sodium hypochlorite (household bleach): 5.25 – 15%

Calcium hypochlorite dry: 65-70%

Chlorine gas: 100%

- It may be necessary to lower the pH during chlorination to increase the effectiveness of the microbial action
 - pH should be <7.0
 - Acid and chlorine should be added to the system 2 to 3 feet apart
 - **NEVER** combine chlorine and acid in the same container
- Establish a documented regular maintenance schedule of inspection and flushing

Finished water storage

The water storage tank site should be well maintained and properly graded. The tank should be located away from livestock and septic systems.

Sanitary survey for finished water storage tank

- Area around the tank:
 - Whether it is on the ground or elevated, the base of the tank should be visible
 - Should be clean and free of debris and weeds
- On a quarterly basis inspect each finished water storage tank to ensure:
 - Structural soundness (interior and exterior damage or rust)
 - No vegetation is growing on tank
 - Access hatch lids are properly gasketed and secured
 - If vents are present, they should be adequately screened with a corrosion resistant material
 - The overflow and drain pipes are screened and have proper air gaps
- Tanks should be cleaned every 3-5 years, or more often as necessary.

Remediation: Disinfection

If water in storage tank tests positive for generic E.coli, contact a water system contractor to clean and disinfect the tank

Water distribution system

Since almost all of the distribution system components are underground, a map of your water distribution system would be helpful. A map of all permanent distribution lines and fixtures should be maintained. If however, a map is not available, check exposed components for any vulnerability to contaminants. Signs of damaged underground components may include unexplained erosion or patches of lush green grass.

Cross connections

As part of the Sanitary Survey, check for cross connections in your water system. The EPA defines a cross connection as an actual or potential physical connection between a water system and another water source of unknown or questionable quality. The physical connection could allow water of questionable quality to back flow into the water system. Cross connections occur in places where proper air gaps between water surfaces and water sources are not maintained and therefore allowing flow reversals. An example of a cross connection is a hose with one end attached to a water line and the other end lying in a tub of water, a fountain base or fish pond.

Sanitary Survey of Distribution System

Issues	Remediation Guidelines
There are cross-connections in the plumbing system	Make sure that your plumbing is not connected to another source of water that may be contaminated (e.g. a defunct community water system). Cross connection with waste water systems, even with separation by valves, is not sufficient or acceptable
There is not adequate back-flow protection	Install a back-flow prevention device on every outdoor faucet (available at most hardware and plumbing supply stores).
There are dead-end or unused water lines connected to your plumbing system.	Flush lines regularly or remove any used lines or sections of the water system.
There are abandoned or inactive wells on my property	When no longer in use, wells must be destroyed to prevent them from functioning as a vertical conduit for contaminants.

Summary and Conclusions

- Keep detailed records of every Sanitary Survey. Documentation should include:
 - Date
 - A description of the condition of the water system
 - Location and description of problem areas and the corresponding repairs and/or resolutions

Worker Hygiene and Training

Most watermelons are harvested or packed by hand. The health and hygiene of farm workers directly impacts the safety of watermelons since their hands can contaminate them as they handle them. The importance of the cleanliness of every worker's hands throughout all phases of production especially harvesting and packing cannot be over-emphasized. Educating workers about the risks, enforcing the use of toilets and hand washing facilities, paying close attention to the health of workers and encouraging them to report illnesses are a few simple steps growers can take to reduce the risk of pathogens being spread from workers to fresh watermelons. All workers, even your family members, should receive training.

Worker health also influences food safety. People who are ill or who have symptoms of nausea, vomiting or diarrhea can transmit harmful microorganisms to watermelons and should not handle them directly. Open or infected wounds, blisters or bleeding cuts also can transmit harmful pathogens to watermelons. Workers who have cuts or who have slight illnesses, but are healthy enough to work, should be assigned to non-produce contact jobs or provided with adequate bandages and gloves to reduce the risk of contamination.

