

Good Agricultural Practices for Small Diversified Farms

Tips and Strategies to Reduce Risk and Pass an Audit

DEVELOPED BY

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This manual made possible by a Specialty Crops Block grant awarded by the U.S. Dept. of Agriculture and the North Carolina Dept. of Agriculture and Consumer Services

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About the Opening Markets Project

The farms participating in this research project all had less than 30 acres in production and harvested crops a majority of the year. In many cases they also managed livestock on the property, employed small staffs or had no staff besides the farm operators themselves, and used the farm operators' house bathrooms for worker hygiene. This manual is based on lessons and tips learned from experiences these small-farm operators went through in an attempt to gain a GAP certificate.

This research and manual were made possible by funding from a North Carolina Specialty Crops Block Grant, awarded by the NC Dept. of Agriculture and Consumer Services, and the US Dept. of Agriculture. The authors thank both agencies for this support.

Introduction

About this Manual

Many small-farm operators identify the food safety certification process as a roadblock to getting their fresh produce into food service, institutional, and retail markets. Through a partnership with Carolina Farm Stewardship Association, North Carolina State University/North Carolina Cooperative Extension faculty conducted research in 2011 and 2012 to evaluate and quantify the barriers that small-farm operators face in attaining food safety certification.

The aim of this project was to document real-world examples of how small, diversified farms could cost-effectively manage food safety risk, and meet the standards set in the US Department of Agriculture (USDA) Good Agricultural Practices (GAP) certification program. The goal was to see whether it was possible for these types of farms to actually pass a GAP audit, without breaking the bank and without requiring them to change their crop production practices. The intent of this manual is to share tips and strategies learned from this research that other small, diversified produce farms can employ to meet GAP certification requirements imposed by potential buyers.

This manual and research are intended to help you level the playing field when working with a GAP auditor, and to give you the tools you need to show an auditor that you have an effective food safety program. To make the most of this document, it is best to have a copy of the USDA GAP audit checklist at hand.

Audit Tip #1 Understand your potential buyer's needs.

If an existing or potential customer asks for GAP certification, find out what they really mean. What are their actual concerns and audit sections they require to address those concerns? Especially for farm-to-school customers, is there a particular distributor the customer works with that is already certified to serve the local school district, and can you get approved for that school system simply by using that distributor to deliver your products? Depending on your operation, particular audit sections may be more or less costly for you to address. For instance, Part One - Farm Review and/or Part Two - Field Harvest and Field Packing may be more approachable for farms that are just getting started with food safety certification.

USDA Good Agricultural Practices (GAP) vs. Good Handling Practices (GHP) Audits

The USDA GAP and GHP (Good Handling Practices) audit program is a voluntary independent audit based on recommendations made in the US Food and Drug Administration's *Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables* (FDA, 1998). Although known as the USDA GAP audit, it is not federal regulation, but a market-driven certification program: A buyer makes the choice to require a farm to obtain this food safety audit before it will buy produce from that farm. GAPs cover on farm production and harvesting practices, and GHPs cover packing, storage and distribution of crops.

Any farm or packing house seeking a USDA GAP/GHP certification must complete the General Section, but otherwise, buyers' expectations vary. A local farm-to-school program, for instance, may be satisfied if participating farms simply supply their

produce to the school through a GHP-certified distributor. To pass any section, you must earn at least 80% of the points available in that section. You can choose to have a single crop or multiple crops included in your GAP certification. Generally, the auditor needs to be able to observe your harvesting and/or packing process for a crop in order for it to be covered by your certification. The certification is good for 12 months from the date the auditor issues your certificate.

NOTE This manual is intended to address only the 'General', 'Farm Review' and 'Field Harvest and Field Packing Activities' sections of the USDA GAP audit program. It does not cover the GHP sections, 'House Packing Facility' and 'Storage and Transportation.' Table 1 provides an overview of the sections included in the audit related to harvesting and packing activities.

TABLE 1 USDA GAP/GHP Audit Section

PROGRAMS	SECTION	TOTAL POINTS (80% needed to pass)	SUMMARY
General Section	Mandatory section	180 (144)	Includes the food safety plan, traceability, worker health and hygiene and pesticide/chemical use
Good Agricultural Practices	Part I Farm Review	190 (152)	Includes farming operations during the growing season such as water usage, the presence of animals, wildlife, livestock, the use of manure and land history
	Part II Field Harvest and Field Packing Activities	185 (148)	Includes the pre-harvest assessment, bathroom facilities, harvesting containers and equipment, transportation and clean up procedures
Good Handling Practices*	Part III House Packing Facility	290 (232)	Includes water use, treatment of processing water, cleaning program, worker health and hygiene, containers and pest control
	Part IV Storage and Transportation	255 (204)	Includes mechanical equipment, ice and refrigeration, cleaning program, worker health and hygiene, transportation and loading, and pest control

USDA GAP and GHP audits are performed by auditors working for your state Department of Agriculture. These auditors are, in turn, certified by the USDA. Contact the inspection office in your state to schedule your audit and ask questions about the process.

***NOTE** Part III and Part IV are outside the scope of this manual.

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The Market Value of GAP Certification

Attaining GAP certification ultimately opens up new markets to you that require a food safety certificate such as schools, major retail grocery stores or wholesalers. The majority of the farms that participated in the research that this manual was built upon reported that their current buyers (retailers, food service operations and consumers) did not require GAPs certification. However, many participants also said that they believed that more buyers would require some sort of inspection or certification in the near future. The NC and SC Farm-to-School programs both require USDA GAPs certification or equivalent private certifications. Producers who have identified these markets as a growth area for their business report that they did not believe that they would receive a premium for a GAP-certified product, and that the access to the new market was the only benefit.

GAPs vs. the National Organic Program

Many of the farms participating in this research program were already third-party certified under the USDA's National Organic Program (NOP), and others followed NOP practices but were not certified organic. For produce to be sold as 'organic,' it must be certified as being grown in accordance with practices and standards developed by the Agricultural Marketing Service as part of the National Organics Program. These regulations detail the practices that are accepted and prohibited in the growing, cleaning, packaging, and marketing of products labeled as organic. The regulations include requirements for maintaining and improving soil health and fertility and specifically

prohibit the use of synthetic fertilizers, soil and product fumigants, and chemical pest control practices in organic production. In addition, sewage sludge may not be used in the production of the crops, and crops may not be processed using ionizing radiation. The regulations include a National List of Allowed and Prohibited Substances to guide growers and certifying entities in the use of the label.

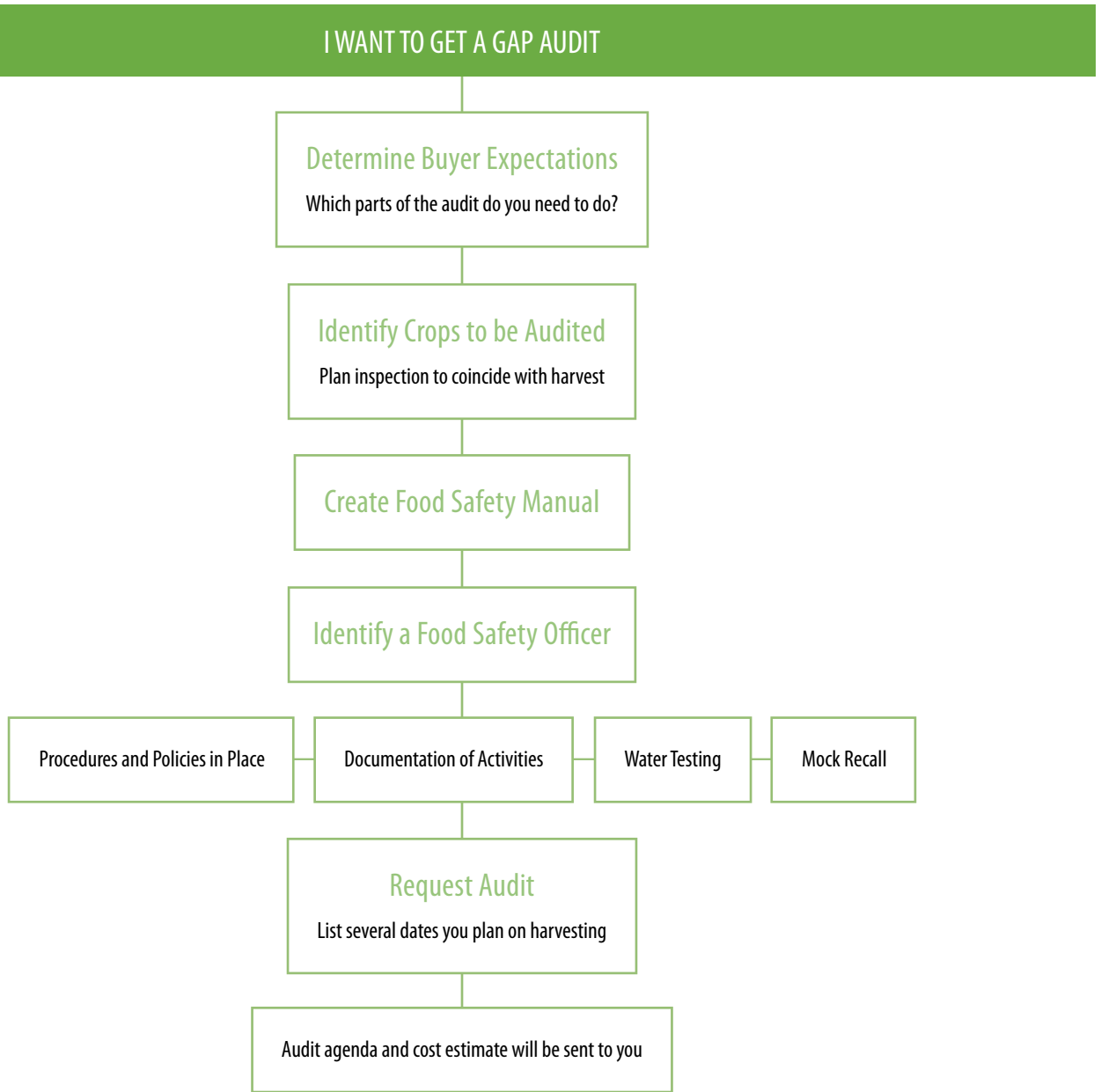
One concern identified by operators of certified organic farms regarding GAP certification is that once approved, a farm's organic certification applies to all produce, grain and oilseed crops produced on that farm, whereas a GAP audit only certifies specific crops. Organic farmers expressed concern that this crop-by-crop approach would require multiple audits and duplicative efforts compared to organic certification. In our research, this concern proved to be less significant than expected. A GAPs auditor can certify multiple crops at once, and will certify types of similar crops as opposed to individual cultivars; GAP certification is based on the way crops are handled in harvesting and packing. For instance, if requested, an auditor will certify all leafy greens from observing the production and harvest process of one leafy green crop on your farm—you do not have to get kale, chard, collards, leaf lettuces, etc., certified individually. Moreover, under certain circumstances, an auditor may approve GAP certification for all crops grown on the farm, if requested. For more information, see the section 'Planning Steps' in Chapter II.

