

Orchard*A*Syst

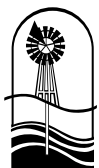
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(Major revision — destroy old)

Crop*A*Syst for Orchards and Fruit Producers



Some field-based orchard and fruit production practices can result in high risk of contamination of groundwater and surface water resources — including your drinking water supply. Others present low risk or virtually no risk at all. Your water supply is least likely to be contaminated if you follow appropriate management practices and dispose of hazardous and toxic wastes off the farm at a properly managed site.

The Crop Assessment System for Orchards and Fruit Producers will provide you with accurate information about how your management practices might be affecting water resources. When higher risk practices are being used, alternative lower risk practices are identified that you can use to reduce potential contamination risk at your fruit farm. Your agricultural representatives can assist you in implementing lower risk management practices and maintain profitable production.



Michigan
Groundwater
Stewardship
Program



MICHIGAN STATE
UNIVERSITY
EXTENSION

Orchard and Fruit System Improvement Action Plan

Risk question	List high-risk practice(s) from Orchard*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
3.14	(example) Pesticide spill clean-up kit not available in the orchard.	Yes	Acquire pesticide spill clean-up kit from groundwater technician for pesticide application area.	Sept. 2007	(✓) Completed Aug. 31, 2007

Introduction

Crop*A*Syst for Orchards and Fruit Producers will assist you to develop and implement a management plan and site improvements that prevent contamination of groundwater and surface water and maintain economic crop production. Plans will be in conformance with Michigan Right-to-Farm guidelines and applicable state, federal and local environmental regulations.

Nutrients used in fruit production come from chemical fertilizers and naturally occurring sources such as manure, legumes and biosolids (sewage sludge). 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. Crop*A*Syst for Orchards and Fruit Producers will assess your 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 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. Crop*A*Syst for Orchards and Fruit Producers will assess your current pest management practices and identify alternative management practices that, when implemented, will reduce negative impacts to the environment.

Crop*A*Syst for Orchards and Fruit Producers is designed to coordinate the pollution prevention efforts of the Michigan Groundwater Stewardship Program (MGSP) and the Michigan Agriculture Environmental Assurance Program (MAEAP). Crop*A*Syst for Orchards and Fruit Producers focuses on management practices in the orchard/field, whereas Farm*A*Syst focuses on activities at the farm headquarters, such as agricultural chemical storage, mixing and loading; water well construction and management, and other activities.

The Michigan Groundwater Stewardship Program (MGSP) is a cooperative effort between the Michigan Department of Agriculture, Michigan State University Extension, Michigan Conservation Districts, the USDA Natural Resources Conservation Service and Michigan AmeriCorps. The program is funded through fees assessed on sales of pesticides and nitrogen fertilizers. MGSP-sponsored education, technical assistance and cost-share programs help

individuals reduce the risk of groundwater contamination associated with pesticide and nitrogen fertilizer use.

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 three systems are livestock, farmstead and cropping. The on-farm risk evaluation uses specific tools for each system -- the comprehensive nutrient management plan (CNMP) for the livestock system, Farm*A*Syst for the farmstead system and Crop*A*Syst for the cropping system. Environmentally assured systems are eligible for various incentives and recognitions.

The Michigan Right-to-Farm Act, P.A. 93, was enacted in 1981 to provide farmers with protection from nuisance lawsuits. This state statute authorized the Michigan Commission of Agriculture to develop and adopt generally accepted agricultural and management practices (GAAMPs) for farms and farm operations in Michigan. These voluntary practices are based on available technology and scientific research to promote sound environmental stewardship and help maintain a farmer's right to farm. The current Right-to-Farm GAAMPs are posted on the Michigan Department of Agriculture Web site:

www.michigan.gov/mda.

Producers who complete the Crop*A*Syst for Orchards and Fruit Producers will be able to determine what structural, management practices or record-keeping changes (if any) will be needed for their businesses to be environmentally assured through the MAEAP. Once a producer develops and implements a plan to address the risks indicated by the assessment, he/she can contact the Michigan Department of Agriculture (MDA) to request Cropping System verification. An MDA inspector will schedule a site visit to complete the verification process.

