GREENHOUSE•A•SYST

FOR MICHIGAN PRODUCERS

FAS 108 · October 2015 · Major Revision – Destroy Old

Greenhouse production in Michigan generates more than $376 million in products (2011 wholesale value) annually. Floriculture requires advanced technology and precise use of pesticides, fertilizers, light, temperature and water to produce bedding and potted plants within a limited area. Like other agricultural enterprises, floriculture involves a number of processes that can potentially affect Michigan's surface and groundwater. Although many improvements have been made to reduce pollution risks, more can be done.

Greenhouse•A•Syst was developed to assist greenhouse growers to identify pollution risks and to make any needed improvements to protect water resources. Greenhouse•A•Syst will also help growers become aware of applicable federal, state and local environmental regulations.

MAEAP

MICHIGAN STATE UNIVERSITY | Extension

Greenhouse•A•Syst

Greenhouse System Improvement Action Plan

Risk question	List high-risk practice(s) from Greenhouse•A•Syst and medium-risk practices that do not meet MAEAP requirements	Required for MAEAP verification?	Alternative low-risk practice (include potential sources of technical and financial assistance)	Action plan	
				Planned completion date	Indicate date when completed
3.09	(example) Pesticide spill clean-up kit not available in pesticide storage area.	Yes	Acquire pesticide spill clean-up kit for pesticide storage area.	Sept. 2016	(✔) Completed Aug. 28, 2016

(continued next page)

I understand that this farmstead and cropping system assessment (Greenhouse•A•Syst) and corresponding Greenhouse System Improvement Action Plan were developed on the basis that I have disclosed, to the best of my knowledge, all information pertaining to my cropping operations.

Farmstead address:

Street _____

City _____

State _____ Zip _____

Watershed name: _____

❑ Aerial map with greenhouse operation boundaries is attached.

Producer's signature _____

Date _____

Greenhouse•A•Syst conducted by:

Name _____

Title _____

Organization _____ Date_____

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Greenhouse System Improvement Action Plan (continued)

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For MAEAP verification, contact MAEAP office at the Michigan Department of Agriculture and Rural Development: 517-284-5609.

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Greenhouse System Improvement Action Plan (continued)

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				Planned completion date	Indicate date when completed

MAEAP Verification Action Plan	Date
Target date for MAEAP verification of **Farmstead System**	
Target date for MAEAP verification of **Cropping System**	
Target date for MAEAP verification of **Livestock System**	

For MAEAP verification, contact MAEAP office at the Michigan Department of Agriculture and Rural Development: 517-284-5609.

Introduction

Greenhouse◆A◆Syst will help growers develop and implement management plans and site improvements that prevent contamination of groundwater and surface water resources and maintain economic crop production. Plans will be consistent with the identified 2015 Michigan Right to Farm Generally Accepted Agricultural and Management Practices (GAAMPs) and with applicable state, federal and local environmental regulations.

Nutrients used in greenhouse production come from chemical fertilizers and naturally occurring sources. All nutrients, whether synthetic or naturally occurring, can become mixed with surface water or groundwater by natural processes such as runoff and leaching. Nitrate contamination of groundwater and phosphorus contamination of surface water can be problems in Michigan. Greenhouse◆A◆Syst will assess current nutrient management practices and identify alternative management practices that, when implemented, will reduce nutrient losses to the environment.

Virtually all crops produced in Michigan greenhouses may be threatened by serious pest problems – disease-producing organisms, insects and weeds. Producers are encouraged to adopt pest management practices that achieve the desired crop quality and yield while minimizing any adverse effects on non-target organisms, humans, and soil and water resources. Greenhouse◆A◆Syst will assess current pest management practices and identify alternative management practices that, when implemented, will reduce negative impacts on the environment.

The Michigan Agriculture Environmental Assurance Program (MAEAP) is a comprehensive, proactive and voluntary agricultural pollution prevention program. It takes a systems approach to assist producers in evaluating their farms for environmental risks. The on-farm risk evaluation uses specific tools for each system. Greenhouse◆A◆Syst covers the environmental risks for both the Farmstead and the Cropping Systems.

The Michigan Right to Farm Act authorizes the Michigan Commission of Agriculture and Rural Development to develop and adopt GAAMPs for farms and farm operations in Michigan. These voluntary practices are based on available technology and scientific research to promote sound environmental stewardship. The current Right to Farm GAAMPs are posted on the Michigan Department of Agriculture and Rural Development Web site: **www.michigan.gov/mdard**.

Producers who complete the Greenhouse◆A◆Syst assessment will be able to determine what structural, management practices or record-keeping changes (if any) will be needed for the businesses to be environmentally assured through MAEAP. Once a producer develops and implements a Greenhouse System Improvement Action Plan to address the risks indicated by the assessment, he/she can contract the Michigan Department of Agriculture and Rural Development (MDARD) at (517) 284-5609 to request a MAEAP Greenhouse System verification inspection. A MDARD inspector will schedule a site inspection to complete the verification process.

P.A. 451, Part 82, ensures the confidentiality of the producer information provided to the MDARD for verification. Any information connected with the development, implementation or verification of a conservation plan or conservation practices is confidential.

Owners of a MAEAP-verified Greenhouse System are eligible for various incentives and can enjoy legislated incentives if an agricultural pollution emergency ever occurs at their facilities and MAEAP standards are practiced.

For a list of currently available incentives and information on how to get started, contact a local conservation district, MSU Extension or NRCS representative.

Greenhouse operations with nursery stock production will also need to complete Nursery◆A◆Syst. Section 13 of this document (Outdoor Container Management Practices) is for greenhouse producers who have outdoor production of floricultural crops.

What is the Greenhouse Assessment System?

Greenhouse◆A◆Syst is a series of risk questions that will help assess how effectively a producer's greenhouse management practices protect groundwater and surface water resources. The risk questions are grouped in the following sections:

1	Greenhouse Site/Soil Evaluation
2	Water Well Condition
3	Pesticide Storage and Handling
4	Pesticide Handler and Worker Safety
5	Fertilizer Storage and Handling
6	Petroleum Product Storage and Management
7	Waste Management
8	Septic System Management
9	Nutrient Management Practices
10	Water Management Practices
11	Soil and Water Conservation Practices
12	Pest Management Practices
13	Outdoor Production Container Management
14	Other Environmental Risks at the Greenhouse Operation

Each risk question assesses the impact of management practices on groundwater and surface water resources. The risk question answers indicate whether management practices have a low, medium or high risk of water contamination. Producers are generally recommended to adopt the low-risk management practice.

Responses to risk questions that address management practices that are regulated by state or federal law indicate **illegal practices with black bold print**. The numbered footnotes indicate what regulation(s) is violated. Refer to Table 3, page 58.

Responses to risk questions that address management practices covered by the GAAMPs indicate ***a management practice consistent with a specific GAAMP with blue bold italic print***.

Finally,

a blue box indicates the management level(s) required for MAEAP verification.

MAEAP management requirements are aligned with state and federal environmental regulations. The GAAMPs and environmentally based horticultural management practices are supported by research. The records and/or evidence that indicate the approved management practices have been implemented on the farm are listed in the far right column. This evidence will provide the basis for awarding environmental assurance through MAEAP.

Horticultural advisors (both public and private) can assist growers to make the appropriate management changes to become environmentally assured through MAEAP.

How does Greenhouse◆A◆Syst Work?

1) Select all relevant sections for the greenhouse operation.

2) Answer each risk question by selecting the answer that best describes management practices used in the operation. Indicate the risk level in the column to the right. Skip any questions that do not apply to the Greenhouse System.

   Note: for MAEAP verification, complete the risk questions with a Greenhouse◆A◆Syst trained individual. Locate a MAEAP technician through the county conservation district or MSU Extension office.

3) After completing each section of risk questions, list the practices that present a high risk of contaminating ground water and surface water resources in the Greenhouse System Improvement Action Plan (printed inside the front cover of the bulletin). Also include any medium-risk practices that do not meet MAEAP verification requirements.

4) In the Greenhouse System Improvement Action Plan, list:
   - Management practices or site improvements that are planned for implementation that will reduce the identified risk.
   - Sources of technical and financial assistance.
   - Target dates for accomplishing the changes.
   - Target date for MAEAP Greenhouse System verification.

A Few Final Words

The key to Greenhouse◆A◆Syst is that once environmental risks to groundwater and surface water resources have been identified, the plan is implemented to reduce the risks. Some of the stewardship practices that will reduce risks may cost very little and take very little time to implement. Other practices may involve additional cost and may not be implemented for a few years. It is important, however, to have a plan to follow. Once a plan is developed and changes are implemented to address the risks, the greenhouse is ready for MAEAP Greenhouse System verification.

Greenhouse Site/Soil Evaluation

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
1.00) Has there ever been a formal Right to Farm complaint against the farm?	There has never been a Right to Farm complaint or the concern was not verified or the concern was resolved.		There was a formal Right to Farm complaint and the concern was not resolved.		Producer's verbal indication of complaint history.
1.01) What is the texture of the dominant soil (zero to five feet deep) at the greenhouse site?	Very fine-textured soils: clay, clay loam, silty clay loam, sandy clay, sandy clay loam and silty clay.	Medium-textured soils: loam, silt loam, sandy loam and silt.	Coarse-textured soils: sand, fine sand, very fine sand, loamy very fine sand.		
1.02) What is the depth of the topsoil and subsoil (A & B horizons)?	Greater then 40 inches.	30 to 40 inches.	Less than 30 inches.		
1.03) What is the depth to the seasonal high water table?	Greater than six feet.	Three to six feet.	Less than three feet.		
1.04) What is the soil organic matter content?	Greater than four percent.	One to four percent.	Less than one percent.		
1.05) What is the makeup of the geological materials more than five feet underground?	Low-permeability materials: silt, clay, shale, claystone.		Highly permeable materials: sand, gravel, fractured rock, karst limestone.		
1.06) Is the greenhouse site subject to visible soil erosion?	Site does not erode.	Slight or occasional erosion, with limited risk to surface water.	**Significant erosion occurs annually**.[4]		No significant erosion present at the greenhouse site.

A boxed risk level indicates the level required for environmental assurance verification (MAEAP verification).

Bold black print indicates a violation of state or federal regulation (see Table 3 on page 58).

Bold blue italic print indicates a management practice consistent with a specified 2015 Right to Farm (RTF) Generally Accepted Agricultural and Management Practice (GAAMP).