Table 2 shows some of the major similarities and differences between the NOP and GAPs.

TABLE 2 Comparing NOP to USDA GAP

	NATIONAL ORGANIC PROGRAM	USDA GAPs
Type of Audit	Audit farm inputs/outputs from documentation regarding organic growing methods	Audit farm practices from documentation and observation regarding risks of contamination
Cost	Baseline price + Price per acre	\$92/hour (includes conducting the audit, travel time and preparatory time), \$50 website administrative fee
Duration of Certification	Annual	Annual
Raw Manure Application	Incorporated into the soil... ...not less than 120 days prior to the harvest of a product whose edible portion has direct contact with soil. ...not less than 90 days prior to the harvest of a product whose edible portion does not have direct contact with the soil surface or soil particle.	Incorporated into the soil... ...at least 2 weeks prior to planting or a minimum of 120 days prior to harvest. ...but not applied to commodities harvested within 120 days of planting, such as leafy greens; manure must have been incorporated into soil at least 120 days before harvest of such crops.
Similar documentation	Field map, land history, seed stock documentation, manure application, compost monitoring, cleaning records of equipment and transportation, traceability.	

TABLE 3 GAP Audit Planning Process



The Audit Process

Understanding the nuts and bolts of the GAP audit process is the foundation for mastering an inspection. The critical idea is to prioritize the safety concerns relevant to your farm based on risks and your resources available to address those risks. With a few important exceptions, a GAP inspection is not a 'one strike and your out' process. Good preparation and knowledge of how audit scoring works allows you to maximize your chances of passing and minimize your time and expense in implementing food safety practices and record keeping protocols.

Planning Steps Before Scheduling an Audit

Once you have decided to pursue GAP certification and identified what parts of your operation you want audited, there are three key issues to consider in planning for the actual inspection.

CROP HARVEST WINDOWS

Timing your audit makes all the difference for maximizing the value of your investment in certification.

If you are seeking to certify only one crop with a short production season, you may want to schedule your audit for the very start of your production season so that you can sell GAP-certified product throughout the season. Example: Strawberries.

If you are certifying one crop with a long production season (ie, greater than 30 days), you have greater flexibility. Try to time your audit so that you can get the most out of the 12 months the certificate will last you. Be aware that your auditor will determine on your first visit if a second, unannounced verification inspection will be required depending on the results and observations in the initial audit. This is not standardized and will be determined on a case-by-case basis. In the event a follow-up audit is required, your certificate won't be issued until after the second inspection, and then will be good for 12 months from that second inspection. Example: Leafy Greens.

If you are certifying multiple crops, schedule your audit so that the auditor is visiting your farm when you have the largest variety of crops being harvested.

Example: If you grow multiple crops such as root vegetables and leafy greens in both the Spring and Fall, as well as Summer crops such as cucumbers, tomatoes and peppers, and short-harvest-window crops such as strawberries, potatoes or sweet potatoes, schedule your initial audit at the transition between two production seasons. A follow-up inspection will result in additional inspection expenses. So if you aren't required to have a follow-up visit, time the one audit to catch production of short-harvest-window crops that you want certified so you can avoid the expense of a separate visit to cover those crops.

NOTE If there is a specific crop that a buyer has asked to be include on the certification that was not seen on the audit, ensure that you request a follow-up visit and provide a window of time when the auditor may see that crop. Care in scheduling will ensure that the auditor can observe, and certify, the maximum number of crops you produce on your farm.

FOOD SAFETY MANUAL

You must have a food safety manual complete prior to requesting an audit. Your food safety manual is a written document that covers all aspects of your growing and handling process, and identifies the potential sources of risks and how you address them. Your manual describes what steps and procedures you will take to reduce the risks of contamination by chemical, physical and microbial hazards. You are required to submit a copy of your manual along with your request to schedule an audit.

Having a complete and easy to read manual can make passing a GAP audit much easier, as you can earn many points simply by including the right paperwork. Many audit points are based on written practices, so auditors can evaluate planned risk-reduction activities. Written policies, procedures, and records will be the main parts of your food safety manual. See 'Audit Scoring' for more information on how to make the most of this opportunity.

FOOD SAFETY OFFICER

You must name someone—you, your co-operator(s), or other farm management staff—as your food safety officer. That officer must be present at the time of the inspection, and must know your food safety practices in complete detail. Not having a food safety officer will result in automatic failure on your audit.

Audit Tip#2 Do you need a follow up inspection?

Although this is a judgment call made by the auditor, help them see why only one audit is necessary and be an advocate for your farm. Show as many crop production examples as you can during the audit process and help the auditor understand your processes. For example, hand harvesting tomatoes should satisfy the auditor's need to see the harvest of vegetables that aren't grown in contact with soil that you also hand harvest.

Preparing for Your Inspection

Before scheduling an audit, make sure all your documentation and logs are in place so you can receive full points for this paperwork. Review all your policies and procedures with all employees, as the auditor will interview them to verify the effectiveness of your food safety program. Make sure your water test results are available in your food safety manual, and if you have conducted a mock recall make sure that paperwork is available as well.

If you are a diversified farmer with several crops to be audited, you will need to prepare a chart listing all crops in a maximum of eight categories, with the corresponding acreage of each crop that you are planning for the year (see Table 4). If you are completing the audit for a specific crop, such as sweet potatoes, make sure that is identified as one of the categories.

TABLE 4 Crop Categories

EXAMPLE CROPS	ACREAGE
Herbs	0.02
Vegetables	3.0
Root Vegetables	1.5
Sweet Potatoes	1.0
Leafy Greens	1.0
Total Acres	6.52

Requesting Your Audit

When you request your audit make sure to include several dates (up to 6) when you know you will be harvesting for scheduled deliveries, such as CSA packing days, or the day before the farmers' market. Also state the time of day when harvest will be conducted, such as before 10 am or after 5 pm, so the auditor can plan to be on site while these activities are actually taking place.

Once your food safety manual is completed, you should send the 'Request for Audit Services' form to the state inspection services agency. This initial audit request form includes:

- Farm contact information
- Farm information (commodities and acres)
- Type of Audit requested: GAP or GHP
 - Select scopes (or parts): Part 1 Farm Review and/or Part 2 Field Harvesting & Field Packing Activities
- Your preferred dates for the audit

Send this form at least 2-3 weeks in advance of your first desired inspection date, along with a copy of your food safety manual. The audit agency will respond with information regarding the auditor's name, the audit date and time, the audit agenda and the estimated cost of the audit.

USDA GAP Audit Costs

The average cost of the audit for farms participating in the research project was \$925. The charges include an administrative fee of \$50, and the auditor's time, charged at \$92/hour. You will be billed for the auditor's time on site conducting the audit, time to travel to and from your farm, and time spent reviewing your food safety manual in preparation for your audit. The distance traveled by the auditor to your farm will greatly effect the cost of the audit. Time spent on the farm to complete the audit will vary depending on the sections you submit to be completed. Charges for a follow-up visit will be approximately the same as an initial audit. If required, the second unannounced visit will have a limited scope and focus on field observations and a review of logs and records.

AUDIT COST EXAMPLE: SINGLE VISIT

Admin Fee	\$50
Prep Time 1 Hour	\$92
Travel to your Farm 3 Hours	\$276
Audit Day 2.5 hours	\$230
Travel from your Farm 3 Hours	\$276
Paperwork 1 Hour	\$92
TOTAL	\$1,016

Audit Tip #3

Coordinate with neighbors to control travel costs.

If an auditor can audit multiple farms nearby to one another on one trip, she will divide her travel costs among those farms. To reduce your overall cost, call around to neighboring farms, ask other small-farm operators at the farmers market, ask buyers, or work with extension agents in your area to coordinate multiple farms to request the audit at the same time to take advantage of this cost-reduction option.