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

As the owner of a MAEAP-verified cropping system, you will be eligible for various incentives and can enjoy "good-faith-effort" environmental liability protection if an agricultural pollution emergency ever occurs in your orchard/fields.

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

What is the Crop Assessment System for Orchards and Fruit Producers?

The Crop*A*Syst for Orchards and Fruit Producers (Crop*A*Syst) is a series of risk questions that will help assess how effectively a producer's crop management practices protect groundwater and surface water resources. The risk questions are grouped in the following sections:

1	Nutrient Management Practices
2	Soil and Water Conservation Practices
3	Pest Management Practices
4	Water Use
5	Irrigation Management Practices
6	Other Environmental Risks in the Cropping System
7	Orchard and Fruit System Improvement Action Plan

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 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**.

Responses to risk questions that address management practices covered by the Michigan Right-to-Farm Act indicate the *risk level required for protection from nuisance lawsuits with bold, italic print*.

Finally,

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

MAEAP management requirements are aligned with state and federal environmental regulations, the Michigan Right-to-Farm Act and environmentally based horticultural management practices that 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.

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

How does Crop*A*Syst work?

- 1) Select all relevant sections for your fruit operation.
- 2) Answer the risk questions by selecting the answer that best describes management practices used on your operation. Indicate your risk level in the column to the right. Skip any questions that do not apply to your cropping system.

*Note: For MAEAP verification, complete the risk questions with a Crop*A*Syst trained individual. You can locate your local Groundwater Technician through your county Conservation District or the MSU Extension office.*

- 3) After completing each section of risk questions, list the practices that present a high risk of contaminating groundwater and surface water resources in the Orchard and Fruit System 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 Fruit System Improvement Action Plan, list:
 - Management practices or site improvements that you plan to implement that will reduce the identified risk.
 - Sources of technical and financial assistance.
 - Target dates for accomplishing the changes.
 - Target date for MAEAP verification of your Cropping System.

A few final words

The key to Crop*A*Syst is that once you have identified the risks to groundwater and surface water resources, you implement your plan 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 you have developed a plan and have implemented changes to address the risks, you are ready for MAEAP verification of your cropping system.

Nutrient 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
1.01 How often are fields soil and tissue tested for nutrient levels (P, K, Ca, Mg) and pH?	All fields are both tissue and soil tested on a regular basis, at least every 4 years.	All fields are either tissue or soil tested every 4 years, or producer plans to bring tests up to date.	Fields have not been soil or tissue tested within the past 4 years.		Field names or map. Acres in the cropped portions of the field. Up-to-date soil test and tissue analysis reports, or schedule to bring all tests up to date.
1.02 Do soil sampling procedures adequately represent field conditions?	One composite sample is taken from uniform field areas of less than 40 acres. For tree fruit, samples are taken from under trees (weed sprayed, cultivated or mulched areas).		One composite sample is taken from areas greater than 40 acres.		
1.03 Do you maintain the soil pH in the desirable range for the crop(s) being grown?	The pH is adjusted to desirable range before planting and maintained for current crop.	Soil pH is maintained and/or adjusted for current crop on the basis of soil analysis after planting.	Soil pH is not maintained in the desirable range.		
1.04 Do you consider all sources of nutrients when making fertilization decisions?	When organic matter, legumes, manure or other biological materials (biosolids) are used, fertilizer rates are adjusted accordingly.	When organic matter, legumes, manure or other biological materials (biosolids) are used, fertilizer rates are sometimes adjusted.	When organic matter, legumes, manure or other biological materials (biosolids) are used, fertilizer rates are not adjusted accordingly.		Written records available, showing nutrient credits utilized.

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

Bold print indicates a violation of state or federal regulation.

Bold italic print indicates conformance with Right-to-Farm guidelines.