An effective employee education and training program that explains the microbial risks associated with farm labor and highlights proper hand washing practices is essential to a comprehensive food safety management plan. This training should be in the language appropriate to the workers and the training information should be reinforced continuously. Providing accessible and clean restroom facilities with well-stocked hand washing stations is critical to encourage good worker hygiene. To ensure the use of these facilities, regular cleaning and maintenance should be scheduled. Hand washing should occur after using the restroom, before starting or returning to work and before and after eating or smoking. An effective worker health and training program will only occur with grower commitment and oversight.

Points of Interest

- Provide clean restrooms and washing facilities that include water, soap and disposable single-use hand towels.
 - These facilities should be in close proximity (within a ¼ mile or a five-minute walk) to the worksite
 - Maintain the cleanliness of facilities by keeping a checklist of when restrooms and washing areas are cleaned and document procedures for cleaning
 - Never clean portable toilets in the field; only clean them outside the field perimeter
 - Water used for hand washing needs to be fresh and not re-circulated.
- Do not allow animals (including dogs) in the field and do not allow grazing livestock near fields
- Do not allow workers to eat, drink, and chew gum or tobacco or smoke in or near the plant beds. Glass objects should not be inside the field perimeter
- Keep packaging materials in a clean and well-maintained area to avoid residue contamination by rodents, birds, etc. Do not leave packages on the soil; this could lead to contamination of the final product.



Management Area	Best Practice
Worker training on hand washing and personal hygiene for food safety	All workers attend regular training programs focused on good personal hygiene AND hand washing is emphasized daily AND language and training materials are appropriate for workers
Management of worker training programs on food safety and personal hygiene	Designated trainers on the management team are responsible for conducting training programs and provide consistent messages. These trainers keep records of frequency and attendance, assuring that all workers have received training at least one time each season. All managers act as role models by practicing proper hand washing
On-farm posted signage instructing workers of personal hygiene requirements	Signs are posted instructing workers to use toilet facilities AND to properly wash their hands after using the toilet, smoking or eating
Signage in appropriate languages or uses diagrams for non-English speaking or illiterate workers	Personal hygiene signage is provided in the appropriate language(s) or via diagrams for workers to read and understand
Worker illness reporting	Workers are required to report illness AND if ill, given non-food contact jobs AND supervisors have permission to reassign workers who appear to be ill Any worker illness should be well documented and maintained including any job reassignments
Record keeping of worker training	Records are kept documenting dates and attendance at training progress, as well as copies of all training materials

Toilet and Hand Washing Facilities

Someone at every farm or in every farm division (e.g. commodity, packing house, field operations) should complete the Toilet and Hand Washing Section AND the Worker Training Section. The easiest and most effective way to reduce transmission of pathogens carried by human fecal material is to prevent the fecal material from entering the field. Provide clean toilets and well stocked hand washing facilities for workers, visitors and customers so that they are not tempted or forced to defecate in the field. Signage and worker training programs should accompany these clean facilities, but worker training that focuses on hand washing and hygiene is useless unless the facilities to implement proper practices are in place.

The GAPs Program recognizes that several agencies and organizations, such as OSHA and individual state legislatures, have developed laws regarding toilet and hand washing facility availability, but in most cases, recommendations in the National GAPs Program are more stringent. The reason for this is that the sole focus of GAPs is reducing microbial risks to fruits and vegetables and to those who work with produce. Even if you have only one worker or only visitors such as u-pick customers, you should have a clean toilet, provide toilet paper and have a well stocked hand washing facility for them to use. This is a GAPs priority. Providing clean, well stocked toilet and hand washing facilities will be expensive and will take time and effort to manage, but effective implementation of this recommendation will reduce risk and will be appreciated by everyone on the farm.

Points of Interest

- Hand washing is important to workers because if hands aren't washed, the possibility of microbial contamination increases. Unwashed hands after eating, smoking or using the restroom are a potential source of contamination.
 - Proper hand washing requires about 15-20 seconds of vigorous scrubbing; remembering to get under fingernails.
 - Hand washing basins should be installed in a publicly visible place so the act of workers washing their hands is obvious.
 - Potable water must be used for hand washing and used water must be contained.
- Have a written medical leave and illness reporting policy in place. Do not allow sick workers to harvest watermelons. Encourage workers to report other sick workers.
 - This includes employees with infectious diseases, ill health accompanied by diarrhea, fever, sore throat or open lesions. These employees should not work in contact with watermelons or any equipment used in the packing or harvesting and alternative work should be provided.
- Workers with minor cuts should have those well washed, covered with first aid materials and then enclosed with rubber gloves.
 - All workers should know where the first aid kit is and there should always be ample materials to suit the crew's needs.
- Product and packaging materials contaminated by or in contact with blood must be segregated and disposed of immediately. Tools contaminated by or in contact with blood must be properly sanitized immediately.