Audit Day

When the auditor arrives, she will confirm the audit sections to be completed, and review your records and documentation with you. The auditor will ask for copies of some items such as the field map and traceability records showing an example of how boxes are labeled with lot numbers for shipping. The auditor will tour your farm and observe field harvesting activities, including but not limited to:

- speaking with you and any family members/employees on site,
- examining restroom facilities (bathroom and handwashing areas),
- examining the condition of equipment, and
- examining crop production areas.

The auditor will confirm that employees are complying with your standard operating procedures and policies. After the auditor has completed all observations and reviewed your food safety manual, she will score your operation. The closing meeting will consist of a review of the auditor's notes, discussion of any corrective actions and presentation of your score(s).

Audit Tip #4 Take advantage of GAP audit cost shares.

In 2013 and 2014, Carolina Farm Stewardship Association will have GAP audit cost share funds available for farmers in North Carolina who participate in a specialized GAP training program for diversified small farms. For more information, call CFSA at 919 542 2402, or email Karen McSwain, Farm Services Director, at Karen@carolinafarmstewards.org.

The North Carolina Dept. of Agriculture and Consumer Services also may offer GAP inspection cost share for NC farms. For more information, contact the NCDA&CS Cooperative Grading Service at (252) 792-1672.

TABLE 5 A Typical Audit Day Timeline

AUDIT	DESCRIPTION
Opening Meeting	The auditor will discuss the agenda of the audit, answer any questions you may have, and explain the audit process so you know what to expect during the audit.
Conducting the Audit	The auditor will review your documents and records, interview workers, and observe processes to determine whether you are following your food safety plan and the audit requirements.
Auditor Paperwork	After the auditor has finished looking over your operation, the auditor will take time to review her findings, and finalize the audit.
Closing Meeting	The auditor will meet with you and discuss the findings of the audit. The auditor will also answer any of your questions and explain any observations.

Audit Scoring

The auditor uses an audit checklist to score your food safety performance in each of the sections that you are undergoing. Each of the questions on the checklist is worth five, ten or fifteen points, and partial points are not awarded. You receive full points on a question for a ‘yes’ answer, and zero points for each ‘no.’

Some questions may not be applicable to your operation, in which case the auditor will enter an N/A. For questions answered N/A, the points available for that question

are deducted from the total points available for that section of the audit, resulting in Adjusted Total Points—and reducing the number of points you must earn to pass that section. The auditor must explain in writing on the audit checklist any ‘no’ or ‘N/A’ answers. See the hypothetical farm examples below including Tables 6, 7 and 8 for an understanding of the application of adjusted total points scoring.

Audit Scoring Example HAPPY HARVEST FARM

General Section Scoring

1. Has a traceability program in place
2. Has not completed a mock recall, (but this is the farm’s first time applying for certification and thus not required)
3. Has drinking and handwashing water test results
4. Has policy on worker/visitor health and hygiene and training
5. Has policy on smoking/eating area and handwashing sign
6. The house restroom is clean
7. Has policy for addressing workers with foodborne illness
8. Has policy on how to deal with product/food contact surfaces that comes in contact with blood
9. Has policy on what workers do when they get hurt
10. Company personnel applying pre-/post-harvest materials are licensed or trained on proper use

TABLE 6 Scoring Calculations for General Section

HAPPY HARVEST FARM	CALCULATIONS	TOTAL POINTS
Total Points Available	180 points	180
Subtract N/A Questions*	G-2, 10 points G-10, 10 points	20
Adjusted Total Points	$180 - 20 = 160$ points	160
Passing Score (80%)	$160 \times 0.8 (80\%) = 128$ points	128
Farm’s Calculated Points	$160 - 0 = 160$ points	160
Pass/Fail	Pass	$160 > 128$

*N/A QUESTIONS

- G-2, 10 points, No mock recall required for first audit
- G-10, 10 points, No cleaning schedule required for house bathroom

Audit Scoring Example MERRY HOLLY FARM

Farm Review Section Scoring

1. Uses pond as irrigation water source
2. Has water test results
3. Has poultry 20 feet away from crop production areas
4. There are no manure lagoons on or near the property
5. Field has monitoring program for animal intrusion
6. Has fence around fields and pond
7. Uses composted manure purchased from a supplier with analysis reports
8. Land has been used for crop production for 20 years
9. Field is not susceptible to flooding
10. Only one production field

TABLE 7 Scoring Calculations for Farm Review Section

MERRY HOLLY FARM	CALCULATIONS	TOTAL POINTS
Total Points Available	190 points	190
Subtract N/A Questions*	1-9, 10 points	10
Adjusted Total Points	$190 - 10 = 180$ points	180
Passing Score (80%)	$180 \times 0.8 (80\%) = 144$ points	144
Farm’s Calculated Points	$180 - 15 = 165$ points	165
Pass/Fail	Pass	$165 > 144$

POINTS LOST

- 1-8, 15 points, poultry 20 feet away from crop production areas

*N/A QUESTIONS

- 1-9, 10 points, No manure lagoons located adjacent to the area

Audit Scoring Example BUNNY LOU FARM

Field Harvest and Field Packing Activities Scoring

1. Uses portable restroom on leased land
2. Has water test results
3. Uses 5 gallon buckets for harvest containers
4. Harvests by hand and knife
5. Uses pick-up truck bed for transporting produce from field to packing shed
6. Does no field packing
7. Uses lot codes for product moving out of field

TABLE 8 Scoring Calculations for Field Harvest and Field Packing Activities Section

BUNNY LOU FARM	CALCULATIONS	TOTAL POINTS
Total Points Available	185 points	185
Subtract N/A Questions*	2-3, 10 points 2-10, 10 points 2-13, 5 points 2-19, 10 points 2-20, 10 points	45
Adjusted Total Points	$185 - 45 = 140$ points	140
Passing Score (80%)	140×0.8 (80%) = 112 points	112
Farm's Calculated Points	$140 - 0 = 140$ points	140
Pass/Fail	Pass	$140 > 112$

*N/A QUESTIONS

- 2-3, 10 points, has a portable restroom, not a permanent toilet
- 2-10 & -13, 15 points total, no mechanical harvesting
- 2-19 & -20, 20 points total, no field packing

Recordkeeping

Just keeping proper paperwork can earn you as much as 65 to 85 percent of the points you need to pass a particular section of the audit.

Paperwork required for an audit falls into three categories:

1. **RECORD** A record is something that must be kept to show an action was taken. Examples include pre-harvest checklists and activity logs such as cleaning schedules.
2. **POLICY** A policy is a written statement in the food safety plan describing the food safety procedures followed on the farm, such as a statement that employees will not be allowed to work with produce while sick.
3. **DOCUMENT** A document may be a combination of a policy and a record, such as a policy listing all health and hygiene practices followed on the farm that is signed by employees after they receive hygiene training; or the results of a water test.

The auditor awards the remaining points based on her observations of the activities and conditions on the farm. For example, the auditor may watch and interview employees; examine the cleanliness of the bathroom facility; and assess the proximity of livestock pesticide and fertilizer storage areas to crop production fields.

The tables on page 11 break down the major areas of emphasis in each GAP specified section, along with the points allotted for each issue based on the means of evaluation.

Automatic Failure

The auditor will end the audit and fail your farm if she observes any of the following:

- High likelihood of product being contaminated, such as livestock in the irrigation water
- High presence of rodents or pests in the production area during packing, processing, or storage
- Employee practices that threaten the safety of the produce
- Failure to have a food safety manual or food safety officer
- Falsification of records

Audit Tip #5

Organic certification records do double duty.

Many farms participating in this research project were already certified organic under the USDA's National Organic Program. If your farm is certified organic, you are already required to keep certain records that are also relevant for GAP certification, and you don't need to reinvent the wheel. Here's a list of organic certification documents that do double-duty:

- 1 Field map
- 2 Land history
- 3 Seed stock documentation
- 4 Manure application records
- 5 Compost monitoring records
- 6 Cleaning records for equipment and transportation
- 7 Traceability system records

TABLE 9 Points distribution for General Questions Section

RANKING	CATEGORY	POINTS	RECORD	POLICY	DOCUMENT	OBSERVATION
1	Worker health and hygiene	75		30	15	30
2	Bathroom and handwashing	35	10			25
3	Traceability	25	10		15	
4	Product handling	15		15		
5	Facilities/storage	10		10		
6	Animals/pests	10	10			
7	Water	10	10			
Total		180	40	55	30	55

TABLE 10 Point distribution for Part One

RANKING	CATEGORY	POINTS	RECORD	POLICY	DOCUMENT	OBSERVATION
1	Water	45			30	15
2	Animals/pests	45	10			35
3	Manure	10				10
Select one	Raw manure	35	30			5
	Composted manure	35	15		10	10
	No manure used	35		35		
4	Sewage/waste	25				25
5	Land history	20	20			
6	Traceability	10	10			
Total		260	85	35	40	100

TABLE 11 Point distribution for Part Two

RANKING	CATEGORY	POINTS	RECORD	POLICY	DOCUMENT	OBSERVATION
1	Equipment/containers	80		5	30	45
2	Bathroom and handwashing	40		10		30
3	Product handling	25		15		10
4	Water	15	15			
5	Land history	15			15	
6	Traceability	10			10	
Total		185	15	30	55	85

Traceability

Traceability is the ability to link a product to its origin. In the event that microbiological, chemical, or physical contamination is discovered in your crops, it is of the utmost importance to remove the implicated product from further distribution as quickly as possible. A traceability program allows a farm to easily identify any other products harvested from the same field on the same date that also may have been contaminated, and that therefore should be removed from the market. The program also allows the farm to identify records that will help isolate potential causes of contamination, such as dates of any pesticide and manure applications to that product or field, employee health/hygiene issues, and any unusual events such as flooding or wildlife intrusion.