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
1.05 How are fertilizer application rates determined?	Consistent with Michigan State University recommendations. (Based on site-specific, block-by-block soil and/or tissue analysis.)	Consistent with Michigan State University recommendations, based on composite analysis representing the whole farm.	Fertilizer rates are not based on tissue or soil analysis.		Applications consistent with MSU recommendations (MSU soil test printout or calculated MSU recommendations on file). When MSU recommendations are not available, applications are consistent with industry standards.
1.06 Do you develop and follow a nutrient management plan for each field/block annually?	Annual nutrient plan is developed on a block-by-block basis to meet crop nutrient needs and minimize loss of nutrients to the environment.	A nutrient plan is developed each year for each crop species. Soil or tissue tests are up-to-date.	Nutrient plan is not developed, or the same plan is used for more than 4 years.		Annual nutrient plan by field or by crop grown.
1.07 Is fertilizer application equipment checked for proper adjustment?	Application equipment is checked for rate of application and placement. Over- and underapplications are monitored and corrected.		Application equipment is not checked.		Name of person responsible for fertilizer applicator adjustments and the dates of adjustments.
1.08 What nutrient management records do you keep?	Records of soil tests and tissue analyses reports and quantities of nutrients applied to individual fields or blocks are maintained.	Partial nutrient management records are kept. Plan to maintain complete nutrient management records.	No nutrient management records kept.		Three years of records — or 5 years, if applying manure — or plans to begin keeping records. Soil fertility tests and/or tissue analysis results. Date(s) of application(s). Nutrient composition of fertilizer or other material used. Amount of nutrient-supplying material applied per acre. Method of application and placement of applied nutrients.

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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
<p>1.09 When not in use, where do you park or store loaded fertilizer and pesticide applicators, to protect water resources from accidental spills and mischievous activities?</p>	<p>Supply vehicle is returned to a secure location when not in use. Fertilizer and pesticides are properly stored more than 150 feet from private wells.</p>		<p>Fertilizer and pesticide supply vehicles are left in an unsecured location. Or, Fertilizer and pesticides are stored less than 150 feet from a private well.¹</p>		<p>Map showing where vehicle should not be parked adjacent to any well. No evidence vehicles left in an unsecured location.</p>
<p>1.10 How do you match N fertilizer applications to the demand of the crop and the conditions of the soil?</p>	<p>N rates are based on tree/plant vigor, production quality, pruning practices and periodic tissue analyses, and do not exceed MSU recommendations.</p>	<p>Nitrogen rates are based on previous practices that match inputs with plant needs, but sometimes exceed MSU recommendations.</p>	<p>Nitrogen rates are not based on nitrogen monitoring or plant assessment and often exceed MSU recommendations.</p>		
<p>1.11 How are phosphorus fertilization rates determined?</p>	<p>Based on soil tests or plant tissue analysis using Michigan State University recommended rates. If the soil test exceeds 150 ppm Bray P1 (300 lb/A), phosphorus is discontinued.</p>	<p>Phosphorus fertilization is based on past practices, without regard to soil test P levels. Application is discontinued if the soil test reaches 150 ppm Bray P1.</p>	<p>Phosphorus fertilization is applied without regard to soil or tissue analyses.</p>		<p>P management consistent with nutrient management GAAMPs.</p>
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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
Manure Management Practices (If you do not use manure, skip this section.)					
1.12) What manure management records do you maintain?	Complete manure application records are maintained.	Some manure application records are kept. Plan to maintain complete manure application records.	Minimal or no records maintained.		Additional nutrient management records that are needed if manure is used in the cropping system: - Date(s) of manure incorporation. - Weather conditions during application of manure (e.g., sunny, 70 degrees F). - Field conditions during application of manure (wet, dry, frozen, etc.). - Manure/wastewater quantities produced/utilized and nutrient analysis results.
1.13) How do you determine the nutrient content of manure?	Laboratory analysis for percent dry matter (solids), ammonium N, and total N, P and K.	Book values or standard nutrient content values used.	Manure nutrient content is unknown or not considered.		All manure analyses or book values on file.
1.14) How do you know the rate of manure application (tons or gallons per acre)?	The amount of manure applied per acre is known. All manure spreaders field calibrated annually.		Manure application rate is unknown.		Rate of manure applied known for all spreaders. Records indicate date of calibration.
1.15) How is manure applied to fields?	Manure is uniformly applied to soils and is either injected or incorporated within 48 hours, whenever feasible.	Manure is uniformly applied to soils and is not injected or incorporated within 48 hours.	Manure is not applied uniformly. Areas of field receive excess manure.		All fields that receive manure are identified. Field evidence of uniform application.
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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
1.16 How do you prevent manure runoff to surface waters?	Manure not applied within 150 feet of surface waters. Or, if within 150 feet, manure is injected or immediately incorporated and/or conservation practices are used to protect against runoff and erosion losses to surface waters.		Manure is applied within 150 feet of surface waters and not injected or incorporated and/or without conservation practices.		Field maps with setbacks identified. Records of manure incorporation.
1.17 How are manure nitrogen application rates managed?	Manure and N fertilizer are applied at rates that do not exceed the N requirements of the crop.		Manure application rates are not based on crop need or soil/tissue test.		Manure rates do not exceed crop N needs, consistent with GAAMPs.
1.18 How are manure phosphorus application rates managed?	If Bray P1 reaches 75 ppm, manure P does not exceed P removed by the crop. If Bray P1 reaches 150 ppm, manure applications are discontinued.	If Bray P1 reaches 75 ppm, manure P does not exceed 2X P removed by the crop. If Bray P1 reaches 150 ppm, manure applications are discontinued.	Manure application rates are not based on crop need or soil/tissue test.		Manure rates do not exceed crop P needs, consistent with GAAMPs.
1.19 How do you prevent the buildup of manure nutrients in a field?	Manure is rotated to different fields every year and applied at agronomic rates. Whole-farm nutrient planning is used to manage manure resources.	Manure applied at agronomic rates. Whole-farm nutrient planning is used to manage manure resources.	Excessive manure is applied to the same field(s) every year.		Farm nutrient plan on file.