Pesticide Use on Produce Farms

READ AND FOLLOW THE LABEL. The most important factor in pesticide use is to read and follow the label instructions. This is the law. Pesticides should only be used on crops that are listed on the label and only in the amounts and concentrations listed on the label. Proper attire and equipment should be used by certified applicators to insure their safety and proper application of the product.

Record keeping is also very important when it comes to pesticide use. State and federal regulations require growers to document pesticide applications and keep this information on file. Recording the trade and scientific name of the chemical, the EPA registration number, the date it was applied, the amount that was applied, the area or field that was treated, the state of development of the crop, weather conditions and the name and pesticide applicator certification number of the applicator are all very important facts that should be written down. Keeping these records in an accessible location allows them to be easily referenced.

Growers who intend to have a GAPs audit of their farm will need to review their pesticide use, handling, storage, disposal and documentation. Proper pesticide use, handling, storage and disposal does impact the safety of watermelons grown on the farm. All growers should read and follow the label instructions for use, handling and disposal to keep the watermelons that they grow on the farm safe.

Additional information on safe pesticide use, handling, storage and disposal is available from local extension or state regulatory agencies.

Points of Interest

- Only trained professionals should apply pesticides. Fieldworkers should always be trained in pesticide safety if pesticides were applied in the last 30 days. Teach workers to recognize pesticide hazards and to be able to determine if a field is safe for re-entry.
- Fieldworkers should always look for re-entry signs before entering a recently treated field to ensure their safety
- Fieldworkers should always wait until their supervisors say it is okay to harvest a field so that a field isn't harvested until the post-harvest interval has expired for the chemical used
- Growers are required by law to document all pesticides applied to the crop and make sure this information is available to fieldworkers. Workers should ask their employees to see this documentation if they have any questions about the pesticide applied, especially if a worker feels that a pesticide is making him/her sick.



Management Area	Best Practice
Pesticide application rates	Pesticides are applied according to label directions and at less than labeled rates when effective
Spill kit and rinsate disposal	A good spill kit is readily available near mixing area. A holding tank for rinsate is available. Excess material and rinsate is used according to label instructions
Spill response plan	A spill response plan is written, updated and routinely reviewed by farm management and employees. Phone numbers of emergency response personnel are posted near all phones and authorities are notified immediately after a spill of a hazardous compound
Application equipment maintenance	SOPs are in place for routine maintenance, calibration and inspection of equipment AND records of equipment maintenance are kept
Weather conditions and drift management for spray applications	No spraying is done if winds are greater than 10 mph (small branches moving in wind) AND spraying is postponed if heavy rain is forecast within 24 hours AND a drift management plan is written and followed
Recordkeeping of pesticide applications (legally required)	Records are kept in accordance with state and federal regulatory agencies. Information recorded for all pesticide applications include: date, chemical and trade name, EPA registration number, rate applied, weather conditions, stage of crop, target pest, area treated, name and certification number of the applicator. Records are easily accessible
Pest monitoring	Crops are inspected for pests during critical periods of crop and pest development (e.g. early growth, flowering, fruit development). The farm uses IPM and pesticides. Pesticides are only applied when pest populations are large enough to cause economic loss