Lot Codes

The essential element of a traceability system is a lot code that is tied to the production area where a crop is harvested, and that uniquely identifies that crop when it moves out of the field. This can be as simple as the date of harvest, for example applying a lot number of 5052012 to all crops harvested on May 5, 2012. Each day would have a lot number and that number will correspond to the field the product was harvested from and all the records associated with that field (manure application, flooding, worker injury, etc). Another alternative is to identify the day and month by using a perpetual

Julian date calendar (see below). Lot codes are not standardized; a producer can define the size of a lot (one day's production, one week's, etc., shipped through CSA) to match their risk tolerance. Having smaller lots can limit how much of a product would be withdrawn from the market in the event of a recall. Reducing the amount of product recalled can minimize the disruption to your business. Regardless of how the code is made, it should provide you with information on how to identify the produce.

JULIAN DATE CALENDAR PERPETUAL												
Day	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1	001	032	060	091	121	152	182	213	244	274	305	335
2	002	033	061	092	122	153	183	214	245	275	306	336
3	003	034	062	093	123	154	184	215	246	276	307	337
4	004	035	063	094	124	155	185	216	247	277	308	338
5	005	036	064	095	125	156	186	217	248	278	309	339

Mock Recall

To be prepared for a recall situation, and to demonstrate the effectiveness of your traceability program for a GAP audit, you should complete a mock recall annually. A mock recall is a simulated recall exercise with a time limit to complete the entire exercise (i.e. 2 hours). Testing these programs is the best way to ensure their effectiveness and your preparedness for an actual recall. Recalls are conducted to identify and recover potentially adulterated, misbranded, and/or hazardous foods from trade and/or consumer channels effectively. For information on current recalls go to <http://www.fda.gov/Safety/Recalls/default.htm>.

There are not a lot of examples of how small farms recall product because the media usually follows big companies with high numbers of illnesses and affected product, but the real world experience of one of the farms involved in our study is instructive. In the summer of 2011, one of the project farms, which at the time was producing sprouts, received an email from one of its CSA customers about 12 hours after news broke regarding a major *E. coli* outbreak in Germany that was linked to sprouts. The

customer claimed to have contracted foodborne illness from the farm's sprouts and therefore no longer trusted the farm's produce.

The farm immediately began implementing its traceability program. The farm contacted its buyers and cancelled all sprouts orders that were due to be delivered the next day, and asked those accounts to remove the farm's sprouts from sale immediately and record the amount of product disposed of so that the farm could reimburse those buyers. The farm did not bother with individual customers since they had no way of contacting them personally. The farm took the remaining sprouts that were due to be delivered the next day to the dump. Aside from one customer complaint, which was not confirmed, the farm received no other complaints, but this farm decided to discontinue selling sprouts.

NOTE For the first time that you are completing a GAP audit, a mock recall is not required.

RECALL PLAN CHECKLIST

1. Create a Customer/Buyer Contact list. Be sure to update names, phone numbers, and emails annually or as needed.
 - Restaurants or buying club distributors: Two contacts in purchasing/shipping department
 - Your own CSA: All members by email or website
 - Farmer's Market/Roadside stand: Website for customers to look for information, email sign up sheet, signs posted at the market or roadside stand
2. Create a Recall Contact list. This list should include names and phone numbers of media representatives, proper authorities (FDA, NCDA&CS, etc.), your insurance company and your legal counsel.
3. Identify the problem (chemical, physical or microbial risks) and assess the health risks.
4. Determine the products and lot numbers involved. (Only strawberries, or one day's worth of all vegetables, etc.)
5. Determine quantities involved. (cases, boxes, etc.)
6. Determine current inventory on the premises.
7. Determine the amount of product in the marketplace.
8. Identify the customers/buyers who have received the product.
9. Collect pertinent documentation regarding the affected product.
 - Inputs and outputs of affected field associated with the lot number such as notes on flooding, wildlife activity, an ill employee, manure application, etc.
10. You will need to determine:
 - the total amount of suspect product shipped/delivered
 - the total amount of suspect product still in the buyer's possession
 - the total amount of suspect product the buyer has shipped
 - any product discarded
11. Upon completion of the mock recall, outline any issues in the recall plan and how you should change the recall plan to make it better. For example, taking longer than 2 hours and not being able to account for 100% of the product.

To conduct a mock recall, identify one of your products delivered to a customer on a specific date. Call the customer, with a lot number and shipping information and enquire where the product went. Also have the customer create or send you a copy of any written documentation to verify their distribution. This document should be in your food safety manual alongside mock recall log (where the date and this activity is recorded).

In the General Section, the auditor will look in your food safety manual for your traceability program and a record of a completed mock recall and award up to 25 points in questions G-1 and G-2. In Part One and Two, the auditor will look for a record showing how production fields and produce moving out of fields are identified and award up to 10 points for each question (1-26 and 2-21).

Audit Tip #6 Get marketing mileage out of your traceability plan.

A majority of the farms in our study sold directly to the consumer through CSA programs, roadside stands and farmers' markets. In the event of a recall, contacting these types of customers can be difficult to unrealistic. Some of the ways small-farm operators can contact these types of patrons are through email sign up sheets, website notifications, and signs at the farmstand/farmers' markets. The system created by preparing for a recall has marketing benefits as well, as having customer email lists and proactively communicating with direct market clients can help build your brand.

Worker Health and Hygiene

There are five key avenues for transfer of pathogens to produce:

1. Human to human, produce, or soil contact
2. Soil to produce contact
3. Container/equipment to soil contact
4. Contaminated water contact
5. Improper sanitation (oral-fecal contact, produce-fecal contact)

Worker Training

All produce handlers on your farm should understand the importance of proper health and hygiene and the role food safety plays in the quality of your product and the health of your customers. You can build this understanding, and score key audit points, by conducting annual training on proper health and hygiene practices with all staff. At the minimum, the training should cover: the importance of good hygiene and handwashing, proper handwashing technique, when to wash hands, first aid procedures, properly using the restroom facilities, illness/injury procedures, and your policy on taking breaks and eating. This can be in the form of formal presentations, videos, demonstrations, or one-on-one instruction.

The auditor will look in your food safety manual for a document that includes a worker health and hygiene policy and a log of all training that has been conducted; worth 15 points in question G-5.

NOTE Also include a training on regulated and non-regulated materials used by employees by reviewing proper usage and directions for such materials (pesticides, etc.) and keep this log of training in your food safety manual along with appropriate licenses; worth 10 points in question G-15.

ONLINE TRAINING

Training videos are available online and upon request from your local Cooperative Extension Agent.

1. GAPs Worker Training Requested by Growers
<http://ncfreshproducesafety.wordpress.com/2011/05/10/gaps-worker-training-requested-by-growers/>
2. Food Safety Begins on the Farm: A Presentation CD
http://calsbookstore-lamp.cit.cornell.edu/catalog/product_info.php?cPath=23&products_id=50&osCsid=hbv2330hvd2jv1h25ovc2ugn23
3. Keeping Food Safe
<http://www.foodsafety.ksu.edu/en/article-details.php?a=3&c=15&sc=128&id=701>

Farm Visitors

You should make sure all visitors to your farm understand that they could contaminate food, and therefore you need to provide them tools for handwashing and hygiene. This is especially important in U-pick operations, where customers are picking their own produce, and customers should be informed of your hygiene procedures

when they receive their U-pick containers. U-pick farms in the study group strategically posted signs in various areas before entrance into the U-pick areas that advised customers to wash hands before picking, to not eat in the field, and that identified the location of bathroom facilities.

You should treat the auditor as a visitor and inform her about health and hygiene practices on your farm. If you keep a sign-in sheet for all farm visitors, make sure the auditor signs in, too.

The auditor will look in your food safety manual for a policy that requires all workers and visitors to follow proper sanitation and hygiene practices; worth 10 points in question G-4.

Hand Washing

Hands can be a major source of human pathogens, so to prevent disease you and your farm employees should always observe proper hand washing techniques and procedures.

Employees who are handling or packaging produce need to be washing their hands:

- Before beginning or returning to work
- After visiting the bathroom
- Before and after eating, smoking and other breaks
- After any other activities besides produce handling
- Anytime hands become dirty

To wash hands properly:

1. Use running potable water
2. Use soap
3. Lather hands, wrists, and fingers
4. Don't forget to scrub your thumbs, under your nails and in between your fingers
5. Wash your hands for 20 seconds
6. Fully dry your hands with disposable paper towels

You will need to post handwashing signs in bathrooms to remind employees to wash their hands. At the minimum a handwashing sign should be present on the property

to remind employees to wash their hands. If the house bathroom is the only toilet facility on your property, a handwashing sign is not required in that bathroom, but it does need to be somewhere on the property where employees and visitors can easily see it.

The auditor will observe employees following good hygiene practices, washing their hands and look for handwashing signage; worth 40 points on questions G-6, G-7, and G-8.