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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
1.20) How do you determine which fields to use for winter spreading?	No winter applications.	Manure application risk index (MARI) is completed for each field receiving winter manure application.	Applications are made to fields where erosion and runoff to water resources are likely to occur.		MARI completed for each field receiving winter manure application, or spreading plan does not include winter spreading.
1.21) How do you control liquid manure loss through tile lines?	Liquid manure is managed to prevent manure flow in a field tile line. Tile outlets are monitored for manure discharges.		Not concerned with manure loss through tile. Tile outlets are not monitored for manure discharge.		Tiled fields identified on map. Records of tile flow before and after application (flow, rate, color and odor).
1.22) How are manure applications managed to prevent any food safety risk?	Manure applied more than four months (120 days) before crop is harvested. Manure is composted or held in storage for 60 to 90 days before application.	Manure applied more than four months (120 days) before crop is harvested.	Manure applied less than four months (120 days) before crop is harvested.		
1.23) Do you have an odor management plan?	Cropping operation is managed in a way that reduces odors.		Manure odors are not minimized.		
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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
Biosolids Management Practices (If you do not use biosolids, skip this section.)					
<p>1.24 How do you prevent biosolids with pathogens grown for human consumption?</p>	<p>Biosolids with pathogens present (Class B biosolids) are applied only to non-bearing trees and plant areas, or harvest restrictions are followed.</p> <p>(Class A biosolids are essentially pathogens-free with no restrictions for land application. Class B biosolids have low levels of pathogens and have restrictions, harvest intervals when land applied.)</p>		<p>Biosolids with pathogens present (Class B biosolids) are applied to active fruit production areas without regard to harvest restrictions.⁴</p>		<p>Application records kept for biosolids applications and can be compared with fruit production records.</p>
<p>1.25 Have you received nutrient content information on the biosolids applied to your farm?</p>	<p>Received laboratory analysis for percent dry matter (solids), ammonium N (NH₄-N), and total N, P and K, and utilize nutrient credits when planning nutrient program.</p>		<p>Have not received any biosolids analysis information.</p>		<p>Biosolids analyses on file.</p>
<p>1.26 How do you know the rate of biosolids (in gallons or dry tons per acre) and the rate of biosolids nutrients applied?</p>	<p>Received actual biosolids application rates from the biosolids generator or its land application contractor. Nutrient rates are consistent with MSU recommendations.</p>		<p>Have not received any biosolids rate or nutrient application information.</p>		<p>Biosolids application rates on file.</p>
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Soil and Water Conservation 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
<p>2.01 Have you identified environmentally sensitive areas (land near surface water, highly erodible land, soils with high leaching or runoff potentials, wells, surface inlets) that require additional management when applying nutrients and pesticides?</p>	<p>Environmentally sensitive areas are identified. Family members, employees and contractors are aware of and understand the management practices to protect these areas.</p>	<p>Some environmentally sensitive areas are identified.</p>	<p>Environmentally sensitive areas are not considered.</p>		<p>Areas identified on field maps with appropriate management or setbacks. -Areas next to surface waters. -Fields with shallow ground water. -Fields with water wells. -Areas near surface water inlets. -Fields with highly erodible soils. -Fields with highly leachable soils. -Fields with high runoff potential. Training/communications plan to inform workers and contractors of appropriate management or setbacks.</p>
<p>2.02 Is soil erosion under control on your farm fields?</p>	<p>Soil erosion losses are within tolerances as documented by the revised universal soil loss equation (RUSLE2) and the wind erosion equation (WEQ). Minimal evidence of erosion in areas of concentrated water flow.</p>		<p>Excessive soil erosion is occurring on the farm. Or, Erosion rates are unknown.</p>		<p>RUSLE2 and WEQ calculations completed and on file.</p>
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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
<p>2.03 Do you protect all streams, wetlands, farm ditches and other water bodies on your farm from polluted runoff and sediment with conservation practices?</p>	<p>Filter strips, riparian buffer strips, grassed waterways and other conservation practices are maintained between fields and all surface waters on the farm.</p>	<p>Conservation practices are maintained on some fields.</p>	<p>No conservation practices are maintained. Farm is immediately next to surface waters and drainage ditches.</p>		
<p>2.04 Do you plant cover crops to prevent soil erosion, trap nutrients and pesticides, and improve soil quality?</p>	<p>Cover crops are included in the crop rotation to protect soil and water resources and control erosion.</p>	<p>Cover crops are used occasionally.</p>	<p>Cover crops are not used.</p>		
<p>2.05 Are soil quality indicators evaluated?</p>	<p>Soil quality indicators (e.g., earthworm populations, water infiltration rates, soil compaction, percent plant and residue cover, pH, cation exchange capacity [CEC] and percent organic matter) are evaluated on all fields.</p>	<p>Some soil quality indicators are evaluated.</p>	<p>No soil quality indicators are evaluated.</p>		
<p>A boxed risk level indicates the level required for environmental assurance verification (MAEAP verification). Bold print indicates a violation of state or federal regulation. Bold italic print indicates conformance with Right-to-Farm guidelines.</p>					