Source of water for topical sprays	Spray water is from a municipal, treated water source or from ground water obtained from a properly constructed, capped well, in good condition, that could be readily treated if indicator organisms were detected in water tests
Certified applicators	Any person who handles and applies pesticides is certified through a state regulatory agency
Proper safety equipment for pesticide applications	All pesticide applicators have access to and wear proper safety equipment for applying pesticide
Pesticide storage area security	The pesticide storage area is locked or fenced AND used only for pesticides
Pesticide storage area design	Pesticides are stored on impermeable shelves over an impermeable floor with curbs or dikes to contain leaks or spills. There is no floor drain OR the floor drains to an acceptable holding tank
Re-entry periods for fields	Signs are posted stating pesticide applications. Workers are prevented from re-entry to fields until the re-entry period has expired
Harvest intervals	No produce is harvested until the legal number of days post application as stated on the pesticide label
Pesticide container disposal	Liquid containers are triple rinsed and rinsate is applied to a labeled site or placed in an approved holding tank for disposal. Containers are returned to the supplier or are taken by a hazardous waste collection service

Pest Control in Packing House

Establish proactive procedures to exclude pests and animals. Screens, wind curtains, bird deterrent tape and traps should be utilized to reduce problems with pests. Dogs and cats should not be allowed to roam in the packing house. A pest control log should be maintained. Each trap should be numbered and marked on a map indicating bait station location. All bait traps containing poison must be located outside the packinghouse or storage area. Only non-poison methods can be used in the packing and storage area. The pest control program should be written down and included along with a copy of the log in the Grower's Standard Operating Procedure Manual.

Check for any major cracks and crevices in the walls, doors, ceiling and floors where pests may hide. All areas where pests may enter should be sealed to the extent possible. Insulation in the ceiling and walls should not be loose. This is an ideal location for birds and other pests to hide.

All animals, including mammals, birds, reptiles and insects, can be a potential source of contamination in produce environments because they can harbor or be a vector for pathogens. Consider the following guidelines to help minimize pest problems in or around packing facilities.

- Establish a pest control system to reduce the risk of contamination
- An established program should include regular and frequent inspections of affected and treated areas
- Maintain your operation in good condition to minimize a pest habit
- Keep grass and weeds around the facility trimmed
- Keep grounds around facility free of litter, waste and garbage
- Remove old and inoperable equipment from facility grounds to eliminate areas that harbor rodents and insects
- Clean daily to remove watermelon and product waste that attracts pests in and around the packing or storage facilities
- Have in place and maintain good surface drainage to minimize a pest habitat
- Regularly monitor and maintain facilities
- Inspect for and minimize sources of food and water for pests
- Remove pests that are either dead or trapped
- Eliminate possible nesting and hiding places for pests
- Clean surfaces soiled by pests, such as birds or other wildlife
- Exclude pests from enclosed buildings. Block holes in walls, doors, flooring, etc., and block vents. Consider using screens, traps and wind curtains
- Keep a pest control log. Include inspection dates, inspection reports and control measures taken

Manure Use on Farms

Several harmful microorganisms (pathogens) found in livestock manure can cause illness in humans, but cause no symptoms in the carrier animal. If watermelon is grown on recently manured land, there is a risk (level unknown) that the crop may become contaminated by these pathogens during the production cycle. While washing watermelons after harvest may reduce surface contamination, most organisms are not effectively removed or killed by use of common disinfectants. Preventing contamination of the crop on the farm and in the packing house is the goal.

As growers, you must consider both environmental and food safety risks in planning your manure applications. Manure management practices that reduce negative environmental impacts, such as runoff and odor, can also reduce risks for contamination with human pathogens that might be in the manure. The use of buffer strips along water ways, and the application of manure to land with a crop residue or cover crop are two examples of GAPs to reduce environmental risk by minimizing runoff. These practices will also reduce potential spread of pathogens to surface water. Minimizing runoff that could contaminate surface water also reduces potential contamination of fruit and vegetable crops because this surface water may be used for irrigation.

Incorporation of manure after land application can reduce chances of direct pathogen contamination by splash. In addition, by maximizing the time intervals between manure application to soil and crop harvest, pathogens levels in soil may be reduced, leading to lowered risk of crop contamination. Manure should not be applied to the field once watermelons are planted. Proper composting reduces pathogens that may be present and is a preferable alternative to raw manure application.