ONLINE INSTRUCTIONS

Designs and directions for building an inexpensive portable handwashing station are available on the internet.

1. How to build a portable hand washing station
<http://www.youtube.com/watch?v=5Ma50Ta3PnU>
2. How to build a field hand washing station
<http://ncgoodfarmersmarketpractices.com/how-to/build-a-handwashing-station/>

Worker Health

If an employee shows symptoms of diarrheal disease or other foodborne illness, they should be prohibited from handling fresh produce. It is important that employees understand that if they work with produce while they are sick they can possibly contaminate the produce. As a farm operator you are relying on your employees to tell you when they are sick, although you should be alert to obvious symptoms such as vomiting during work or frequent trips to the restroom. If your only workers are

you and your family members, you should have a policy in place that if all the worker/family members are sick with foodborne illness then no harvesting will occur that day.

The auditor will look in your food safety manual for a policy that workers do not work when they are sick with foodborne illness; worth 15 points in questions G-12.

Employees should be instructed to seek prompt treatment with clean first aid supplies if they suffer injuries (cuts, abrasions and other injuries). You need to have a properly stocked first aid kit on site so that workers are able to deal with injuries properly.

If produce comes in contact with blood or other bodily fluids, you should have a procedure describing its proper disposal, i.e. bag the items and throw away immediately. Other elements of a policy to respond to contamination by human bodily fluids would include:

1. Marking the area with flags and not harvesting any materials from the area.
2. Using shovels to place contaminated soil and produce into doubled heavy plastic garbage bags.
3. Placing shovels in separate bags and moving them to a designated area for cleaning and sanitizing.

Dispose of the contaminated bags of produce and soil in a manner approved by the county environmental health department.

The auditor will look in your food safety manual for policies directing workers to seek treatment if they are injured and describe procedures related to cleaning/disposal of produce or contact surfaces that have come in contact with blood or other bodily fluids; worth 20 points over questions G-13 and G-14.

Restroom and Sewage Facilities

To reduce contamination on the farm it is important to provide employees with clean bathroom facilities. Researchers have found that some pathogens, such as Salmonella, can persist in the air after flushing the toilet and contaminate the toilet seat and the toilet seat lid (Barker and Jones. 2005). In another study, Salmonella was isolated in the toilet bowl below the waterline up to 50 days after seeding (Barker and Bloomfield, 2000).

Employee Restrooms

You must provide a bathroom and handwashing station for all employees. Bathroom facilities should be reasonably clean and stocked with single use towels, toilet paper, hand soap or antibacterial soap, and water for handwashing. It is essential to have these items (single use towels, toilet paper, hand soap or antibacterial soap) stocked on the property.

In the General Section, the auditor will inspect restroom facilities to determine their cleanliness and whether they are properly stocked, and will look for a restroom cleaning log in your food safety manual; worth 25 points in questions G-9 and G-10, if applicable.

If you rent portable bathroom facilities to have on the property, you will need to have records from the sanitation company about the frequency of servicing and cleaning. It is not necessary to have a cleaning schedule for a house bathroom but the auditor will observe the bathroom to make sure it is as clean as possible.

The number, condition, and placement of field bathroom facilities needs to comply with applicable state and/or federal regulations. The Occupational Safety and Health Administration (OSHA) requires one bathroom and one handwashing facility for every 20 employees within ¼ mile walk of each hand laborer's place of work. Such field bathroom facilities will need to be located close to the crop production fields, but not in a location where a wastewater spill would contaminate the crop production area. Making sure to have a response plan in place for the event of a major spill or leak of bathroom facilities is a simple way to score audit points. This plan needs to describe what will be done to contain the spill and prevent additional contamination, what will be done to clean it up, and how contaminated product will be disposed.

SAMPLE PORT-A-JOHN SPILL RESPONSE PLAN

1. Any affected produce is immediately disposed in a covered waste bin.
2. The contaminated area will be marked off with caution tape or string.
3. Signs in appropriate languages will be posted at the perimeter prohibiting entry to the contaminated area.
4. People and animals will be kept out until the port-a-john is sufficiently decontaminated.
5. Any solid waste still resting on the surface will be shoveled up and removed to the waste bin.
6. Any affected permanent structures will be hosed off and disinfected with a dilute bleach solution.
7. The sanitation unit will be cleaned up and replaced by the company providing the units and maintenance services.

In Part Two, the auditor will observe the restroom facilities (number, condition, distance from workers, and location compared to production fields) and look for a policy in your food safety manual detailing a response plan in case of a spill or leak; worth 30 points over questions 2-2, 2-4, and 2-5.

Sewage Treatment Systems

The farm sewage treatment/septic system should be functioning properly and not leaking. In an audit, the auditor will ask where the system is located and observe the area.

Your audit score can be negatively impacted by conditions off your farm and out of your control. For example, if there is a municipal/commercial sewage treatment facility or waste material landfill within a ¼ mile of the crop production area, you are at risk of losing 10 points. If possible in such a situation, establish a buffer area on your property between the treatment facility and your crop production areas.

Audit Tip # 7 Have back up stocks of restroom supplies.

It is important to have items properly stocked on your property such as restroom supplies or cleaning supplies. The auditor understands she is on a farm operation and you may need to restock items daily. Your ability to address on the spot something that was outside the guidelines allows the auditor to see your food safety policies at work on the farm. During an audit, a farm participating in the research project had no soap, single use towels or trash can available at the portable bathroom. The farm supervisor told the auditor that the sanitation company had just finished cleaning the facilities, and must have failed to restock those items. The auditor advised the supervisor to properly stock the bathroom immediately and they would not lose any points.

NOTE The auditor also spoke with the farm's employees to verify that the sanitation company had in fact been on site that day.

Water

Water issues can cost you points in the General Section, Farm Review, and Field Harvest sections of the GAP audit. Therefore it is essential to complete your agricultural and drinking water test at the appropriate intervals, keep records in your food safety manual, and conduct environmental assessments of your water source periodically to determine any new contamination routes.

Water Risk Assessment

Water is a potential source of contamination for fresh produce, and one of the most significant areas of concern in a GAP audit. To reduce contamination risk and maximize your audit performance, it is important to choose the highest quality source possible for agricultural irrigation. Water can be contaminated by sediment, agricultural runoff, chemicals, or any of the major microbial contaminants, such as bacteria, viruses, or parasitic organisms. Irrigation methods that reduce water contact with produce such as drip are recommended over overhead irrigation.

NOTE If your water source is well water, you should regularly check the integrity of the well casing and head; combined with a clean annual water test, this step should be sufficient to ensure the safety of your well water supply.

In the General Section and Part Two, the auditor will look in your food safety manual for a record of test results for drinking and harvested product wash water and award up to 25 points in questions G-3 and 2-15. In Part One, the auditor will look for a record of test results for water used for irrigation and fertigation purposes and determine if the water source is protected from contamination; worth up to 45 points over questions 1-3, 1-4 and 1-5.

Table 12 below identifies sources of irrigation water and the level of risk with each source. Overhead irrigation is more likely to spread contamination to above-ground plant parts than root-zone irrigation.

TABLE 12 Water Source Risk Assessment

WATER SOURCE	RISK	FREQUENCY OF TESTING
Municipal water	Low	Request testing results from local authorities
Well water	Medium	Annual test at the beginning of the season
Surface	High	Water needs to be tested, at the minimum, three times during the season (beginning, peak, and end of season)

Water Testing

It is important for you to understand the microbial quality of the water you are using for irrigation or wash water on your farm. The water should be tested specifically for fecal coliforms and generic *E. coli*, and the test used should not be a simple positive/negative but should determine the number of *E. coli* present.

The laboratory used by farms for water testing in this project was typically the local environmental health department and the typical charge was \$25-50 per sample. While the presence of generic *E. coli* does not correlate directly with the likelihood of pathogens being present, it does suggest that the water has been exposed to fecal matter that may contain pathogens. We test for indicators as it is a more cost-effective activity than testing for all possible pathogens. Thresholds exist for water quality for different uses: zero *E. coli* are allowed for wash water and drinking; higher levels are permissible for irrigation water as that water is often impacted by UV rays and drying.

Audit Tip #8 Tap local soil & water agencies to improve water quality.

When surface water (a pond, lake, stream, creek or river) is used, it is critical to prevent polluted runoff from contaminating this source. Key strategies are: berms, diversions, separation from animals with fencing, distance, and topography. The Natural Resource Conservation Service (NRCS) provides cost share funding for water quality protection enhancements such as fencing, berms, wind-breaks, micro-irrigation systems, and other enhancements. Contact your local NRCS office or your local soil and water conservation agency for information about these options.

How to Take a Water Sample

BEFORE SAMPLING YOUR WATER SUPPLY

- Contact your selected laboratory prior to collecting the sample to confirm the following:
 - Sample delivery times
 - Collecting instructions
 - Pricing per sample
 - Testing methods available
- Collect samples in sterile containers provided by the testing laboratory.
- Do not rinse your sample bottles prior to taking samples.
- If more than one sample is to be tested, all samples should be collected within a continuous 18 hour period.
- Always take extra bottles and sample request forms from the testing lab.