Pest 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
<p>3.01 Do you use integrated pest management (IPM) on your farm?</p>	<p>Pest management decisions are based on:</p> <ul style="list-style-type: none"> - A weekly monitor program utilizing traps. - Visual scouting techniques. - Collection of weather data. - Economic thresholds and use of predictive models. <p>Reduced-risk spray application equipment used.</p> <p>Pesticide selection considers effects on beneficial organisms and inclusion of reduced-risk materials.</p> <p>Pesticide selection considers prevention of pesticide resistance development by pests.</p> <p>Cultural methods are utilized to reduce need for pesticide application:</p> <ul style="list-style-type: none"> - Timing of mowing for sanitation to reduce inoculum. - Use of mulch or ground cover under plants to reduce leaching of nitrates into groundwater, suppress weeds, conserve water, etc. 	<p>Control decisions not based on routine, site-specific monitoring but on MSU or on-farm consultant recommendations using regional information.</p> <p>Reduced-risk pesticides are utilized.</p>	<p>Pesticides are utilized to control pests on a calendar basis only; little consideration is given to pest monitoring.</p> <p>Reduced-risk pesticides are not utilized.</p>		
<p>A boxed risk level indicates the level required for environmental assurance verification (MAEAP verification).</p> <p>Bold print indicates a violation of state or federal regulation.</p> <p>Bold italic print indicates conformance with Right-to-Farm guidelines.</p>					