Management Area	Best Practice
Knowledge of manure handling from provider	The manure source provides information on manure handling practices, including documentation.
Manure segregation practices of young and adult animal manure	Source manure from a farm that treats and monitors animals for pathogens of human health concern
Timing manure application to planned acreage	Manure is applied and incorporated into the soil at least 120 days prior to harvest of a produce crop OR manure is applied to the field the year fruit trees are planted OR composted manure is applied. Time between manure application and harvest is ALWAYS maximized.
Manure teas	No manure teas are used.
Sidedressing crops with manure	No manure is used to sidedress the produce crop in the field
Barriers to reduce manure runoff or movement to surface water sources, to minimize risks of pathogen contamination of water used by downstream neighbors	Crop residues or cover crops are always used to minimize manure nutrient leaching or run-off from fields. Cover crops or "filter strips" are always used at field boundaries and along water courses to minimize manure runoff.
Manure run-off to produce fields	Produce is never grown in fields that might receive manure run-off from other fields or barnyards.
Field status at time of application	Manure is never spread on fields that are water saturated, prone to flooding or runoff, AND is not spread on frozen or snow covered ground.
Record keeping of manure use	Detailed records are kept of fields receiving manure, including rates and dates of application.
On-farm manure storage, prior to land application	Manure is stored in an area that is physically isolated from produce fields and produce handling facilities, with barriers to reduce risk of leaching, runoff, or windspread.

Management Area	Best Practice
Slurry storage periods prior to application to produce fields	Slurry to be applied to produce fields is placed in separate storage that once filled, is held for 60 days in summer and 90 days in winter prior to land application.
Manure storage conditions	Manure storage has roof AND there is no liquid runoff from the storage area. Manure is never piled in the field or on bare soil.
Preventing clean water from entering manure storage	Storage unit has surface water diversions to prevent runoff from entering storage AND a perimeter drainage system to prevent ground water entry.
Slurry storage design to reduce risks of manure leaching or spills onto fields or to water courses	Slurry storage facilities are designed and installed according to engineering standards. Plans and test pit data are on file AND there are no signs of leaks, cracks or other structural problems. An emergency plan is available for pit failure or spills.
Use of self-assessments or consultants to reduce negative environmental impacts of manure management practices	An assessment of farm environmental impacts has been conducted and necessary changes have been made to reduce risk of manure movement from fields or barnyards into water courses or other fields. These records are on file.

Compost Use on Farms

Composting of animal manure can reduce microbial pathogen numbers in the manure. This reduction in the numbers of pathogens in compost is due to the high temperature phase of an aerobic composting process. There is no time interval recommended between compost application and crop harvest, due to the reduction in pathogens by the high temperature phase of composting. High temperatures are maintained by manipulating the compost pile inputs (feed stocks), carbon and nitrogen ratios, moisture and aeration. The longer the duration of this high temperature phase, the more likely pathogens will be killed. This time frame required for this kill varies, depending on the inputs used for the composting and the conditions. Time frames range from 5 to 15 days, and desired temperatures range from 130° to 160°F. Monitoring the pile temperature is the only effective way to verify that killing temperatures have been reached. Turning the pile when temperatures fall to 100°F is one strategy to assure thorough mixing and even heating of the pile. Monitoring weed seed kill is not a consistent measure of heating for kill of pathogens.

Once compost is curing, prevent recontamination of the pile by covering the pile or storing the pile in an enclosed facility. Compost is a nutrient rich media well suited to microorganisms. Care should be taken to prevent the movement of either compost or the runoff from piles into fields or packing areas. This runoff provides a nutrient rich media for the growth of pathogens.

Simply piling manure and bedding without active management to achieve high temperatures will not transform the manure to compost. Anaerobic systems for producing compost also do not have a high temperature phase. In both of these cases, the materials should be treated as raw manure products. Therefore, you should know how the compost producer handles and monitors both the composting process and the final product storage. Information the producer should provide includes temperature and moisture management, specifying the duration and high temperatures that were achieved.

The producer should also monitor carbon dioxide and ammonia levels, carbon to nitrogen ratios, and equipment sanitation between raw and curing piles. Turning the pile to insure all parts reach the desired high temperatures is important and should be documented. The compost producer should be able to provide this information and verify the pile was protected from recontamination.