One of the tests recommended is the Colilert® method (Generic *E. coli* and coliforms) with quantitative results (not presence/absence). If funds are low, a single sample at

the point of use is recommended to account for the entire irrigation system. If funds are available or you plan on participating in a cost share program, one sample should be taken from the water source (wellhead, surface water, etc) and from the point of use (end point) for irrigation and wash water. Your results will be representative of the water quality throughout your system. You will be able to identify if your water is becoming contaminated through your system, either in irrigation lines or at the wash station. If you do find an unacceptable level of contamination, you can isolate it either to the water source (i.e. crack well casing, inflow from above due to faulty well seal, contaminated runoff, wildlife contamination, etc.) or to the above-ground (i.e. irrigation or wash station) system.

TABLE 13 Water Sampling Procedures

Irrigation water samples	Run the irrigation system for the amount of time needed to flush the 'hold up' volume of the system plus an additional 5-10 minutes. Collect samples from the sprinkler/drip system (not the intake area).
Post Harvest Water	When collecting samples from the distribution system tap make sure to remove any attachments, such as aerators. Open the tap fully and allow the system to run for at least 10 minutes (or the time to flush out the 'hold up' volume) before the sample is taken. Slowly fill the container to the line as indicated and tightly cap the container.
Transportation	The sample should be delivered to the laboratory as soon as possible, and no longer than 24 hours after its collection. Samples should be placed in a cooler with ice or gel packs during transportation. Check with specific lab for any additional procedures.

How to Read Your Test Results

Using the Colilert test for Generic *E. coli*, results will be available after 22 to 26 hours. Laboratory results can be delivered via fax, email, or mail. Keep your results in your food safety manual. The results you receive should provide you an average of the generic *E. coli* levels for your 5 samples, and provide the highest single sample concentration. For irrigation water coming in direct contact with the edible portion of a plant, if the average is below 126 MPN/100 mL and highest single sample is below 235 MPN/100 mL then your water is acceptable for agricultural use (EPA, 1986). For water not coming in direct contact with the edible portion of a plant, if the average is below 126 MPN/100 mL and highest single sample is below 576 MPN/100 mL then your water is acceptable for agricultural use. If either number exceeds those tolerances, then you need to take remedial action.

NOTE Most testing labs will return results as MPN/100 mL but some will report in CFU/100 mL. These measures are equivalent, so regardless of the measurement units, you are looking for the same thresholds (126/235 or 126/576).

What to Do if Your Water is Contaminated

If you discover your water exceeds the EPA standards for contamination, then you should conduct an environmental survey to find the cause and retest the water source as soon as possible. Issues to investigate include; a crack in your well casing, a faulty well seal, contaminated runoff, wildlife contamination, or some other impact. If possible, you can take steps to mitigate these circumstances, such as; repairing your well casing, providing a riparian buffer for livestock around an irrigation pond, fencing livestock out of irrigation ponds and drainage areas, or if possible, switching to another source of irrigation water until results are below the EPA standard.

A more aggressive sampling program (i.e., sampling once per week instead of once per month) may be necessary if an explanation for the contamination is not readily apparent. Do not use water from that water system, in a manner that directly contacts edible portions of the crop, until the water can meet the outlined acceptance criteria for its use.

Improving Your Water

You can take specific mitigation steps to improve your water to meet the water quality parameters. These steps can include filtration or the use of disinfection practices. A sand filter will not remove bacterial contamination.

- If water disinfection is necessary, you will need to contact your local irrigation dealer for specific setup and costs.
 - You should discuss the size of the system, the amount of water that will need to be treated, the physical parameters of the water, and price.
 - You should seek input from your local extension agent or a representative from NC State University to help with your decision.
- The most common disinfection method is application of chlorine using one time-released calcium hypochlorite tablets. This method will add a suitable level of free chlorine (5 mg/L or ppm) to water that will inactivate most bacterial contaminants, but is less effective for viruses and parasites.
- It is important to account for the debris, soil and/or feces that may be in the water that will “consume” the disinfectant. Thus it may be necessary to add 200 mg/L (ppm) or more of chlorine to environmental waters, in order to achieve 5 mg/L (ppm) of free chlorine.
- Other systems are available that use gaseous chlorine as well as copper ionization, copper sulfate, ozone, chlorine dioxide, etc.

NOTE To demonstrate to the auditor that your mitigation was effective, and gain the water testing points, a retest with results lower than the prescribed thresholds is required.

Synthetic Water Treatments and Organic Certification

The National Organic Program Regulations 7 CFR § 205.601, provide that certain synthetic substances may be used to disinfect contaminated water. Chlorine products, such as calcium hypochlorite, chlorine dioxide and sodium hypochlorite, can be used as algicides, disinfectants, and/or sanitizers, including in irrigation water cleaning systems. The residual chlorine levels for wash water in direct crop or food contact and in flush water from cleaning irrigation systems that is applied to crops or fields cannot exceed the maximum residual disinfectant limit under the Safe Drinking Water Act (currently 4 ppm).

Chlorine products may be used up to maximum labeled rates for disinfecting and sanitizing equipment or tools. No intervening event is necessary before equipment is used in contact with organic crops.

NOTE You are not required to wash crops, but you should make an effort to remove excessive dirt and mud from the product and/or the harvesting containers. It is not a best management practice to use a wet cloth to wipe off crops because cross contamination from the cloth is likely to occur.

Audit Tip #9:

It's not pass/fail—prioritize your food safety investments.

There will be times when you need to make business decisions based on audit questions: Do I need to implement a particular risk reduction method right now to gain certain points, or can I use my resources elsewhere to make up for these missed points?

During an audit, a farm in the research project lost 15 points for question 1-5 because the auditor did not feel the irrigation water source was protected from contamination, even though the irrigation water test results were compliant with EPA Standards. The surface water source was not protected from runoff from the up hill packing shed or from animals with fencing. The farm passed the Part 1 audit despite missing this question.

Animals

Domestic and wildlife animals in crop production and packing areas can serve as a potential source of contamination. Since animals are in contact with soil, manure and water, they are at risk for picking up contaminants from these sources. Wild and domestic animals can carry pathogens in their feces. Therefore, keeping wild and domestic animals and their feces out of your field and packing area is a significant focus of a USDA GAP audit.

The auditors understand there is no method that will be 100% effective at keeping animals out of crop production fields, but they want to see a positive deterrence followed up with monitoring to determine if the method is effective. Employees should report animal tracks, crop destruction or evidence of feces to their supervisor. Of course, wild animals in production fields can also cause crop yield losses due to consumption and quality issues such as bruising, so it makes sense to prevent animal intrusion for business reasons as well.

In Part One, the auditor will look in your food safety manual for a list of measures taken to keep animals out of production fields and a record of monitoring for animal intrusion signs and award up to 10 points (1-12 and 1-13).

Animal Control Methods

There are a variety of wildlife control methods to try, and none of them are foolproof. Options include fencing, noise cannons, scarecrows, reflective tape, and applications of fish emulsion. Fencing can be expensive: the average cost of fencing for farms in the research project was \$4.83 per foot. So it is perfectly acceptable to try other methods. The biggest mistake you can make, however, is to assume that wildlife intrusion is not a problem.

A farm in the research project lost 5 points on Part One because the auditor discovered animal tracks in the middle of the unfenced production fields; and the farm operator had not taken any control steps because he believed there was no wildlife pressure in the area.

Another farm in the research project did not fence any crop production areas on leased land due to cost. However after observing a deer in the fields during a safety review, the farmer decided to work towards fencing crop production areas for both food safety and product loss reasons. Even though you may not be attempting a GAP certification, keeping animals out of production fields is of importance to prevent contamination, which is a food safety risk, and product loss which is a profitability issue.

Animal Buffering

If livestock are near production areas—including livestock on neighboring farms—the auditors will observe the property to see if there is a distance of approximately one mile between those animals and crop areas, or if there is a natural barrier such as a small forest area or cover crop between animals and the production fields. During an audit, a farm in the research project lost 15 points for question 1-8 because the farm's crop production land, which was leased, was approximately 15 feet from an active horse pasture, owned by the farmer's landlord. The auditor recommended planting a cover crop buffer in this area in future seasons to attain those points. Other farms in the project that managed livestock on their farms as part of their farming operation, and that kept far less than a mile between produce crops and livestock, received full points on this question because production fields and livestock were separated by a small tree line or forest area, housing areas, ditches, and other physical barriers to water- and wind-borne contaminants.

The auditor will observe the property and determine if the production fields are separated from livestock areas by an appropriate distance or a natural barrier; worth 15 points on question 1-8.

If manure lagoons are located adjacent to or near the production fields, it is important to prevent lagoon leakage/overflow or runoff from reaching crop production areas. It is important that the farmer or owner of the manure lagoon maintain the integrity of the lagoon and ensure no leaching. The lining materials (compacted bentonite clay or synthetic lagoon lining) of the lagoon need to be checked regularly for erosion, agitation damage, animal burrows, or cracks. Manure lagoons need to be 300 feet from any well and diversions or other barriers need to be installed to prevent runoff.

Audit Tip #10 Be aware of foot traffic on the farm.

If you manage livestock, you will be walking the property to manage the livestock and crop production fields on a daily basis. When employees move from livestock areas to crop production areas, anything they have come in contact with will be on their shoes, clothes and/or hands, possibly leading to cross-contamination. If possible, employees should be assigned tasks in one area for the whole day or after working with animals employees should be instructed to wash their hands and change boots/shoes or walk through a foot bath to prevent cross contamination between the livestock and crop production areas.