Water Well Condition

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
2.01) How old is the well that serves the greenhouse?	Less than ten years old.	Ten to 25 years old.	More than 25 years old, or age is unknown.		
2.02) What kind of well(s) are present?	Drilled and grouted.	**Drilled and not grouted**[1] or driven point or water jetted.	Large diameter (twelve to 48 inches) dug well, or construction is unknown.		
2.03) Is the greenhouse well classified as a private or public water supply?	Private: potable water for drinking or domestic or greenhouse purposes for family members only.	Public: water for drinking or household/greenhouse purposes to persons other than the owner and family (greenhouse with employees or that is open to the public).			
2.04) What is the slope from the well to potential contamination sources?	Well is upgrade from all contamination sources.	Well is at grade from most contamination sources.	Well is downgrade or in a depression relative to contamination sources.		
2.05) What is the condition of the well casing and cap?	Not holes or cracks. Cap tightly secured.		**Holes or cracks visible. Cap loose or missing. Water can be heard running into well. Exposed well casing bent.**[1]		Satisfactory well casing and cap present.
2.06) From the well installation record, is there a protective soil layer (confining material) in the soil formation?	Continuous clay or shale layer more than ten feet thick. Or, Continuous clay mixture more than 20 feet thick.	Clay or shale layer less than ten feet thick. Or, Clay mixture less than 20 feet thick.	No protective layer (unconfined aquifer).		
2.07) What is the depth of the well casing?	More than 100 feet. Or, Minimum of 60 feet with ten feet of clay or 20 feet of clay mixture (confining material.)	At least 25 feet, but no confining material.	**Less than 25 feet, or no casing**.[1]		

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Water Well Condition (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
2.08) What is the casing height above grade?	12 inches or more.	**From grade level to less than 12 inches**.[1]	**Below grade or in a pit or in a basement**.[1]		
2.09) What is the well pump capacity?	25 gallons per minute or less.	Greater than 25 gallons per minute.			
2.10) When was the last time the well was inspected by a professional well driller or pump installer?	Within the past 10 years.	Between 10 and 20 years ago.	More than 20 years ago, or don't know when the well was last inspected.		
2.11) How is backflow or back siphoning of fertilizer or pesticide mixtures into the watersupply prevented?	***Anti-backflow device installed***, including a Reduced Pressure Zone (RPZ) valve, double check valve assembly, or chemigation valve with an internal air gap, and six-inch ***air gap maintained above level of liquid in sprayer tank***. Air gap is twice the diameter of the fill pipe or six inches, whichever is greater.	Either an ***anti-backflow device installed***, including an RPZ valve, double check valve assembly, or chemigation valve with an internal air gap, or six-inch ***air gap maintained above level of liquid in sprayer tank***. Air gap is twice the diameter of the fill pipe or six inches, whichever is greater.	**Neither an anti-backflow device installed, nor air gap maintained**.[1,3]		Anti-backflow device installed, including an RPZ valve, double check valve assembly, or chemigation valve with an internal air gap, or air gap present or demonstrated.
2.12) Is there an unused well located on the greenhouse site?	No unused well, or abandoned well is properly sealed.	- Unused well temporarily abandoned properly: Meets minimum isolation distances. - Is disconnected from any water distribution piping - Has the top of the casing securely capped.	**Unused, unsealed well at greenhouse site**.[1]		Unused well(s) properly sealed.
2.13) How often is the drinking water tested for nitrates and bacteria?	Drinking water tested yearly.	Drinking water tested within the past three years.	No water testing done, or more than three years since last test.		Water tests for nitrates and coliform bacteria within the past three years.

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Water Well Condition (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
2.14) What are the water test results?	No coliform bacteria or nitrate detected.	Water contamination detected. Public water well(s) test below health advisory limits.	Water contamination detected. **Public water well(s) test above health advisory limits**.[3]		Water tests within health advisory limits for public well.
2.15) Are the greenhouse site or portions of the greenhouse site included in a community wellhead protection area?	No.	Yes or don't know, and soil characteristics and greenhouse operations pose minimal risks to groundwater.	Yes, and soil characteristics and/or greenhouse operations pose significant risks to groundwater.		
2.16) If a frost-free yard hydrant is connected to a water system, is the hydrant approved by the Michigan Department of Environmental Quality (MDEQ)?	MDEQ-approved yard hydrant protects water supply from contaminated water back-siphoned into the hydrant's drain valve. Or, **Yard hydrant is not MDEQ-approved**[1], but an anti-backflow valve is installed between the hydrant and the water source.		**Yard hydrant is not MDEQ-approved**[1] and there is no anti-backflow valve.		
2.17) If the drinking water well serves 25 or more people for 60 consecutive days (Type IIb public water supply), has it been tested for arsenic?	Drinking water tested on a quarterly basis. Average arsenic level is less than 10 parts per billion (ppb).		**Drinking water is not tested**.[3]		

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Water Well Condition (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
2.18) If the groundwater and surface water pumps have a combined capacity to pump more than 70 gallons per minute (gpm) (100,000 gallons per day) for agricultural purposes, has water use been registered and reported to the State of Michigan?	Pump capacity is less than 70 gpm (100,000 gallons/day). Or, Register and report annual water use to Michigan Department of Agriculture and Rural Development by April 1.		**Pump capacity is greater than 70 gpm (100,000 gallons per day) and water use is not reported to the State of Michigan.**[13]		Records indicate compliance with water use reporting.
2.19) Have new or increased large quantity water withdrawals been registered (pumping capacity greater than 70 gallons per minute [gpm] or 100,000 gallons per day for systems established after July 9, 2009)?	The Water Withdrawal Assessment Tool (WWAT) was used to determine if a proposed withdrawal or expansion is likely to cause an Adverse Resource Impact, and to register the water withdrawal with MDEQ, prior to beginning the withdrawal. The WWAT and registration site is www.deq.state.mi.us/wwat.		**No, a new water withdrawal exceeding 70 gpm has been established without the use of the WWAT.**[13]		Producer's verbal indication of compliance with regulation.

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Water Well Condition (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
2.20) Is a horizontal sock well (HSW) present at the greenhouse?	- HSW outlets are clearly identified as not being suitable for human consumption. - HSW is completely separated (no common piping) from any potable water supply system. - HSW meets isolation distance requirements the entire horizontal length of the HSW. - Both ends of the HSW are identified.	- HSW outlets are clearly identified as not being suitable for human consumption. - HSW is completely separated (no common piping) from any potable water supply system. - HSW meets isolation distance requirements the entire length of the HSW, except for chemigation/ fertigation systems during active use season that have a Reduced Pressure Zone (RPZ), double check valve assembly or chemigation valve with an internal air gap installed and secondary containment. - Both ends of the HSW are identified.	**HSW is being used for human consumption, shares common piping with a potable water supply, does not have both ends clearly identified, or does not meet State of Michigan isolation distances,** or MAEAP Standard, **for its entire horizontal length**.[1,3]		Low or medium risk criteria are present or demonstrated.

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Pesticide Storage and Handling

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
3.01) How far is the pesticide storage located from any water well (Private wells include irrigation, livestock watering, cooling, etc.)? Type IIb and Type III (Public wells include wells that service the milkhouse, bathrooms, drinking fountains, etc. on greenhouse sites with employees). Use Table 1 in FAS107 for well type identification.	For private wells: 150 feet or greater. Or, with secondary containment 50 feet or greater. For public wells (greenhouse with employees or that is open to the public): more than 800 feet from the farm well. Or, approved isolation distance deviation for the well. Or, between 75 and 800 feet with approved storage and well protective site features.* For Type IIa public wells, refer to FAS 112S.		For private wells: **Less than 150 feet without secondary containment, or less than 50 feet with secondary containment**.[1] For public wells: (greenhouse with employees or that is open to the public): **Less than 800 feet from the farm well**.[3]		Appropriate pesticide storage isolation distance for site characteristics.
3.02) How far is the pesticide storage located from surface water (drains, streams, ponds, catch basins on site, etc.)?	***200 feet or greater***.	Less than 200 feet with appropriate security measures.	Less than 200 feet.		Appropriate pesticide storage isolation distance from surface water.
3.03) How are pesticides delivered to the greenhouse?	Just-in-time delivery provided by dealer or greenhouse employee to mix/load site.	Responsible, trained farm employee or family member or dealer transports pesticides to storage.	Untrained greenhouse employee or family member transports pesticides.		
3.04) Where are pesticides stored?	Storage building is locked and separate from all other buildings.	Storage is within the headhouse or greenhouse but isolated and locked.	Storage is in high-traffic area and unlocked.		

* See MAEAP water stewardship technician for additional information on criteria for reduced isolation distances.

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Pesticide Storage and Handling (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
3.05) What design features does the pesticide storage have to contain spills and leaks?	Impermeable floor surface does not allow spills to soak into soil. Curb installed on floor to contain leaks and spills or provide individual package containment.	Impermeable floor surface without curb.	Permeable floor surface (wood, gravel or dirt floor) or impermeable floor with cracks. Spills could contaminate soil. **Drain in the floor that directly discharges to surface water**.[4]		Adequate secondary containment for pesticide storage.
3.06) What type of pesticide storage shelving is used?	Metal or plastic shelving, with shelf lips to prevent containers from falling. And, Dry formulations are stored on upper shelves and liquids on lower shelves.	Metal or plastic shelves without lips. Or, Wood shelves, covered with epoxy paint or plastic liner.	Bare wood shelving without lips. Or, No shelves, pesticides containers are on the floor where they may be damaged.		
3.07) What level of security is provided for the pesticide storage?	Fenced or locked area, ***secure from unauthorized access***. Storage separate from all other activities.	Storage open to activities that could damage containers or spill chemicals.	**Open access to pesticide storage could result in theft, vandalism, and injury to children, pets or wildlife**.[19]		Adequate pesticide storage security.
3.08) What signage is posted on the storage facility?	***A highly visible, weather-proof sign indicates that pesticides are stored there. A "No Smoking" sign is also posted***.	Pesticide storage sign is posted, but "No Smoking" sign is not posted.	The pesticide storage has no signs.		Pesticide storage signage present.
3.09) What kind of spill kit is available at the pesticide storage?	***A complete spill kit is immediately available. A fire extinguisher approved for chemical fires is easily accessible*** and usable.	***Spill kit is immediately available***, but no fire extinguisher.	**A spill kit is not available**.[6] A fire extinguisher is not available.		Spill kit with fire extinguisher present at pesticlde storage.