Only well cured, well managed composts should be used for the making of compost teas. The process of brewing a compost tea may increase the levels of harmful human pathogens, if they are present in the compost. A pre-harvest interval for compost tea use has not yet been proposed.

Management Area	Best Practice
Knowledge of compost handling from the provider	Compost producer keeps and provides records on feedstocks and handling practices that insure complete aerobic composting such as temperature, aeration and moisture management, equipment sanitation and isolation / protection of curing piles.
Composting conditions for manure and bedding	Compost producer manages compost pile to achieve a high temperature (131° to 160°F) for at least 5 days AND aerates or turns the pile several times. Records are kept that verify compliance with critical limits and all prevailing laws and regulations
On-farm compost storage prior to land application	Compost is stored in an area that is physically isolated from produce handling facilities. Barriers or tarps are used to minimize risk of leaching, runoff, wind movement and possible recontamination by wild animals OR compost is immediately applied to fields when received.
Compost teas	No compost teas are used.
Sidedressing crops with compost	No produce crops are sidedressed with compost.
Barriers to reduce compost runoff or movement to surface water sources	Crop residues or cover crops are always used to minimize compost runoff from fields. Cover crops or "filter strips" are always used at field boundaries and along water courses to minimize compost runoff.
Record keeping of compost use	Detailed records are kept of fields receiving compost, including rates and dates of application.

Packing House and Storage Cleaning Recommendations

Areas	Cleaning Method	Frequency	Cleanser
Walls	Foam, brush, rinse	Monthly	Soap and Water followed by Chlorine based or Quat, or other appropriate products
Ceiling	Foam, brush, rinse	Monthly	Soap and Water followed by Chlorine based or Quat, or other appropriate products
Floors	Wash, rinse	Daily	Soap and Water followed by Chlorine based or Quat, or other appropriate products
Doors	Foam, scrub	Quarterly	Soap and Water followed by Chlorine based or Quat, or other appropriate products
Overhead Pipes & Beams	Foam, brush	Monthly	Soap and Water followed by Chlorine based or Quat, or other appropriate products
Hoist	Wipe, clean	Quarterly	Soap & water
Light Fixtures	Wipe, clean	Quarterly	Soap & water
Drains & Trenches	Clean, rinse with flooding	Daily	Soap and Water followed by Chlorine based or Quat, or other appropriate products
Grids	Brush	Weekly	Soap and Water followed by Chlorine based or Quat, or other appropriate products
Waste & Dumpster Areas	Foam, brush, rinse	Daily	Heavy duty chlorine based
Break Rooms & Restrooms	Wash, rinse	Daily	Soap and Water followed by Chlorine based, or other appropriate products
Maintenance Area	Scrub, rinse	Monthly	Degreasing agent
Coolers	Wash, rinse	Monthly	Soap and Water followed by Quat, or other appropriate products

JEWELRY POLICY

EMPLOYEES VISITORS

1. All exposed jewelry must be removed before entering the packing area
2. Wedding rings can be wrapped with tape, if required
3. Eyeglasses are allowed for those who have prescriptions

Storage and Transportation

Container and Pallets

Containers not being used should be stored and protected from contamination by pests, bird droppings, dirt and water. Wherever containers are stored, inside or outside, they must be covered for protection.

All pallets and containers used for watermelons should be kept clean and / or sanitized. The containers must be protected from exposure to soil in the field. A system to repair, clean and disinfect containers and pallets should be in place.

Storage / Temperature Control

The storage facility should be cleaned on a regular schedule or as required to minimize free-floating dust and other airborne contaminants. All visible debris and unnecessary items should be removed in a timely manner.

Refrigeration systems must be maintained regularly and kept in good operating condition. Storage temperature logs will help to verify the rooms are maintaining proper temperatures. Thermometers should be calibrated on a regular schedule for accuracy and those checks should be documented.

Transportation / Loading

Employees should make every effort to ensure that trucks and trailers are clean, free of objectionable odors and are in generally good condition. Refrigeration units should be calibrated on a regular schedule and watermelons should be shipped only with produce items. Canvas shoots on refrigeration units should be in good shape with no rips or holes and securely fastened to the unit and trailer. A log must be maintained to show that trucks were checked prior to loading. Produce temperature requirements during shipment should be recorded on the bill of lading. The trailer should be at the proper temperature prior to loading. The refrigeration units are not designed to lower temperatures, but to maintain temperatures.