Working Animals

If you use livestock to reduce pests or weeds in crop production areas, you should recognize that the animals' presence in a field is a 'manure application.' Therefore you should take steps to increase the time between that application and the harvest of crops from that area. An example would be using chickens in a movable tractor to clear

out pests/weeds after harvest has completed. During this time, livestock urine and feces will accumulate in the crop production area. It is important to document this raw manure application and make sure no crops will be planted for 2 weeks or harvested within 120 days of your removal of the poultry from that field (see example below).

DATE	ACTIVITY	DOCUMENTATION
Sept 2	Animals allowed to graze on harvested crop production area	Record raw manure application on Sept 2-10
Sept 10	Animals removed from harvested crop production area	
Sept 24 -26	Till the remaining plants and soil; if planting immediately must wait 2 weeks after tilling	Record tilling of land after raw manure application
	A best practice would be to use this area for cover crop, to increase time between raw manure application and planting/harvest of crops	Record when crops are planted and expected to be harvested

If you are using domestic animals such as dogs and cats to control wildlife entry into the fields, or horses to pull plows, you will need to determine how to deal with urine and feces from these domestic animals in the crop production areas. Domestic animals in production fields are specifically addressed in Part One, questions 1-12 and 1-13.

Manure and Composting

Effectively managing your use of any type of soil amendment that includes manure from animal or human sources makes a big difference for passing the 'Farm Review' section of a USDA GAPs audit. Pathogens of concern when using manure-based soil amendments are Salmonella and *E. coli* O157:H7.

Fertilizer Management Practices

When using raw or composted manure fertilizer, it is important to use best management practices to reduce contamination, such as; proper storage to prevent introduction of pathogens into the material, thorough incorporation of the material into the soil, maximizing the time between application of the material and harvest of produce crops, following proper composting practices, and keeping records of the application of the material. If manure is composted improperly or incompletely it may contain pathogenic bacteria.

A farm in the research project stored raw manure from a dairy in the production field so that it was easy to apply the manure during the harvesting season. The manure pile was placed in an area where runoff from the pile would enter the production fields. It is important to store manure (raw or composted) in an area where it is not likely that runoff from the pile will enter crop production areas. Manure piles should not be stored uphill from crop production areas, and if possible should be covered with a shelter or tarp to limit runoff and leaching.

For GAP audit purposes, your management approach depends on whether you use raw or composted manure.

NOTE If you apply both raw and composted manure to a field, or use a mix of raw and composted manure, for audit purposes you should manage the field and the amendments under the raw manure application rules (Part One – Option A).

NOTE If no manure from animal or human sources is used on crop production fields (policy in food safety manual), the auditor will award 35 points in question 1-22.

Raw Manure

When applying raw manure:

- It should be incorporated into the soil at least 2 weeks prior to planting, OR a minimum of 120 days prior to harvest.
- It should not be applied to crops that will be harvested within the next 120 days.
- Your records of raw manure application should include the dates of application and the planting/harvesting of crops grown in that crop production area.

In Part One – Option A, the auditor will look for records demonstrating the application rate, time, and location of raw manure and observe the storage of manure; worth up to 35 points over questions 1-14, 1-15, 1-16 and 1-17.

Composted Manure

When applying composted manure:

- Make sure it was composted properly to reduce the level of pathogens.
- Maintain records of your composting methods including time charts for passive composting methods and time and temperature charts for active methods.

- if the compost is purchased from off the farm, make sure you receive and keep in your food safety manual an analysis report documenting the compost's treatment process and the levels of heavy metals, fecal coliforms (<1,000 MPN/g), Salmonella and *E. coli* O157:H7 (<detection limit).

In Part One – Option B, the auditor will look in your food safety manual for a procedure describing your composting method and a log reporting the duration of the composting period, as well as the temperature of the pile if you are using active composting methods (see below). The auditor will also observe the storage of the compost pile. If purchasing a composted product, it is important to have a copy of the analysis report from the supplier. A total of 35 points over questions 1-18, 1-19, 1-20, and 1-21 are available.

Audit Tip #11

GAP and organic rules conflict on manure application.

The USDA GAP audit specifies that raw manure application should be a minimum of 120 days prior to harvest and that no raw manure should be applied on crops harvested within 120 days of application.

The National Organic Program allows application of manure 120 days before harvest for crops where the consumed portion comes into contact with the soil, or 90 days before harvest if the consumed portion does not come into contact with the soil. If possible, a best management practice would be to apply manure when the field is not in production, and follow with a cover crop planting. This will maximize the time between application and harvest of crops.

'Green manure' is a crop that is grown then plowed into the soil or otherwise left to decompose for the purpose of soil improvement. Examples include soybeans, clover, rye, and others. Green manure does not mean raw manure, and is not treated as a soil amendment of concern in a GAP audit.

Manure Composting Methods

PASSIVE COMPOSTING (AGING)

To reduce pathogens, passive methods rely on:

- Time
The length of time the material should be aged will vary based on regional and seasonal climate factors as well as the type and source of manure. You will need to maintain records showing how long the material has been aged.
- Natural temperature.
- Moisture fluctuations.
- Ultraviolet (UV) irradiation from the sun.

NOTE If you are using passive composting methods for manure, and are going to allow a 120-day-plus window between applying that composted manure to a field and harvesting any product, it may be easier for you to treat that compost as raw manure for documentation purposes.

ACTIVE COMPOSTING

To reduce pathogens, active methods involve:

- Microbial action (aerobic and anaerobic) to digest organic material.
- High temperatures that kill off pathogens in days.
- Regular turning of the compost pile to eliminate cold spots where pathogens can take refuge. You will need to document the duration of the composting period, the temperatures achieved, and the frequency of turnings.

This process will vary depending on seasonal and regional climatic factors such as ambient temperatures and rainfall.

Land History

Your food safety manual should include a description of the land use of the farm for at least the previous five years. What the land was used for previously will affect what contamination risks might be present in the soil and water ways. Conduct a site evaluation for the evidence of old buildings, prior flooding or the potential for flooding (i.e., proximity to streambeds, swamps, etc.), or other risk factors for contamination from pathogens, heavy metals, or chemicals. There is a minimum risk of contamination if there has been no recent dumping of trash; use of the farm as a dairy, livestock or poultry feedlot; or evidence of improper use of animal wastes.

If you identify a risk of contamination occurred in the past, you should have a record of soil testing, and the land should be used for cover crops or cash crops with minimal contact with the soil until the soil tests show contaminant levels below safe threshold levels.

If your crop production areas have been flooded it is important to test the soil for microbial, chemical, and heavy metals contamination (Provin et al., 2008). Floodwaters are likely to contain contaminants, such as raw manure or feces, agricultural chemicals, fuel, heavy metals, or other chemical contaminants. Microbial pathogens that could be in floodwaters include bacteria, viruses, and parasites. For this reason, the FDA considers crops where the edible portion has come in contact with floodwaters to be adulterated, and they should not to be sold for human consumption (FDA, 2011). This applies to both above ground crops and root crops, as root crops can internalize contaminants.

Before cleaning up or destroying crops in flooded fields, check with your local Farm Services Agency or NRCS representatives regarding exact documentation to certify losses, procedures for initiating claims, and possible financial assistance (Bosworth & Kauppila, 2001). If you are an organic grower, floodwaters may contain residues of prohibited substances. Contact your certifier to discuss your situation.

Flooded soils should be allowed to dry sufficiently and should be reworked, tilling to at least six inches deep, before planting crops. Adding compost or other organic matter when tilling will be beneficial to the soil. The soil should be retested for nutrient levels after floodwaters recede, as the pH and nutrient levels of the soil may have changed.

NOTE Water from heavy rainfall that pools on the surface of saturated soils is NOT considered flooding.

Equipment and Containers

It is important to keep all equipment and harvesting containers that come in contact with produce as clean as possible, and this is a major focus in a GAP audit. Spoilage bacteria and pathogens can survive and grow on surfaces that remain wet or where nutrients are readily available. In the washing environment, it is important to prevent areas of standing water and use equipment that can be easily cleaned and sanitized properly so as not to contribute to cross contamination. Remaining plant material on equipment surfaces, such as knives, will support the growth of bacteria.

How to Clean and Sanitize Properly

To maximize the effectiveness of your cleaning procedures:

- Avoid contact between fruits, vegetables, bins, etc. and soil where possible.
- Avoid bruises or cuts to fruits or vegetables that may allow internal contamination.
- Don't use surface water for product washing.
- Clean and sanitize bins and harvest equipment after each use.

A farm in the research project used knives to harvest crops in the fields and those knives were cleaned once a year and stored on a wooden board. If harvesting equipment is not cleaned on a scheduled basis there will be a buildup of plant material and contaminants such as plant and/or human pathogens.

Cleaning food contact surfaces means removing soil and residues. This involves a three-step process of rinsing away surface debris, washing and scrubbing with soap or detergent, and rinsing with clean potable water. Rinsing surfaces thoroughly is important so that any detergent residue is removed (Wilson et al., 2011).

Sanitizing is the process of treating a food contact surface with a sanitizing solution that will kill most microorganisms or reduce them to a non-harmful level. For sanitizers to be effective, surfaces must first be cleaned, because soil and soap residues can make the sanitizing solution less effective (Wilson et al., 2011). It is important to follow directions for proper use of the sanitizer of choice (i.e. for household bleach (chlorine) one cap full per one gallon of water). The sanitizer will also not work as well if not mixed properly; for example, if you add more chlorine than just one capful per gallon you may actually reduce the sanitizer's efficacy.