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Pesticide Storage and Handling (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
3.10) What total quantities of pesticides are stored on the greenhouse site?	No pesticides stored at any time, or only seasonal use storage.	One gallon to ten pounds or more of each pesticide in long-term storage.	More than 56 gallons or more than 55 pounds of each pesticide in long-term storage.*		
3.11) What quantities of liquid pesticides are stored?	No liquids – all dry formulations.	Some liquid formulations stored.	More than 55 gallons of liquid formulations stored.*		
3.12) Are pesticides with high leaching potential stored?	No pesticides stored, or only pesticides with low leaching potential.	Pesticides with low and medium leaching potential stored.	Pesticides with high leaching potential stored.		
3.13) Have Extremely Hazardous Substances (EHS) been reported to authorities?	No EHS stored or used.	EHS stored or used on farm have been identified and reported to local and state authorities (if stored at or above threshhold planning quantity).	**EHS stored or used at the greenhouse have NOT been identified or reported**.[18]		Records indicate EHS names have been shared with authorities or that EHS are not used at the greenhouse.
3.14) What is the condition of stored pesticide containers?	***Original containers clearly labeled or containers appropriate for pesticide storage that are properly labeled***. No holes, tears or weak seams.	Old containers with hard to read labels. Patched containers, metal containers showing signs of rusting.	Containers have holes or tears that allow chemical to leak. **Some containers have no labels**.[17]		Stored pesticides in satisfactory condition with labels attached.
3.15) How are pesticide inventory control and disposal of unwanted products managed?	Pesticides accurately inventoried. Old product used first. Unusable product disposed of through Clean Sweep program.	Some inventory process maintained. Unsure of status of unusable product in storage.	No pesticide inventory maintained. Unusable product maintained in storage for indefinite time.		

* Producers who store certain bulk pesticides in containers that exceed 10 gallons or 100 pounds may be subject to additional regulation.[4]

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Pesticide Storage and Handling (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
3.16) Is there a written emergency plan to deal with spills and other farm emergencies?	Up-to-date plan developed and shared with authorities (if required), employees and family members.	More than one-year-old plan or an incomplete plan is available.	An emergency plan has not been developed.		Up-to-date emergency plan.
3.17) Is there a written pesticide drift management plan for applications made at the farmstead?	***A written drift management plan is utilized that minimizes off-target drift.***	Pesticide applications follow labeled instructions for target pests, but no drift management plan is utilized.	**Spraying operations are completed regardless of weather conditions or forecast, and regardless of the potential of off-target drift.**[17]		A written drift management plan.
3.18) How far is the mixing and loading area from any water well (Private wells include irrigation, livestock watering, cooling, etc.)? Type IIb and Type III (Public wells include wells that service the milkhouse, bathrooms, drinking fountains, etc. on greenhouse sites with employees). Use Table 1 in FAS107 for well type identification.	For private wells: - 150 feet or greater. Or, with secondary containment 50 feet or greater. For public wells (greenhouse with employees or that is open to the public): - More than 800 feet from the greenhouse well. Or, - Approved isolation distance deviation for the well. Or, - Between 75 and 800 feet with approved storage and well and protective site features. For Type IIa public wells, refer to Fas 112S.		For private wells: **Less than 150 feet without secondary containment, or less than 50 feet with secondary containment.**[1,3] For public wells (greenhouse with employees or that is open to the public): **Less than 800 feet from the greenhouse well.**[3]		Appropriate mixing and loading area isolation distance for site characteristics.

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Pesticide Storage and Handling (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
3.19) How far is the mixing and loading area from surface water or catch basins?	***200 feet or greater.***	Less than 200 feet with appropriate security measure.	Less than 200 feet, without appropriate security measures.		Appropriate mixing and loading area isolation distance from surface water.
3.20) How is the potential reduced for surface and groundwater contamination at the mix/load areas(s)?	Mixing and loading pad with curb keeps spills contained. Sumps allow collection and transfer to storage.	Mixing and loading on concrete pad without curbs.	No mixing and loading pad. Permeable soil. Spills soak into ground. Same location every time.		Satisfactory explanation of mixing and loading procedures.
3.21) How is backflow or back siphoning of pesticide mixtures into the water supply prevented?	***Anti-backflow device installed***, including a reduced pressure zone (RPZ) valve, double check valve assembly, or chemigation valve with an internal air gap, and six-inch ***air gap maintained above level of liquid in sprayer tank***. Air gap is twice the diameter of the fill pipe or six inches, whichever is greater.	Either an ***anti-backflow device installed***, including an RPZ valve, double check valve assembly, or chemigation valve with an internal air gap, or six-inch ***air gap maintained above level of liquid in sprayer tank***. Air gap is twice the diameter of the fill pipe or six inches, whichever is greater.	**Neither an anti-backflow device installed, nor an air gap maintained**.[1,6]		Anti-backflow device installed, including an RPZ valve, double check valve assembly, or chemigation valve with an internal air gap, or air gap present or demonstrated.
3.22) How are tank overflows prevented when filling the sprayer?	***Sprayer monitored when being filled***.		Sprayer seldom or never monitored when being filled.		Satisfactory explanation of spray tank filling procedures.
3.23) How are pesticides, additives and water quantities measured when loading the sprayer system?	***Measuring devices*** labeled and ***kept in pesticide storage area. Devices rinsed and rinse water put into spray tank***. Tank capacities labeled.		A variety of unlabeled measuring devices used. Devices may be used for other purposes. Tank capacities not identified.		Set of dedicated measuring devices for pesticides. Spray tank capacities labeled.

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Pesticide Storage and Handling (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
3.24) How are pesticide products transferred from their containers to the sprayer tank?	Closed system for all liquid and dry product transfers.	All liquid and dry products hand-poured. Mixing/storage tank opening easy to reach.	All liquid and dry products hand-poured. Mixing/storage tank opening hard to reach.		
3.25) What is done with excess spray mixture?	***Spray mixture applied to labeled site at or below labeled rate of application***.		**Spray mixture dumped in greenhouse or in nearby area or pond**.[4,6]		Satisfactory explanation of procedures for excess spray mixtures.
3.26) How is the sprayer system rinsed?	***Sprayer system rinsed on pad or in field. Rinse water applied to labeled site at or below labeled rate of application.***		Sprayer rinsed out at greenhouse. **Rinse water dumped in greenhouse or in nearby area or pond**.[4,6]		Satisfactory explanation of procedures for rinsing sprayer system.
3.27) How is the exterior of the sprayer cleaned?	Sprayer washed on pad. Wash water collected and applied to labeled crop.		Sprayer washed at greenhouse site. **Rinse water dumped in greenhouse or in nearby area or pond**.[4,6]		
3.28) How are empty pesticide containers rinsed and disposed?	***Containers are triple rinsed or power rinsed, punctured*** and returned to dealer, or disposed of in a licensed landfill. Bags are returned to dealer or taken to licensed landfill. Properly rinsed containers can be disposed in a dumpster that is taken to a licensed landfill.	**Disposal of empty containers and bags on the farm property**.[8]	**Disposal of partially filled containers. Burning of containers on the greenhouse site**.[5,8]		Rinsed jugs stockpiled for recycling or landfilling. No unrinsed jugs at greenhouse.
3.29) What type of pesticide containers are purchased?	Where available, all pesticide products are purchased in recyclable or returnable containers to reduce the number of empty containers that require disposal.	Some pesticide products are purchased in recyclable or returnable containers.	Most pesticides are purchased in containers that require special handling or treatment before disposal.		

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Pesticide Handler and Worker Safety

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
4.01) How are pesticide handlers/workers trained on pesticide use and handling?	***All handlers/workers are certified pesticide applicators or have had Worker Protection Standard (WPS) training***.		**Handlers/workers are not certified pesticide applicators and have not had WPS training**.[21]		Evidence of pesticide applicator certification or WPS training.
4.02) How are handlers/ workers informed of risks associated with pesticide applications?	***Central notification of pesticide applications is provided. Display includes EPA-approved safety poster, emergency medical information and pesticide application information***.	**Central notification provided, although not all posting requirements are met**.[19]	**No central notification provided**.[21]		
4.03) What supplies are provided to handlers/ workers for pesticide decontamination?	***Clean water, soap, disposable towels and clean coveralls (handlers) are available for all handlers/workers within 1/4 mile of worksite.***	**A decontamination site is provided, although not all Worker Protection Standard requirements are met.**[19]	**A decontamination site is not available**.[21]		
4.04) How are workers notified of pesticide applications?	***Oral and/or posted warnings about pesticide application provided***.		**No notice about pesticide application provided**.[21]		
4.05) Who provides and maintains personal protective equipment (PPE) and trains handlers in its use?	***All label-required PPE provided and maintained by employer. Training on use of PPE provided***.	**Worker Protection Standard requirements for PPE partially met**.[19]	**PPE not provided**.[21]		

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Fertilizer Storage and Handling

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
5.01) How far is the fertilizer or sulfuric acid storage located from any water well (Private wells include irrigation, livestock watering, cooling, etc.)? Type IIb and Type III (Public wells include wells that service the milkhouse, bathrooms, drinking fountains, etc. on the greenhouse site with employees) Use Table 1 in FAS107 for well type identification.	For private wells: - 150 feet or greater. Or, - With secondary containment: 50 feet or greater. Or, For public wells (greenhouse with employees or that is open to the public): - More than 800 feet from the greenhouse well. Or, - Approved isolation distance deviation for the well. Or, - Between 75 and 800 feet with approved storage and well and protective site features.* For Type IIa public wells, refer to FAS 112S.		For private wells: **Less than 150 feet without secondary containment, or less than 50 feet with secondary containment**.[1] For public wells: (greenhouse with employees or that is open to the public): **Less than 800 feet from the farm well**.[3]		Appropriate fertilizer storage isolation distance for site characteristics.
5.02) How far is the fertilizer storage located from surface water (drains, streams, ponds, catch basins on farmstead, etc.)?	***200 feet or greater***.	Less than 200 feet with appropriate security measures.	Less than 200 feet.		Appropriate fertilizer storage isolation distance from surface water.

* See MAEAP water stewardship technician for additional information on criteria for reduced isolation distances.

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Fertilizer Storage and Handling (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
5.03) Is the fertilizer storage facility (both liquid and dry) identified with a sign?	Storage facility labeled "Fertilizer," or the fertilizer containers labeled with fertilizer analysis.	No sign.			Note: Bulk liquid fertilizer storages installed after August 13, 2008, having a capacity greater than 2,500 gallons, or having combined capacity of all tanks greater than 7,500 gallons, must be located 200 feet or more from surface water.
5.04) What level of security is provided for the fertilizer storage?	***Fertilizer storage areas, valves, and containers are secured when not in use.***	Appropriate conditions are partially met.	Fertilizer storage facilities are not locked or secured by any means. Open access to theft, vandalism and children exists.		Adequate fertilizer storage security.
5.05) Is fertilizer stored in the direct presence of fuel products?	No. Fertilizer is not stored in the direct presence of fuel products.		Yes. Fertilizers and fuel products are stored together – posing an increased potential for explosions and significant disposal problems.		
5.06) How often is the fertilizer storage area inspected for safety concerns?	***At least annually.***		No regular inspections of the storage facility.		Evidence fertilizer storage is inspected at least annually.
5.07) Is there a written emergency plan to deal with fertilizer spills, discharges and other emergencies?	Up-to-date plan developed and shared with authorities (if required), employees and family members.	More than one-year-old plan or an incomplete plan is available.	An emergency plan has not been developed.		Up-to-date emergency plan.