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
<p>3.02 How do you control weeds on your farm?</p>	<p>Herbicide selection and rates are based on weed species present; scouting and thresholds are utilized. Where appropriate, cultural and mechanical practices are used to suppress weeds and minimize weed seed survival (cultivation, crop rotation, certified seed, cover crops, mulch, etc.).</p>	<p>Pre-emergence and post-emergence herbicides are selected on the basis of past performance, weed history, cost or ease of application.</p>	<p>Herbicides are selected primarily on the basis of price or ease of application. Little consideration is given to weed species present.</p>		
<p>3.03 How do you control insects on your farm?</p>	<p>Treatment is always based on monitoring, predictive models and economic thresholds. Where available, reduced-risk and biological pesticides (e.g., Bt), pheromones, cultural methods (resistant varieties, field border management, etc.), selective insecticides and reduced-risk pesticide application methods are used.</p>	<p>Insecticide treatments are not based on site-specific monitoring but on MSU or off-farm consultant recommendations using regional information. Reduced-risk and biological pesticides are utilized.</p>	<p>Insecticides are used as insurance or on a calendar schedule regardless of insect pressure or treatment thresholds.</p>		
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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					
3.04) How do you control plant diseases on your farm?	Fungicide and bactericide use is based on disease prediction, weather forecasts and site-specific scouting information. Reduced-risk materials and reduced-risk pesticide application methods are utilized. Diseases are managed through cultural methods where available (resistant varieties, field and equipment sanitation, inoculum reduction, etc.).	Fungicide and bactericide use is based on disease prediction, weather forecast and regional scouting information. Spraying is done at the first sign of disease.	Crop is not monitored for disease. Spraying is based on the stage of plant development or calendar date.		
3.05) Do you consider soil characteristics and field conditions when making pesticide applications?	Soil characteristics (texture and organic matter) and field conditions (slope and moisture) are assessed when deciding on pesticide application practices. Site-specific or variable-rate technology may be used.	Whole-field application rates are based on the most vulnerable soil type in the field.	Pesticides are applied at full labeled rates without regard to vulnerable soil characteristics or field conditions.		
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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
3.06 How do you protect surface and groundwater in and near fields from pesticide contamination?	Pesticide labels with ground-water and surface water advisory statements are followed.		Labeled directions are not followed. ¹⁷ Spray is applied adjacent to or over the top of surface water, tile drain inlet or well. Other field restrictions are ignored.		Field maps indicating pesticide label setbacks and other restrictions are followed. Plan identifies sensitive areas and how they are treated. Drift management plan available.
3.07 Are leaching/runoff and toxicity potentials considered when making pesticide decisions?	Pesticides with the lowest potentials for leaching, runoff and non-target toxicity are always selected when appropriate for use in fields. Delay some spray applications to non-rainy periods. Use of mulches and ground covers under trees to prevent leaching.	Leaching/runoff and toxicity potentials are occasionally considered when selecting soil-applied pesticides.	Pesticide choice is not based on leaching/runoff and toxicity potentials. Only cost and effectiveness are considered.		
3.08 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.
<p>A boxed risk level indicates the level required for environmental assurance verification (MAEAP verification).</p> <p>Bold print indicates a violation of state or federal regulation.</p> <p>Bold italic print indicates conformance with Right-to-Farm guidelines.</p>					