A company policy must be included in the Grower Food Safety Manual explaining how trucks are loaded to minimize produce damage.

Example: Procedure to minimize watermelon damage; pallets are secured with load braces after loading the truck.

Sanitation conditions need to be evaluated wherever produce is transported and handled. Transporters should keep watermelons separate from food and nonfood pathogen sources to help prevent contamination.

General Considerations:

- Workers who load and unload watermelons should use good personal hygiene and sanitation practices
- Produce buyers, inspectors and other persons involved should also practice good hygiene, such as thoroughly washing hands prior to inspection of watermelons

Operators from all phases of the watermelon transportation chain should help ensure that sanitation measures for vehicles and trailers are met.

- Inspect vehicles and transport cartons for cleanliness and odors before loading watermelons
- Keep vehicles clean and know prior load use
- Maintain proper temperatures to ensure both the quality and safety of watermelons
- Be sure transporters are aware of produce temperature requirements. Avoid those hauling mixed loads if possible, in particular with products that may have much colder temperature requirements (less than 41 degrees F).
- Use trucks and transport cartons that minimize damage to watermelons
- Load watermelons to minimize physical damage, and maximize flow of cold air. These factors can help reduce the potential for contamination during transport.

Farm Bio-security

Bio-security for growers and packers now means preventing intentional contamination of the operation, people or produce with chemical or biological agents. The United States government is active in introducing laws and recommendations to increase the bio-security of domestic as well as imported produce. As a grower and packer of watermelons, you need to be aware of the risks your operation faces. To reduce these risks there are several steps you can take to protect your operation, employees and commodities. The following is not a comprehensive list, but represents areas to investigate and develop strategies to reduce risks to your operation.

- Employee hiring – Develop a process to thoroughly check the background of prospective employees to insure they do not intend to damage your operation or commodity.
- Building security – Maintain control of your packinghouse and surrounding buildings by locking the doors and restricting access only to employees and associates who need to be present to successfully grow, harvest, pack and transport your commodities. Other strategies include use of fencing, cameras and surveillance. The goal is to insure no trespassing or tampering with field and packing areas.
- Visitor protocols – Have a plan in place for all farm visitors. This could include a central check-in location, posted signs to direct visitors to appropriate locations, guest badges and written expectations for behavior while visiting your facility.
- Visual vigilance – Always be aware of your farm, packinghouse, fields under cultivation and other farm property. If you notice unfamiliar people or vehicles, investigate the situation. Although it is unlikely your operation will be targeted for terrorist activity, it has become a national concern especially since you produce watermelons for people to consume.
- Chemical storage – When not in use, keep all agricultural chemicals stored in secure buildings which are kept locked. Limit keys and access to these buildings to designated employees.
- Public Health, Security and Bioterrorism Preparedness Response Act of 2002 – New federal regulation spelled out in this act require some food producers to register their operation with the FDA. The rules and regulations for registration are specific, so consult the FDA regulations directly to assess how it impacts your operation.

*Visit the following website for additional information:
<http://www.fda.gov/oc/bioterrorism/bioact.html>*



HEALTH AND SAFETY NOTICE



VISITORS MUST BE AWARE OF THE FOLLOWING POINTS

- › Toilet facilities are available for your use. Please request locations
- › Please follow all good hygiene / sanitation practices and wash hands thoroughly prior to handling any watermelons , utensils or food contact surfaces and equipment
- › Make yourself aware of the emergency procedures located in the office
- › When walking around please be aware of forklift trucks operating
- › Slippery surfaces are a hazard and care should be taken while walking around the site.
- › Watch out for trip hazards i.e. crates and undulations in surfaces and edges of concrete surfaces
- › Head injuries: watch out for low structures
- › After the visit make sure hands are thoroughly washed before eating

Signed: _____

Printed Name: _____

Date: _____

Notice Reviewed by: _____

Printed Name: _____

Title: _____

Date: _____