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Fertilizer Storage and Handling (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
5.08) Is there secondary containment for liquid fertilizer stored on the farm?	All liquid fertilizer is stored with secondary containment.	Containers with greater than 2,500-gallon capacity or all containers located at a single site with a combined total capacity of greater than 7,500 gallons have secondary containment.	**Containers with greater than 2,500-gallon capacity or all containers located at a single site with a combined total capacity of greater than 7,500 gallons do not have secondary containment.**[18]		Satisfactory liquid fertilizer secondary storage containers, if required.
5.09) What kind of structure is used for dry fertilizer storage?	***A structure or device capable of preventing contact with*** irrigation***, precipitation and/or surface water***.		Storage allows fertilizer contact with precipitation and/ or surface water.		Satisfactory dry fertilizer storage facilities.
5.10) What is the condition of storage tanks, hoses, valves, injectors and fittings used for liquid fertilizer?	***Tanks, hoses, fittings and valves are*** in good condition, well maintained and ***compatible with the fertilizer being stored***.	Tanks, hoses, fittings and valves have some rust or signs of wear. Tanks were previously used for underground petroleum storage and are in good condition and in secondary containment.	Rusty, aged, worn, damaged or leaking storage tanks, hoses, fittings or valves **directly discharging to surface waters**,[4] or use of underground petroleum tanks without secondary containment.		Satisfactory condition of liquid fertilizer storage system.
5.11) How is backflow or back siphoning of fertilizer mixtures into the water supply prevented?	***Anti-backflow device installed***, including a reduced pressure zone (RPZ) valve, double check valve assembly, or chemigation valve with an internal air gap, and six-inch ***air gap maintained above level of liquid in sprayer tank***. Air gap is twice the diameter of the fill pipe, or six inches, whichever is greater.	Either an ***anti-backflow device installed***, including an RPZ valve, double check valve assembly, or chemigation valve with an internal air gap, or six-inch ***air gap maintained above level of liquid in sprayer tank***. Air gap is twice the diameter of the fill pipe, or six inches, whichever is greater.	**Neither an anti-backflow device installed, nor an air gap maintained**.[1,4]		Anti-backflow device, including an RPZ valve, double check valve assembly, or chemigation valve with an internal air gap present. Records of at least annual testing.

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Fertilizer Storage and Handling (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
5.12) What is done with excess fertilizer solutions at the end of the greenhouse season?	Fertilizer solutions applied to crop at or below agronomic rate. Or, Excess fertilizer concentrates returned to dealer.	Excess fertilizer stored until next year.	Excess fertilizer solutions applied to crop without agronomic considerations. **Fertilizer solution dumped on the greenhouse site or in nearby field or pond**.[4,6]		
5.13) How far is the mixing and loading area from the water well (Private wells include irrigation, livestock watering, cooling, etc.)? Type IIb and Type III (Public wells include wells that service the milkhouse, bathrooms, drinking fountains, etc., on the greenhouse site with employees). Use Table 1 in FAS107 for well type identification.	For private wells: 150 feet or greater. Or, with secondary containment 50 feet or greater. For public wells (greenhouse with employees or that is open to the public): more than 800 feet from the greenhouse well. OR, Approved isolation distance deviation for the well. OR, Between 75 and 800 feet with approved storage and well and protective site features.* For Type IIa public wells, refer to FAS 112S.		For private wells: **less than 150 feet without secondary containment, or less than 50 feet with secondary containment**.[1] For public wells (greenhouse with employees or that is open to the public): **less than 800 feet from the greenhouse well**.[3]		Appropriate mixing and loading area isolation distance for site characteristics.
5.14) How far is the mixing and loading area from surface water?	***200 feet or greater***.	Less than 200 feet with appropriate security measures.	Less than 200 feet, without appropriate security measures.		Appropriate mixing and loading area isolation distance from surface water.

* See MAEAP water stewardship technician for additional information on criteria for reduced isolation distances.

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Petroleum Product Storage and Management

This section is designed to help meet environmental concerns related to petroleum storage; it is not intended to represent all of the legal requirements for storage and handling of petroleum products on the farm.

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
All petroleum storage facilities					
6.01) Are fuel storage tanks designed for the way they're being used and compatible with the material stored?	Each tank designed for the way it is being used and compatible with the material stored.		**Belowground tank being used for aboveground petroleum storage, aboveground tank being used for underground petroleum storage or tank does not meet specifications for usage.**[15]		Fuel tanks used appropriately.
6.02) Are fuel storage piping, secondary containment and related equipment designed for the way they're being used and compatible with the material stored?	Fuel storage piping and equipment designed for the way they are being used and compatible with the material stored.		Fuel storage piping or equipment not designed for the way it is being used. **Belowground piping on all underground tanks or aboveground tanks of greater than 1,100 gallon capacity, not corrosion protected.**[15]		Fuel storage equipment appropriate for use.
6.03) Are fuel tanks monitored for leaks and are leaks repaired?	Owner and operator ensure that releases do not occur.		Tank and piping not monitored and repaired on aboveground tanks equal to or less than 1,100 gallons capacity. **Tank and piping not monitored and repaired on all tanks greater than 1,100 gallons capacity.**[15]		No fuel leaks present.

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Petroleum Product Storage and Management (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
All petroleum storage facilities (continued)					
6.04) What design features does the fueling station have to prevent spills from entering the groundwater, surface water or subsurface soils?	Impermeable and compatible surface for fuel transfer such as concrete without cracks.	Compatible surface for fuel transfer such as asphalt for diesel fuel, sealed asphalt for gasoline, steel or other compatible liner material.	Incompatible surface such as unsealed asphalt surface, for gasoline.[15]		Impermeable or compatible surface present for fuel transfer.
6.05) Is the fill opening separate from the vent opening?	Yes.		**No**.[15]		

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Petroleum Product Storage and Management (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
All petroleum storage facilities (continued)					
6.06) How far is the fuel storage from any water well (Private wells include irrigation, livestock watering, cooling, etc.)? Type IIb and Type III (Public wells include wells that service the milkhouse, bathrooms, drinking fountains, etc., on the greenhouse site with employees.) Use Table 1 in FAS107 for well type identification.	For private wells: - 50 feet or greater for tanks less than 1,100 gallon-capacity with no secondary containment, OR, - 300 feet or greater for tanks greater than 1,100 gallon capacity or more with no secondary containment, OR, - 50 feet or greater for tanks greater than 1,100 gallon capacity or more with secondary containment. For Type III or Type IIb public wells: - More than 800 feet from the farm well, OR - Approved isolation distance deviation for the well, OR - No less than 75 feet for a Type IIB or III well if secondary containment, and site and well protective features are present.* For Type IIa public wells, refer to FAS 112S.		For private wells: **Less than 50 feet for most storage tanks.** **Less than 300 feet for tanks greater than 1,100 gallon capacity without secondary containment.**[15] For public wells (dairy farms or farms with employees): **Less than 800 feet from the farm well without an approved deviation, protection features or secondary containment**.[3]		Appropriate fuel storage isolation distance from water well.

* See MAEAP Water stewardship technician for additional information on criteria for reduced isolation distances.

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Petroleum Product Storage and Management (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
All petroleum storage facilities (continued)					
6.07) Does the tank have secondary containment?	Double-walled tank with continuous space between the two walls, tank in concrete vault or tank in diked area.	No secondary containment for tanks equal to or less than 1,100 gallons capacity.	No secondary containment when combined aboveground storage capacity is 2,500 gallons (55-gallon containers or larger) **or an individual aboveground tank is greater than 1,100 gallons**.[15]		
6.08) If a combined aboveground petroleum storage capacity of greater than 2,500 gallons (counting 55-gallon containers and greater) is present and could reasonably discharge into navigable waters of the United States, has a spill prevention control and counter-measure (SPCC) plan been developed?	Plan developed and copy present at farm facility.		**No plan**.[22]		
6.09) What is the maximum fuel storage capacity (in aggregate) on the farm?	48,000 gallons or less of gasoline or 80,000 gallons or less of diesel, in UL 142 single- or double-walled tanks.		**Greater than 48,000 gallons of gasoline, or 80,000 gallons of diesel, in UL 142 single- or double-walled tanks.**[15]		
Motor vehicle fuel storage tanks with capacity equal to or less than 1,100 gallons					
6.10) Does each tank's fill opening have a lockable closure?	Fill pipe equipped with lockable closure.		**No lockable closure on fill pipe**.[15]		

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Petroleum Product Storage and Management (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
Motor vehicle fuel storage tanks with capacity equal to or less than 1,100 gallons (continued)					
6.11) How far is the tank from a storm drain, surface water or designated wetland?	Tank is more than 50 feet away or has some other engineering control present that would control or divert a spill from reaching a storm drain, surface water or designated wetland.		**Tank 50 feet or less.**[15]		Appropriate fuel storage isolation distance from surface water.
6.12) For tanks <1,100 gallons, how far is the (non-fire protected) tank from buildings and property lines?	- More than 40 feet from a building or a structure.		**- Located inside a building.** **- 40 feet or less from a building, or a structure.**[15]		
6.13) How many tanks (equal to or less than 1,100 gallons) are at each site at one facility?	Three or fewer.	More than three.			
6.14) How far apart are the fueling sites at the facility?	100 feet or greater.	Less than 100 feet.			
6.15) Are the portable fueling tank and transfer system adequate to reduce risk of environmental contamination?	UL-approved tank and adequate fueling system.	Adequate portable fueling system that reduces risks.	Inadequate portable fueling system that poses risk of environmental contamination.		Adequate portable fueling system.

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Petroleum Product Storage and Management (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
Motor vehicle fuel storage tanks with capacity equal to or less than 1,100 gallons (continued)					
6.16) Do mobile fuel tanks meet the Federal Hazardous Materials Regulations (FHMR) and United States Department of Transportation (USDOT) specifications?	Yes, the mobile fueling system meets the FHMR including USDOT specifications or USDOT specifications do not apply because the tank is less than 502 gallons, and only goes from farm to field and is properly secured and free from leaks.		No, the tank poses an environmental risk.		Meeting USDOT specifications includes having shipping papers, tank markings and placards. See FAS 112S.
Aboveground tanks					
6.17) Is the tank labeled according to its contents with letters three inches or more in height?	Yes, labeled according to contents (gasoline or diesel) and with the following: "FLAMMABLE" (OR "COMBUSTIBLE") and "KEEP FIRE AND FLAME AWAY." If tank is not a fire-protected type, it is also labeled: "KEEP 40 FEET FROM BUILDINGS."		**Tank labeled with contents. Tanks storing gasoline not labeled: FLAMMABLE – KEEP FIRE AND FLAME AWAY. Tanks storing diesel not labeled: COMBUSTIBLE – KEEP FIRE AND FLAME AWAY**.[15]		
6.18) Is the tank elevated off the ground to protect from corrosion?	Tank stably mounted on solid timbers, solid cement blocks, manufactured cradles or equivalent to protect the tank bottom from corrosion due to contact with ground. The tank is elevated to allow for a visible inspection of all tank surfaces.		**Tank not stably elevated in order to allow adequate visible inspection of all tank surfaces**.[15]		Appropriate tank elevation.