Harvest Tools

Equipment used for harvesting produce such as knives, scissors, and pruning shears, should be cleaned and sanitized on a regular basis to remove any leftover plant debris and prevent the growth of bacteria. Make sure you have a policy on cleaning, train your employees on the policy and proper cleaning procedures, and abide by the policy. An auditor will inspect harvest equipment storage areas and review your policy, including asking harvest workers when and how they clean harvest equipment.

If any mechanical harvesting takes place on your farm, make sure that any light bulbs or other glass on the harvesting equipment are protected to prevent contamination of produce in the fields in the event of glass breakage.

Harvest Containers

When packing in the field, new or sanitized containers should be used for packing the product. Reusing harvest containers that are not easily cleaned and sanitized is not recommended for use as a best management practice. If practical, it is recommended to use reusable plastic containers (RPCs) that are easily cleanable and stackable. If you cannot use RPCs, another acceptable practice would be purchasing new cardboard/wax boxes (approximately \$1-2 dollars) for single use. If funds are not available for RPCs or new boxes, you should use new box liners or plastic bags to be the primary package that the produce item is in direct contact with; the reused box will act as the secondary package, similar to a cereal box.

Materials used for packing product in the fields should be stored in an area protected from contamination. If packaging is being reused after it has been cleaned, it needs to be protected from contamination with a tarp or other covering, and stored so it is not in contact with the floor, such as on a pallet or shelf.

In Part Two, the auditor will look in your food safety manual for your cleaning/sanitizing procedures for harvesting containers and equipment and for a record of scheduled cleaning activities; worth up to 20 points in questions 2-6 and 2-7.

During the season, harvesting containers should not be used to carry other items. Containers that are used for other activities need to be clearly labeled so they will not be used for harvesting (5 points, question 2-14). If harvesting containers are broken or damaged, they should be fixed or thrown away (5 points, question 2-8).

Transportation equipment used to move produce items from field to other areas should be clean and in good repair. For instance, a truck bed or cart used to carry packed harvest containers should be free of debris and washed on a regular basis, and should not be seriously rusted or otherwise damaged to an extent that could result in damage to harvest containers or crops.

In Part Two, the auditor will look in your food safety manual for a policy regarding harvesting container use during season and observe the cleanliness of transportation; worth up to 15 points in questions 2-14 and 2-17.

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Cooperative Grading Service

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REQUEST FOR AUDIT SERVICES

AUDITEE INFORMATION		FARM/FACILITY INFORMATION	
Company Name:		COMMODITIES:	# of ACRES:
Address:			
City, State & Zip:			
GPS Coordinates:			
Phone#:			
Fax #:			
Email Address:		ARE YOU A NC FARM TO SCHOOL SUPPLIER?	
Contact Person:		[] YES [] NO	

For a copy of the USDA GAP/GHP Audit Checklist, visit the USDA website www.ams.gov/gapghp

Type of Audit(s) Requested (Choose at least one)	Scope(s) of GAP/GHP Audit Requested:
<input type="checkbox"/> Good Agricultural Practices & Good Handling Practices (GAP/GHP-Select Audit Scopes----->	<input type="checkbox"/> Part 1 - Farm Review
<input type="checkbox"/> Harmonized Food Safety Standard	<input type="checkbox"/> Part 2 - Field Harvesting/Field Packing Activities
<input type="checkbox"/> Tomato Audit Protocol (T-GAP)	<input type="checkbox"/> Part 3 - House Packing Facility
<input type="checkbox"/> Leafy Greens Audit (LGMA)	<input type="checkbox"/> Part 4 - Storage & Transportation
<input type="checkbox"/> Identity Preservation Audit (IP)	<input type="checkbox"/> Part 6 - Wholesale Distribution Center/Terminal
	Warehouse
	<input type="checkbox"/> Part 7 - Food Defense
DATE(S) preferred to have the audit:	

Once the request form has been received we will fax you an agenda outlining the objectives, audit, criteria, personnel required, affirmed date, time schedule, and estimated cost of the audit.

If the date on the agenda needs to be changed, we will need to be informed as soon as possible.

We charge the USDA rate of \$92.00 per hour which includes travel, time on site, and audit preparatory time.

As per USDA requirements, we charge an additional \$50.00 fee for website maintenance and certification.

There is a \$150.00 USDA fee for all Harmonized Food Safety Audits and requires signature of a Subway Audit Release Form.

Before performing the audit, we must have a Participation Agreement on file that is signed by a company official. The agreement allows the auditor to view your records, access the facility, and allows for an unannounced visit to your facility if in operation > 30 days.

We would like to have this request no later than 2 weeks prior to the end of your season.

The commodity has to be in harvest before we can perform Pt. 2. In Part 2 or 3, employees must be working in the field or packing facility in order to verify that policies and procedures are being followed.

Signature _____ **DATE** _____

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revised 9/2012



UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Marketing Service
Fruit and Vegetable Programs
Fresh Products Branch

REQUEST FOR AUDIT SERVICES

(This is the only acceptable form for fax or electronic submission to USDA for audit requests)

NOTE: Fill in all appropriate blocks. Requested services may be delayed because of incomplete information. Type of service requested must be selected below.

DATE OF REQUEST: _____ **ANTICIPATED DATE OF AUDIT:** _____

AUDITEE INFORMATION

FARM / FACILITY INFORMATION

Company Name:		Location:	
Street Address:			
City, State & Zip:		Total Acres / Total Sq Feet to be audited:	
Phone Number:			
Contact Person:			

APPLICANT INFORMATION

COMMODITIES TO BE COVERED BY AUDIT (Please List)

Company Name	
Phone Number:	
Fax Number:	
E-mail:	
Contact Person:	

TYPE OF AUDIT SERVICES REQUESTED

Type of Audit(s) Requested (Please choose at least one)	Scope of GAP&GHP Audit (Please choose all that apply)
<input type="checkbox"/> Good Agricultural Practices & Good Handling Practices (GAP&GHP) (Select Audit Scopes)	<input type="checkbox"/> Part 1 – Farm Review
<input type="checkbox"/> Mushroom Specific GAP Audit (M-GAP)	<input type="checkbox"/> Part 2 – Field Harvest & Field Packing Activities
<input type="checkbox"/> Tomato Audit Protocol (T-GAP)	<input type="checkbox"/> Part 3 – House Packing Facility
<input type="checkbox"/> Leafy Greens Audit (LGMA)	<input type="checkbox"/> Part 4 – Storage & Transportation
<input type="checkbox"/> Identity Preservation Audit (IP)	<input type="checkbox"/> Part 6 – Wholesale Distribution Center / Terminal Warehouse
<input type="checkbox"/> Other, Specify: _____	<input type="checkbox"/> Part 7 – Preventative Food Defense Procedures

ADDITIONAL REMARKS

To download a copy of the USDA Good Agricultural Practices & Good Handling Practices audit checklist, please visit the USDA website at <http://www.ams.usda.gov/gapghp>.

Once a request has been received, a USDA representative will make contact within 48 hours of receipt to schedule the audit.

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0125. The time required to complete this information collection is estimated average .02 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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Checklist for Retail Purchasing of Local Produce

Name of Producer/Farm _____
 City _____ State _____ Zip _____
 Telephone _____ E-mail _____
 Total acres farmed _____ Availability of promotional materials YES NO
 Products to be purchased _____
 Is an insurance liability required YES (Dollar amount _____) NO
 Was the produce grown without addition of chemical pesticides and fertilizers? YES NO
 Are you USDA Certified Organic? YES NO
 Is the facility licensed and inspected to process products YES NO
 Are there acceptable substitutes available if an order cannot be filled YES NO

Production Practices	Yes	No	N/A
Are wells protected from contamination?			
If irrigation is used, what is its source? <input type="checkbox"/> Well <input type="checkbox"/> Stream <input type="checkbox"/> Pond <input type="checkbox"/> Municipal <input type="checkbox"/> Other _____			
What types of manures are used? <input type="checkbox"/> Raw manure <input type="checkbox"/> Composted <input type="checkbox"/> Aged <input type="checkbox"/> No manure is used			
Is raw manure incorporated at least 2 weeks prior to planting and/or 120 days prior to harvest?			
Is the manure application schedule documented with a copy submitted to the retail operation?			
Is land use history available to determine risk of product contamination (e.g., runoff from upstream, flooding, chemical spills, or excessive agricultural crop application)?			
Is the field exposed to runoff from animal confinement or grazing areas?			
Is land that is frequently flooded used to grow food crops?			
Are coliform tests conducted on soil in frequently flooded land?			
Are farm livestock and wild animals restricted from growing areas?			
Are portable toilets used in a way that prevents field contamination from waste water?			

Product Handling	Yes	No	N/A
Are storage and packaging facilities located away from growing areas?			
Is there risk of contamination with manure?			
Are harvesting baskets, totes, or other containers kept covered and cleaned (with potable water) and sanitized before use?			
Is harvesting equipment/machinery that comes into contact with the products kept as clean as possible?			
Are product and non-product containers available and clearly marked?			
Is dirt, mud, or other debris removed from product before packing?			
Are food grade packaging materials clean and stored in areas protected from pets, livestock, wild animals, and other contaminants?			

Transportation	Yes	No	N/A
Is product loaded and stored to minimize physical damage and risk of contamination?			
Is transport vehicle well maintained and clean?			
Are there designated areas in transport vehicle for food products and non-food items?			
Are products kept cool during transit?			