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Petroleum Product Storage and Management (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
Aboveground tanks (continued)					
6.19) Are siphons, manifolds or internal pressure discharge devices present on tank(s)?	Siphons not present on tank(s). Multiple tanks not connected together (no manifold). No internal pressure discharge device present.	Manifold(s) present on tanks installed prior to 2003. After 2003, tanks that are located within diked containment, equipped with a spill bucket and audible overfill alarm may have top-only manifolds.	**Siphons or internal pressure discharge device(s) present on tanks installed after 2003**.[15]		No siphons or internal pressure discharge devices present. No manifolds present on tanks installed after 2003 unless additional protection factors are present.
6.20) Is the tank dispenser (top-opening tank) or discharge connection (gravity discharge tank) made inoperable when not in use?	Yes, locked or otherwise made inoperable.		**No**.[15]		
6.21) Does the top-opening tank pump discharge or gravity discharge tank have a self-closing nozzle?	Yes.		**No**.[15]		
6.22) If a single-walled tank is in a dike with rain protection, are the roof or canopy and supports constructed of noncombustible material and designed so vapors don't collect?	Yes.		**No, combustible materials used or design is such that vapors collect under the roof or canopy**.[15]		
6.23) If the tank is covered, are roof and canopy supports located on edge of dike or outside diked area?	Yes.		**No**.[15]		

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Petroleum Product Storage and Management (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
Aboveground tanks (continued)					
6.24) If the tank is covered, is the lowest elevation of the roof or canopy six feet or higher above the top of the tank?	Yes.		**No**.[15]		
6.25) If the tank is covered, does the normal tank vent extend through the roof or canopy?	Yes.		**No**.[15]		
Underground tanks					
6.26) Has the underground fuel tank (installed before August 1, 2003, with a capacity of less than 1,100 gallons) been tested for leaks within the past three years?	No leaks detected.		No testing.		Appropriate report indicates no leaks present.
6.27) Does the underground storage tank (installed after August 1, 2003, with a capacity of less than 1,100 gallons) meet Flammable Liquid Combustible Liquid (FLCL) rules?	Yes. Leak detection system in place, tank has corrosion protection. Spill bucket installed and overflow prevention in place (alarm or shutoff valve).		**FLCL rules not met**.[15]		Tank meets FLCL rules.

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Petroleum Product Storage and Management (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
Underground Tanks (continued)					
6.28) Do tank(s) or piping that are in contact with the soil have corrosion protection on all parts?	Yes, properly engineered, installed, maintained and inspected (every three years). Corrosion protection provided for tank, piping or portions in contact with the soil.		**Tank or piping in contact with soil without corrosion protection or unmaintained protection. Not inspected at least once every three years.**[15]		
6.29) Are there any unused fuel storage tanks on the farm?	If tank present, it has been emptied, cleaned of liquid and sludge, rendered vapor free and safeguarded from trespassing.		**Tank present and not empty, clean and/or vapor free. Tank fill opening not secured to prevent trespassers from putting chemicals in tank.**[15]		
Farm motor vehicle fuel storage tanks with capacity greater than 1,100 gallons					
6.30) Is the tank registered and is valid proof of registration available?	The aboveground storage tank with capacity greater than 1,100 gallons is registered, and valid proof of registration is available.	The total volume of fuel storage on site is less than 10,000 gallons. **The aboveground tank is not registered, or valid proof of registration is not available,**[15] but an inspection finds it meets all applicable boxed MAEAP requirements in the Petroleum Products Storage and Management Section.	**Tank is not registered and/ or the tank does not bear a UL tag, and/or valid proof of registration is not available.**[15]		
6.31) Does the tank fill pipe have spill protection?	Spill protection (catch basin) installed and maintained on tank fill pipe.		**Tank fill pipe does not have spill protection.**[15]		Catch basin installed on fuel tank.

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Petroleum Product Storage and Management (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
Farm motor vehicle fuel storage tanks with capacity greater than 1,100 gallons (continued)					
6.32) Is there an emergency control disconnect for electrically operated fueling systems?	Emergency control disconnect located 20 to 100 feet away from dispensing area.		**No emergency control disconnect present**.[15]		Appropriate disconnect control present.
6.33) Are there absorbent materials, a container with lid and a non-metallic shovel to deal with a petroleum spill?	Spill kit present.		**No spill kit**.[15]		Spill kit present.
Aboveground storage tanks with capacity greater than 1,100 gallons					
6.34) Does the tank have secondary containment?	Double-walled tank or tank within diked area.		**No secondary containment**.[15]		Appropriate secondary containment.

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Petroleum Product Storage and Management (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
Aboveground storage tanks with capacity greater than 1,100 gallons (continued)					
6.35) How far is the tank from buildings, property lines and public ways? In-vault tank up to 15,000 gallons: Protected aboveground tank (UL 2085 tank) 6,000 gallons or less: UL 2085 tank 6,000 to 12,000 gallons or less: UL2080 tank 0-12,000 gallons: Other secondary containment tank up to 12,000 gallons:	From bldg. / From lot line / From public way 0 feet / 0 feet / 0 feet 5 feet / 15 feet / 5 feet 15 feet / 25 feet / 10 feet 25 feet / 50 feet / 25 feet 50 feet / 100 feet / 50 feet		**Less than distance indicated for type of tank.**[15]		
6.36) Is there a fence to prevent unauthorized entry?	Tank or property fenced or tank within vault with entry protected from unauthorized entry or vandalism.		**Unprotected from unauthorized entry.**[15]		
6.37) Is there crash protection for the tank and piping?	Guard posts or appropriate barrier installed for crash protection.		**No crash protection.**[15]		Crash protection present for fuel tank.
6.38) Is the tank labeled according to its contents with letters three inches or more in height?	Yes, labeled according to contents (gasoline or diesel) and with the following "FLAMMABLE (or COMBUSTIBLE) LIQUIDS" and "KEEP FIRE AWAY."		**Tank not labeled.**[15]		

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Petroleum Product Storage and Management (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
Aboveground storage tanks with capacity greater than 1,100 gallons (continued)					
6.39) Are there any unused fuel storage tanks on the farm?	If aboveground tank present, it has been emptied, cleaned of liquid and sludge, rendered vapor free and safeguarded from trespassing.		**Aboveground tank present and not empty, clean and/or vapor free. Tank fill opening not secured to prevent trespassers from putting chemicals in tank.**[15]		
Underground tank with capacity greater than 1,100 gallons					
6.40) Is the underground tank registered, and is valid proof of registration available?	The underground storage tank with capacity greater than 1,100 gallons is registered, and valid proof of registration is available.		**The tank is not registered, and/or proof of registration is not available.**[15]		Underground storage tank is registered.
6.41) If there is an underground fuel storage tank greater than 1,100 gallons on the farmstead is there a State of Michigan certified operator for the farm?	Yes.		**No.**[15]		
6.42) Did a professional (trained and certified by the tank manufacturer) install the tank?	Professional installation.		**No.**[15]		
6.43) Is there insurance or demonstration of financial responsibility should there be a fuel release?	Yes, meet the $500,000 financial responsibility level for tanks less than 10,000 gallons.		**Unable to demonstrate financial responsibility for third-party injury and property damage due to accidental release.**[15]		

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Petroleum Product Storage and Management (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
Underground tank with capacity greater than 1,100 gallons (continued)					
6.44) Are there any unused underground fuel storage tanks on the farm?	No, tanks have been removed from the ground and the site. Excavation site checked for evidence of contamination (site assessment). Any contamination present was properly handled.	Underground tanks have been removed or filled with inert solid material. A site assessment has not been completed.	**In-ground tank has been left unused for 12 months. Tanks greater than 1,100 gallons have been removed or filled with inert material but a site assessment has not been completed.**[15]		Proper management of unused underground fuel storage tanks.
Other petroleum product storage					
6.45) Is the heating oil tank for a farm building being used as designed?	Tank is labeled and used as designed.	Tank is not labeled and used outdoors.	Tank is not being used as designed.		Heating oil storage tank is appropriate.
6.46) 6.46) Is a heating oil tank being used to store diesel fuel?	Yes, but tank is labeled as a UL 80 tank and is being used as designed.		Tank is not labeled or is not being used as designed.		Diesel fuel storage tank is appropriate.
6.47) How far is the home heating fuel or kerosene tank from a building?	Minimum of five feet from the building.		Less than five feet.		

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Petroleum Product Storage and Management (continued)					
Risk question	**Low risk – 3 (recommended)**	**Medium risk – 2 (potential hazard)**	**High risk – 1 (significant hazard)**	**Your risk**	**Records or evidence for MAEAP verification**
Other petroleum product storage (continued)					
6.48) How far is the fuel tank for the emergency generator from any well?	For private and public wells: Close proximity to the well if the emergency generator provides power to the well in the event of a power outage, and the fuel is in secondary containment. If the emergency generator is not used to run the well, standard well isolation distance criteria applies.		The emergency generator does not run and well does not meet standard well isolation distance. For private wells: **Less than 50 feet for most fuel tanks**.[1] For public wells: **Less than 800 feet from the well without an approved deviation protection features or secondary containment**.[3] **Less than 75 feet with fuel in secondary containment**.[3]		Acceptable fuel storage isolation distance from water.
Waste Management					
7.01) How are household waste and waste generated at the greenhouse managed?	All waste recycled or disposed of in a licensed solid waste facility or incinerator.		Household waste burned on site (if allowed by local government). **Greenhouse waste burned on site**.[8]		
7.02) Is there a trash dump?	No dump or dump property cleaned up and closed.	Dump exists but is not being used.	Dump still in use.		
7.03) If a household trash burn barrel or incinerator exists, how are the ashes disposed?	Ashes collected and disposed at a licensed landfill.	Ashes stored or disposed on the greenhouse site more than 300 feet from a well or surface water.	Ashes stored or disposed on the greenhouse site within 300 feet of a well or surface water.		

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Waste Management (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
7.04) How are hazardous product containers (treated seed packages, fertilizer bags, chemical containers, etc.) disposed?	Recycled or reused appropriately. Or, Disposed at a licensed landfill, or hazardous waste collection service used, or returned to the dealer.		**Empty and partially filled containers burned or disposed on the greenhouse site.**[8]		
7.05) How is waste oil disposed?	Recycled.	Burned in approved waste oil heater or furnace.	**Dumped on the greenhouse site.**[7]		Evidence of proper oil recycling or disposal.
7.06) How is antifreeze disposed?	Recycled	Disposed of in municipal sewer (with municipality's approval).	**Dumped on the greenhouse site.**[7]		Evidence of proper antifreeze recycling or disposal.
7.07) How are scrap tires disposed?	Recycled.		**Disposed on the greenhouse site.**[11]		
7.08) How are lead-acid batteries disposed?	Recycled.		**Disposed** or stored **on the greenhouse site.**[7]		Evidence of proper battery recycling.
7.09) How are paints, solvents and/or cleaners disposed?	Used up, taken to household hazardous waste collection or recycled.	Liquid evaporated in open air, sludge taken to licensed landfill.	**Burned or disposed** or stored **on the greenhouse site.**[7]		Evidence of proper recycling or disposal.

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Waste Management (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
7.10) How far from water wells are hazardous products stored? (Private wells include irrigation, livestock watering, cooling, etc.) Type IIb and Type III (Public wells include wells that service the milkhouse, bathrooms, drinking fountains, etc. on the greenhouse site with employees). Use Table 1 in FAS107 for well type identification.	For private wells: 150 feet or greater. Or, With secondary containment, 50 feet or greater. Or, For public wells (dairy farms or farms with employees): More than 800 feet from the farm well. Or, Approved isolation distance deviation for the well. Or, Between 75 and 800 feet with approved storage and well, and protective site features.* For Type IIa public wells, refer to FAS 112S.		For private wells: **Less than 150 feet without secondary containment, or less than 50 feet with secondary containment**.[1] For public wells (dairy farms or farms with employees): **Less than 800 feet from the farm well**.[3]		
7.11) Are used motor oil, new oil and hydraulic oil stored in acceptable containers and properly isolated from drinking water wells?	Oil in acceptable containers stored on impermeable floor or in secondary containment, and with reasonable isolation from any well and does not discharge to surface water.	Oil stored in acceptable containers, but with inadequate isolation from any well and does not discharge to surface water.	Oil stored in a leaking container. Evidence of oil soaking into the soil **and/or discharging to surface water**.		Acceptable oil storage demonstrated.
7.12) Are floor drains present in buildings?	No floor drains. Or, all drains go to an appropriate system designed for the materials drained.	Floor drains are made inoperable except when used for appropriate materials, or materials are stored in secondary containment to prevent leaks from entering drain.	**Floor drains are discharged to surface water**[4], are vulnerable to spills, or **drain hazardous materials to inappropriate systems**.[4]		Quantities of hazardous materials stored in secondary containment or floor drains plugged to prevent spills or major losses from entering the drain.

* See MAEAP water stewardship technician for additional information on criteria for reduced isolation distances.

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Waste Management (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
7.13) Are there mercury-containing devices on the farm? (Examples include fluorescent lights, thermostats, thermometers, irrigation switches, septic lift station switches and other switches.)	No.	Some mercury-containing devices in use. Proper disposal methods when replaced.	Yes, many mercury-containing devices.		Examples: recycling centers or return to retailer.
7.14) How are old or unusable plant containers and trays disposed?	Containers are recycled or reused.	Containers are disposed of in a licensed landfill or stored on site.	**Waste containers are burned**[8] or disposed on site.		Evidence of system for recycling or proper disposal of waste containers.
7.15) How often is greenhouse poly changed?	Using poly or covering that will last for three or more years.	Price is the primary factor; purchase product that lasts only one to two years.			
7.16) How is greenhouse poly disposed?	Recycled through a recycling company or offered to others for reuse.	Disposed of in a licensed landfill or stored on site.	**Greenhouse poly burned on site**.[8]		Evidence of system for recycling or proper disposal of used greenhouse poly.
7.17) Are bio-degradable containers used?	Incorporating bio-degradable containers in program.	Have not considered or studied the use of bio-degradable containers.			
7.18) How are unwanted media and other organic wastes disposed?	Media and organic wastes are separated from containers and composted or land applied. Compost pile stored in a location protected from leaching and runoff.		Media and organic wastes stored in an unprotected site. **Nutrients can leach into the groundwater or run off into surface water**.[4]		Environmentally safe disposal demonstrated.
7.19) Are other materials recycled?	All paper, cardboard, plastic containers, aluminum and steel recycled.	Most recyclables are recycled.	Only deposit can/bottles are redeemed.		

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Septic System Management

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
8.01) Is the bathroom on the greenhouse site connected to a septic or municipal system to treat the waste?	Bathroom on the greenhouse site connected to septic tank and drainage field or to a municipal system, or to another system approved by the local health department. Or, No bathroom on the greenhouse site.		**No septic system. Direct discharge of wastes to environment**.[4]		If there is a bathroom on the greenhouse site, it must be connected to a functioning septic system.
Note: complete the remainder of this section only if the greenhouse has a septic system.					
8.02) Is the septic system adequately sized to treat wastewater generated in the greenhouse?	Septic system designed to handle more wastewater than required.	Capacity just meets wastewater requirements.	Design capacity is much less than potential flow of wastewater. Or, No septic system; **direct discharge of wastes to environment**.[4]		
8.03) What is the age of the septic system?	Less than five years old.	Six to 20 years old.	More than 20 years old.		
8.04) What distance separates the septic system components from water wells?	Greater than 50 feet from private wells (75 feet from public wells, including greenhouse with employees or that is open to the public).		**Less than 50 feet from a private well**[1] **(less than 75 feet from public wells, including greenhouse with employees or that is open to the public)**.[3]		
8.05) When was the last time the septic tank was pumped out?	Within the past five years.	Between five and ten years.	More than ten years ago.		
8.06) Who pumps out the septic tank?	Licensed septage hauler.		**Farmer/self or unlicensed contractor**.[9]		Satisfactory explanation of tank pumping procedures.

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Septic System Management (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
Note: complete the remainder of this section only if the greenhouse has a septic system (continued).					
8.07) How is the drainfield protected from traffic, deep-rooted plants and structures?	Vehicles and other heavy objects or activities kept away from drainfield area. No deep-rooted plants, pavement or structures over the drainfield.		Vehicles, livestock, heavy objects or other disturbances permitted in area. Trees planted in or directly next to the drainfield.		
8.08) Are there any signs of trouble with the septic system?	Greenhouse sanitary drains flow normally. No sewage odors inside or outside. Soil over drainfield firm and dry. Well water tests negative for coliform bacteria.	Greenhouse sanitary drains run slowly or soil over drainfield is sometimes wet.	Sewage odors noticed in the greenhouse or near the drainfield. Drains plugged or backed up. Soil wet or spongy in the drainfield area. Well water tests positive for coliform bacteria.		
8.09) What records are maintained on the septic system?	Good map and records of system repairs and maintenance are kept.	Some records maintained.	No map and maintenance records kept.		
8.10) What kinds of greenhouse cleaners, solvents and other chemicals are poured down the drain?	Moderate use of cleaning products that end up in wastewater. Hazardous chemicals never poured down the drain or toilet.	Moderate use of cleaning products. Small amounts of hazardous chemicals poured down drain or toilet.	Heavy use of cleaning products. **Septic system used to dispose of hazardous chemicals (solvents, degreasers, acids, oils, paints, disinfectants, pesticides)**.[4]		
8.11) How is water softener recharge handled?	Underground drainage separated at least 50 feet from well and septic systems (75 feet from the farm well for greenhouse with employees or open to the public).	Open ditch, farm field drain.	Septic system.		

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Septic System Management (continued)					
Risk question	**Low risk – 3 (recommended)**	**Medium risk – 2 (potential hazard)**	**High risk – 1 (significant hazard)**	**Your risk**	**Records or evidence for MAEAP verification**
Note: complete the remainder of this section only if the greenhouse has a septic system (continued).					
8.12) How are discharges from footer drains, basement sumps and roof drainage handled?	Grassed area, open ditch, field drain.		Directed into the septic system.		
Nutrient Management Practices					
9.01) How are pH and electrical conductivity (EC) meters used to manage fertilizer use?	Meters – pH and EC – are present at all times for monitoring container substrate before and after planting and during growing. Instruments are calibrated regularly.	Either a pH or an EC meter is available to do trouble-shooting when necessary.	Neither a pH nor an EC meter is available.		
9.02) How often is irrigation water monitored for alkalinity?	Water tested before every crop cycle to determine alkalinity.	Water tested once every one to five years to determine alkalinity.	Water never tested or tested for alkalinity only if there is a crop nutrition problem.		
9.03) How often is premixed medium monitored for pH and electrical conductivity (EC)?	Each shipment of premixed medium is tested for its pH and EC.	Several samples of premixed medium are tested during the season for pH and EC.	Premixed medium is not tested for pH or EC.		
9.04) How often is on-site-mixed medium monitored for pH and electrical conductivity (EC)?	Growing medium is tested at least weekly for pH and EC.	Growing medium is tested periodically for pH and EC.	Growing medium is not tested for pH or EC or, is tested only when there is a problem.		
9.05) How often is irrigation water monitored for pH and electrical conductivity (EC)?	Irrigation water is tested for pH and EC weekly.	Irrigation water is tested for pH and EC periodically.	Irrigation water is not tested. Or, Tested for pH and EC only when there is a growing problem.		

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Nutrient Management Practices (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
9.06) How are the fertilizer stock tanks near injectors protected from leaking into groundwater?	Stock tank on concrete floor with a curb and a catch basin installed.	Stock tank on a concrete floor, no curb, or in plastic secondary containment.	Stock tank on a permeable surface.		
9.07) How are aboveground ebb-and-flow storage tanks protected from leaking into groundwater?	Tanks in an isolated area, on a concrete floor with a curb and a catch basin installed.	Tanks in a traffic area on a concrete floor, no curb.	Tanks on a permeable surface, not barricaded.		
9.08) How are underground ebb-and-flow storage tanks protected from leaking into groundwater?	Concrete structure, treated with impermeable material on the inside and outside, with catch basin below.	Concrete structure, treated with impermeable material on one side, no catch basin.	Concrete stucture, no treatment of surface.		
9.09) How often is nutrient testing done by a commercial laboratory or land-grant university?	Medium and tissue testing done several times a growing season through commercial laboratory or land-grant university.	Medium and tissue testing done through commercial laboratories or land-grant universities once a growing season.	Greenhouse company has rarely used the services of a commercial laboratory or land-grant university.		
9.10) How is slow-release fertilizer used in the operation?	Slow-release fertilizer is used only in those crops that require high nutrient levels or are in hard-to-get-to places.	Slow-release fertilizer is used on crops requiring a lot of watering (leaching).	Slow-release fertilizer is used on all crops because of convenience.		
9.11) How are fertilizer application rates determined?	***Consistent with Michigan State University (MSU) recommendations***. When MSU recommendations are not available, other land-grant university or industry recommendations developed for the region may be used.	Occasionally exceed MSU or equivalent recommendations.	Often or always exceed MSU or equivalent recommendations.		Applications consistent with MSU recommendations. When MSU recommendations are not available, other land-grant university or equivalent recommendations developed for the region may be used.

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Nutrient Management Practices (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
9.12) How are fertilizer solutions managed to prevent application to vacant crop areas?	Applications of fertilizer solutions are automated or applied manually so that vacant crop areas do not receive fertilizer solutions.	Fertilizer solutions applied to vacant crop areas, but fertilizer solutions are captured and do not discharge to the environment.	Fertilizer solutions applied to vacant crop areas. **Fertilizer solutions discharge to groundwater or surface water**.[4]		Fertilizer solutions properly managed and do not discharge to the environment.
9.13) How are nitrogen fertilizer applications determined?	Nitrogen fertilizers are applied according to container substrate tests and crop requirements.	Nitrogen fertilizers are applied according to visual observation or past practices.			
9.14) How are phosphorus fertilizer application rates determined?	***Based on soil tests or plant tissue analysis using Michigan State University (MSU) recommended rates***, other land-grant university standards or industry standards if land-grant university standards do not exist.	Crop is grown with phosphorus rates higher than recommended.	High-phosphorus fertilizers are used routinely.		Applications consistent with MSU recommendations. When MSU recommendations are not available, other land-grant university or industry recommendations developed for the region may be used.
9.15) How is phosphorus management changed when phosphoric acid is used to acidify irrigation water?	Phosophoric acid credited, phosphorus fertilizer reduced.		No changes in phosphorus fertilizer applications.		
9.16) What fertilizer records do you keep?	***Maintain records of fertilizer purchases.***		No fertilizer records maintained.		Fertilizer records on file (fertilizer types and quantities), or plan to maintain records in the future.

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Water Management Practices

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
10.01) What is the water source?	Municipal supply.	On-site well.	Stream, river or pond.		
10.02) What irrigation management records are maintained?	***Maintain annual records of irrigation water used or irrigation scheduling***.		No irrigation records maintained.		Irrigation records on file, or plan to maintain records in the future.
10.03) How is irrigation water managed to prevent a discharge to the environment?	Water is recycled or does not leave the greenhouse or facility.	Runoff water is controlled to minimize leaching and prevent a direct discharge.	**Irrigation water from greenhouse goes directly into a ditch or storm sewer, or significant leaching occurs**.[4]		Evidence of a system that prevents direct discharge or leaching.

Soil and Water Conservation Practices

11.01) What percent of the parking lot area is covered with impervious surfaces?	Less than five percent.	Five to 20 percent.	More than 20 percent, and no provision to manage runoff.		
11.02) How is greenhouse roof runoff water handled?	A retention pond, settling basin or man-made wetland to capture greenhouse runoff water and hold it.	Plans being made to build either a retention pond, settling basin or man-made wetland to capture greenhouse roof runoff water and hold it.	No roof runoff system in place.		
11.03) How is the greenhouse site contoured to reduce runoff?	Site is contoured or graded to slow runoff and increase water infiltration.		No site improvements to slow runoff and increase water infiltration.		
11.04) Are vegetative buffer strips used to reduce runoff?	Plant material such as grass, shrubs or trees used to slow water movement to streams, lakes and wetlands.		The use of a buffer strip has not been considered as a means of slowing water movement off the site.		

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Soil and Water Conservation Practices (continued)					
Risk question	**Low risk – 3 (recommended)**	**Medium risk – 2 (potential hazard)**	**High risk – 1 (significant hazard)**	**Your risk**	**Records or evidence for MAEAP verification**
11.05) How are drainage ditches and drain tiles managed?	Annually maintained in accordance with local government regulations.	Drainage ditches or drain tiles checked and maintained every two to five years.	Drainage ditches or drain tiles have not been maintained.		
11.06) How is erosion minimized on roads, parking lots and traffic areas?	Built and maintained to minimize erosion.	A small amount of erosion does occur on the roads and parking lots.	Erosion from the parking lots/ roads can be a problem and pose a risk to surface water.		
11.07) How often is the greenhouse site evaluated for runoff problems?	Site is evaluated after each renovation or addition.	Site evaluated every three to five years, after a number of renovations or additions.	Runoff occurs on a regular basis. No plan to address problem.		
Pest Management Practices					
12.01) How does the grower stay current on new pest management practices and strategies for weeds, insects and diseases?	Attends educational meetings, reads educational materials provided by the university or other reliable sources. At least one new pest management practice adopted on a trial basis each year.	Occasionally attends educational meetings and reads new pest management materials.	Relies on outdated pest management practices.		
12.02) Does the grower consult with a pest management consultant or service during the growing season?	Employs an independent crop consultant throughout the growing season that is knowledgeable of Integrated Pest Management. Or, Utilize public reports and services from the university, local agribusiness or other reliable providers.		Relies on outdated pest management practices.		

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Pest Management Practices (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
Pest prevention and avoidance					
12.03) Does the grower review previous growing season pest management activities and results?	Previous pest populations, pest suppression activities/ pesticide usage and crop yield/injury are reviewed. Records used for future pest management plans.	No.			
12.04) When available, are certified seed or plant material (tubers, crowns, transplants, etc.) used that are insect, weed and disease free?	Certified or quality seed and planting materials used whenever possible.	Bin-run or uncertified planting materials that are cleaned and treated.	Use saved seed or planting materials that are untreated and potentially infected with insect, weed and/or disease pests.		
12.05) Are pest-resistant and pest-tolerant varieties planted?	Pest-resistant and pest-tolerant varieties are planted when available.	Varieties without resistance and tolerance are planted, resulting in the need for pest suppression practices.			
12.06) Are greenhouses scouted for pests during the growing season?	All greenhouses are scouted on a weekly schedule, by a qualified individual trained in Integrated Pest Management. Scouting reports and records are on file.	Greenhouses are scouted at critical times, but not on a weekly basis.	Greenhouses are not scouted.		
12.07) How are weeds outside the greenhouse controlled?	Herbicide selection and rates are based on weed species present; scouting and thresholds are used. Where appropriate, cultural and mechanical practices are used to suppress weeds and minimize weed seed survival (cultivation, cover crops, weed barrier, mowing, etc.).	Pre-emergent and post-emergent herbicides used outside of buildings are selected on the basis of past performance, weed history, cost or ease of application.	Herbicides used outside of buildings are selected primarily on the basis of price or ease of application. Little consideration is given to weed species present or runoff/leaching potential or other methods of control.		

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Bold blue italic print indicates a management practice consistent with a specified 2015 Right to Farm (RTF) Generally Accepted Agricultural and Management Practice (GAAMP).

Pest Management Practices (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
Pest prevention and avoidance (continued)					
12.08) How are weeds inside the greenhouse controlled?	Hand removal, weed barrier or other cultural practices.	Herbcide used with attention to a specific greenhouse use label.	Herbicide used without attention to a specific greenhouse use label.		
12.09) Are sticky card traps used?	Use sticky cards at regular intervals to detect insect pests.	Sticky cards are used on some crops and read every two weeks.	Sticky cards are not used.		
12.10) Are biological control agents used?	Use biological agents to reduce or eliminate the use of pesticides.	Use biological agents in conjunction with pesticides for efficient pest control.	Not considering the use of biological agents.		
12.11) Are human toxicity or health risks considered when choosing pest control materials?	Use only insect growth regulators (IGRs) or other new low-risk compounds instead of more toxic pesticides.	Incorporate IGRs or low-risk compounds into the program when able.	Satisfied with current higher toxicity pesticides. Does not consider human health risk in pesticide selection.		
12.12) Are low restricted-entry intervals (REIs) pesticides (<12 hours) used?	Low-REI pesticides make up 100 percent of the program.	Low-REI pesticides make up about 50 percent of the program.	Disregard REIs when selecting and applying pesticides.		
12.13) Are pH and alkalinity of water used with pesticides checked?	Check pH and alkalinity of water source every six months, realizing that both factors can affect pesticide effectiveness.	Alkalinity and pH of water source used for pesticides checked every one to three years.	Alkalinity and pH of water source not checked or checked only if the pesticide is not working.		
12.14) Are pest problems spot treated?	Pesticides are applied only to infested plants.	Pesticides are applied to infested plants and surrounding plants.	The entire greenhouse range is treated on a regular basis.		

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Pest Management Practices (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
Pesticide application					
12.15) How are surface and groundwater in and near greenhouses protected from pesticide contamination?	Pesticide labels with groundwater and surface water advisory statements are followed.		**Labeled directions are not followed**.[17] Spray applied adjacent to or over top of surface water, tile drain inlet or water well.		Pesticide labels are followed.
12.16) Are the purchasers and applicators of Restricted Use Pesticides (RUP) certified applicators?	***The purchaser and applicator of RUP comply with the certification requirements***.		**Non-certified and unsupervised applicators use RUP**.[6]		RUP certification confirmed.
12.17) What management practices are used to prevent the development of pest resistance to certain pesticides?	Pesticides with different modes of action are rotated within a season or from one season to the next or used in tank mix where permitted. Pesticides at highest risk of resistance are not used when alternatives are available.	Some but not all pesticide modes of action are rotated or tank mixed. Pesticides at highest risk of resistance are used sparingly.	Pest resistance is not considered when selecting pesticides.		
12.18) Is a spill kit immediately available to pesticide applicators in the greenhouse?	***A spill kit*** containing a shovel, absorbent material, personal protective equipment (PPE) and a container ***is immediately available.***		**No spill kit is available**[6] or no plan is in place to contain spills.		Adequate spill kit present.
12.19) How is pesticide rinsate disposal handled?	***Excess mixtures or rinsate is used on crop or labeled site at or below labeled rates***.		No plan is in place to deal with excess mixture or rinsate.		Evidence that rinsate is properly managed.

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Pest Management Practices (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
Pesticide application (continued)					
12.20) What pesticide application records are kept?	***Accurate records maintained of all greenhouse crop applications of pesticides for at least three years.***	Partial pesticide records kept. Complete pesticide application records will be kept in the future, for review at the time reverification.	No records are kept. Chemicals used are known by memory or invoices only.		Pesticide records for the past three years are on file (or plans to maintain records). - Application date - Application time - Pesticide brand/product name - Pesticide formulation - EPA registration number - Active ingredient(s) - Restricted-entry interval (REI) - Rate per acre or unit - Crop that received the application - Total amount of pesticide applied - Treated area size - Applicator's name - Applicator's certification number - Application location - Application method - Target pest - Carrier volume

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Pest Management Practices (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
Pesticide application (continued)					
12.21) How are agriculture pollution emergencies handled?	Call 911, sheriff, fire or emergency services department for personal safety issues. ***All uncontained spills or releases should be reported to the MDARD Agriculture Pollution Emergency Hotline: (1-800-405-0101)*** or the MDEQ Pollution Emergency Alerting System (1-800-292-4706).		**No contact to state or local authorities. Spill discharges directly to surface water.**[4,20]		Emergency plan on file or local emergency telephone numbers are available.
12.22) Are Safety Data Sheets (SDS) available on site?	SDS are available and employees know their location.	Most SDS are available; not all employees know their location.	SDS are not available.		Evidence of system for making SDS available to employees.
12.23) Do pesticide applicators read and follow the pesticide label instructions?	***Everyone using pesticides follows label and labeling instructions***.		**Label and labeling instructions are not always followed.**[19]		No evidence of pesticide application contrary to pesticide label instructions.
12.24) Is pesticide application equipment ever stored with leftover product?	Application equipment is always stored empty.	Occasionally leftover product is stored in application equipment.	Storage of leftover product in application equipment is a standard operating procedure.		
12.25) Is loaded pesticide application equipment ever left unattended?	Sprayer containing pesticide(s) is never left unattended.	Pesticide handlers on occasion are called away from spraying activities.	Leaving sprayers with pesticide unattended is a common occurrence.		

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Pest Management Practices (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
Pesticide application (continued)					
12.26) How often is pesticide application equipment calibrated?	Application equipment is calibrated twice a year according to manufacturer's recommendations.	***Application equipment is calibrated every year*** according to manufacturer's recommendations.	Application equipment is calibrated only if there is plant damage or the pesticide doesn't seem to be effective. **Pesticide application equipment is not properly calibrated.**[6]		Evidence of system of calibrating pesticide application equipment at least once per year.
12.27) How often is pesticide application equipment tested?	Application equipment is tested annually to determine if it is working properly.	Application equipment is tested only if there is time.	Application equipment is tested only if it has been broken and repaired.		

Outdoor Production Container Management

(If you do not have outdoor containers, please skip.)

13.01) What happens to runoff in production areas with containers?	Runoff is collected, filtered and reused.	Runoff does not pond and does not enter surface water.	Runoff is not collected and is allowed to enter surface water.		No evidence of significant runoff or erosion.
13.02) Are runoff storage areas sized adequately?	Runoff collection areas can store an average rain event.	Runoff collection areas can not store an average rain event but do not regularly flood into surface water.	Runoff collection areas overflow regularly and runoff enters surface water.		
13.03) How is the pH of irrigation water managed?	Sulfuric acid is used to lower the pH of irrigation water.	Nitric acid or phosphoric acid is used to lower the pH of irrigation water. Nutrient credits are taken for the acidified irrigation water.	Nitric acid or phosphoric acid is used to lower the pH of irrigation water. Nutrient credits are not taken for the acidified irrigation water.		
13.04) What type of irrigation is used?	Trickle irrigation with in-pot emitters.	Overhead irrigation with scheduled irrigation (split applications).	Overhead irrigation.		

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Outdoor Production Container Management (continued)

Risk question	Low risk – 3 (recommended)	Medium risk – 2 (potential hazard)	High risk – 1 (significant hazard)	Your risk	Records or evidence for MAEAP verification
13.05) What fertilizers are used to minimize nutrient loss?	Controlled-release fertilizers used or multiple applications of liquid fertilizer with minimal leaching potential.		Minimal use of controlled-release fertilizers. Use liquid fertilizer with high leaching potential.		
13.06) Is container stock fertigated with overhead sprinklers?	Overhead irrigation with fertigation is avoided on containers.		Overhead irrigation with fertigation is regularly used on containers.		

Other Environmental Risks at the Greenhouse Operation

14.01) Are there other activities, products, processes, equipment, services, by-products and/or wastes at this greenhouse operation that pose contamination risks to groundwater or surface water?	No risk(s) identified.	Risk(s) identified and plan to mitigate the contamination risk(s).	No plan to mitigate contamination risk(s).		No evidence of other activities, products, processes, equipment, services, by-products and/or wastes at this greenhouse operation that pose contamination risks to groundwater or surface water.

Greenhouse System Improvement Action Plan

Develop the greenhouse system improvement action plan beginning on the inside cover of this bulletin. Once the plan has been implemented, you can request MAEAP verification of your greenhouse system.

Table 1. Greenhouse well description and isolation distances.

Farm well information		Isolation distance (in feet) from:				
Description	Private or public	Fuel storage	Pesticide storage	Fertilizer storage	Mix/load area	Septic System
1						
2						
3						
4						
5						

Table 2. Federal, state and local environmental requirements for operation of this farm business.

This table contains the typical requirements for a farm business. There may be additional environmental requirements due to the type of operation and location. Contact the local or state permitting agencies for further information: MDEQ Environmental Assistance Hotline — 1-800-662-9278, MDARD information — 1-800-292-3939.

Environmental regulatory requirements	Description	Frequency	Administering agency	Your expiration date
Private pesticide applicator certification	Any persons using or supervising the use of restricted-use pesticides (RUP) in the production of an agricultural commodity on their own or their employer's land must be a certified pesticide applicator.	3 years	MDARD/Pesticide and Plant Pest Management Division (PPPM)	
Pesticide safety training for pesticide workers	The federal Worker Protection Standard for agricultural pesticides requires employers of pesticide handlers and workers to train employees on pesticide safety. As an alternative to on-site training, pesticide applicator certification meets the WPS training requirement for pesticide handlers and workers. Agricultural employers must be able to verify compliance.	Each employee must be trained every 5 years	MDARD/PPPM	
Farm motor vehicle fuel storage tanks greater than 1,100 gallon capacity (above- and below-ground tanks)	Fuel storage tanks have to be certified (aboveground) or registered (underground); a site plan has to have been submitted to the LARA before the installation is placed into service. Smaller tanks have other requirements to be met.	Annual	Department of Licensing and Regulatory Affairs (LARA)	
Air use permit	Permit to install and operate equipment or processes which may emit air contaminants (incinerators for burning animal carcasses or manure, and biodigesters and associated equipment are examples).	Before construction	MDEQ/Water Resources Division	N.A.
Groundwater discharge permit	Any discharge of waste or waste effluent into or onto the ground (e.g., egg wash water and milk cooling water [over 10,000 gallons/day] that is discharged), and any livestock facility over 5,000 animal units.	5 years	MDEQ/Water Resources Division	
Well permit	A person who installs a well, pump or pumping equipment shall comply with applicable laws, regulation, ordinances and codes.	Before construction	Local health department	N.A.
Septic permit (house and farm operation)	The first step in the process of determining if a piece of land that does not have municipal wastewater services available can be considered for an on-site septic system.	Before construction	Local health department	N.A.
Land and water interface construction permits	Construction activities (dredging, filling, draining, construction, structure placement) in, across, under water.	Before construction	MDEQ/Water Resouces Division	N.A.
Soil erosion and sedimentation control permit	Earth change activities within 500 feet of a lake or a stream, or that will disturb an area greater than 1 acre in size.	Before construction	County soil erosion permitting agency	
Water use reporting	Agricultural water users with the capacity to withdraw surface or groundwater that exceeds 100,000 gallons per day (70 gallons per minute) are required to report actual water withdrawals annually.	Annual	MDARD	N.A.

Table 2. Federal, state and local environmental requirements for operation of this farm business (continued).

Environmental regulatory requirements	Description	Frequency	Administering agency	Your expiration date
Water Withdrawal Assessment – new or increased large quantity withdrawal	The Water Withdrawal Assessment Tool (WWAT) is designed to estimate the likely impact of a water withdrawal on nearby streams and rivers. Use of the WWAT is required of anyone proposing to make a new or increased large quantity withdrawal (over 70 gallons per minute) from the waters of the state, including all groundwater and surface water sources, prior to beginning the withdrawal. The WWAT and registration site is: **www.deq.state.mi.us/wwat**.	Before water withdrawal	MDEQ/Water Resources Division	The registration is valid for 18 months
Other environmental guidelines	**Description**		**Administering agency**	
Manure management and utilization	The Michigan Right-to-Farm Act (Act 93 of 1981) requires the establishment of generally accepted agricultural and management practices (GAAMPs). Agricultural producers who voluntarily follow these practices are provided protection from public or private nuisance litigation. The GAAMPs are reviewed annually. The latest GAAMPs can be accessed at: **www.michigan.gov/mdard**.		MDARD	
Pesticide utilization and pest control				
Nutrient utilization				
Site selection and odor control for new and expanding livestock production facilities				
Irrigation water use				
Farm market				
MAEAP verification: livestock, farmstead, cropping and greenhouse systems	MAEAP systems verification is valid (P.A. 1 & 2, 2011) for five years. MAEAP verification in good standing is dependent on following the practice specific to each system, being in conformance with the applicable GAAMPs, an annual plan review and update (livestock system) and updates as necessary as conditions change on the farm.		MDARD	

Table 3. Legal citations for environmental risks in Greenhouse•A•Syst.

Footnote	Michigan Law	Description
1	Public Health Code, Public Act 368 of 1978	Part 127: Water Supply and Sewer Systems
2		Part 138: Medical Waste Regulatory Act
3	Safe Drinking Water Act, Public Act 399 of 1974	
4	Natural Resources and Environmental Protection Act 451 of 1994	Part 31: Water Resources Protection
5		Part 55: Air Pollution Control
6		Part 83: Pesticide Control
7		Part 111: Hazardous Waste Management
8		Part 115: Solid Waste Management
9		Part 117: Septic Waste Servicers
10		Part 121: Liquid Industrial Waste
11		Part 169: Scrap Tires
12		Part 201: Environmental Response
13		Part 327: Great Lakes Preservation
14	Bodies of Dead Animals Act, Public Act 239 of 1982 as amended	
15	Fire Prevention Code Public Act 207 of 1941	Storage and Handling of Flammable and Combustible Liquids
16	Grade A Milk Law, Public Act 266 of 2001	
17	Michigan Department of Agriculture and Rural Development Pesticide Regulation 637	Pesticide Use
18	Michigan Department of Agriculture and Rural Development Regulation 642	On Farm Fertilizer Bulk Storage
	Federal Law	
19	Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	
20	Title III of the Superfund Amendments and Reauthorization Act of 1986, also know as the Emergency Planning and Community Right-to-Know Act	
21	Worker Protection Standard for Agricultural Pesticides	
22	Clean Water Act, Oil Pollution Regulation	

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