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
<p>3.09 Do you protect workers and pesticide handlers from exposure to pesticides?</p>	<p>Workers and handlers: -Follow specific label requirements. -Are provided decontamination supplies. -Are trained or certified applicators. -Are informed of pesticide applications. -Are provided personal protective equipment. -Are provided emergency assistance, if needed. -Follow preharvest interval and restricted-entry interval requirements.</p>	<p>Worker Protection Standard requirements are partially met.¹⁹</p>	<p>Worker Protection Standard requirements are ignored.¹⁹</p>		
<p>3.10 If pesticides are mixed and loaded in the field, how are they handled?</p>	<p>A mixing and loading pad is used. Mixing and loading are done more than 150 feet from any well and more than 50 feet from surface waters.</p>	<p>Mixing and loading are done in different locations in the field, more than 150 feet from a private well, more than 800 feet from a public well* and more than 50 feet from surface waters. A mixing and loading pad is not used.</p>	<p>Pesticides are mixed and loaded at the same spot in the field year after year without a pad.</p>		<p>Proper pesticide mixing and loading demonstrated.</p>
<p>* See groundwater technician for additional information on criteria for reduced isolation distances.</p> <p>A boxed risk level indicates the level required for environmental assurance verification (MAEAP verification). Bold print indicates a violation of state or federal regulation. Bold italic print indicates conformance with Right-to-Farm guidelines.</p>					

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
<p>3.11 How do you rinse and dispose of empty pesticide containers?</p>	<p>Containers are triple-rinsed or power rinsed, punctured and returned to dealer, recycled or taken to a licensed landfill. Bags are returned to dealer or taken to licensed landfill.</p>	<p>Disposal of empty containers and bags on the farm property.^{8, 17}</p>	<p>Disposal of partially filled containers. Burning of containers on the farm property.^{8, 17}</p>		<p>Evidence of containers being recycled.</p>
<p>3.12 Do pesticide applicators read and follow the label instructions?</p>	<p>Everyone using pesticides follows label and labeling instructions.</p>		<p>Label and labeling instructions are not always followed.¹⁷</p>		<p>Evidence that labels are followed.</p>
<p>3.13 What management practices are used to prevent the development of pest resistance to certain pesticides?</p>	<p>Pesticides with different modes of action are rotated (target successive pest generations with different pesticide classes) or used in tank mixes where permitted. Pesticides at highest risk of resistance are not used when alternatives are available. Full rates used for pesticides suspected of resistance development.</p>	<p>Some but not all pesticide modes of action are rotated or tank mixed. Pesticides at highest risk of resistance are used sparingly.</p>	<p>Pest resistance is not considered when selecting pesticides.</p>		
<p>3.14 Is a spill kit immediately available to pesticide applicators in the field?</p>	<p>A spill kit containing a shovel, absorbent material, PPE and a container is immediately available.</p>		<p>No spill kit is available, or no plan is in place to contain spills.⁶</p>		<p>Adequate spill kit present.</p>

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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
3.15 How are excess mixtures and pesticide tank rinsate disposal handled?	Excess mixtures and rinsate are used at or below labeled rates.		No plan is in place to deal with excess mixture or rinsate.		Evidence that rinsate is properly managed.
3.16 How do you ensure the proper and safe operation of pesticide application equipment?	Equipment is correctly calibrated at least annually, and leaks are minimized to apply intended rate and distribution pattern.		Pesticide application equipment is not properly calibrated. ⁶		Date equipment calibrated recorded annually.
3.17 How do you assure that pesticide applications remain on-target and minimize off-target pesticide spray drift?	A written drift management plan is utilized (when needed) that minimizes off-target drift. Spraying is less than 5 mph winds is avoided with airblast sprayers.	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. ⁶		Written drift management plan on file.
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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
3.18) What pesticide application records are kept?	Accurate records are maintained of all agricultural of crop applications pesticides for at least 3 years.	Partial pesticide records are kept. Plan to maintain complete pesticide application records, and a form has been identified that will be used to record pesticide application information.	No record is kept. Chemicals used are known by memory or invoices only.		Pesticide records for the past 3 years on file (or plans to maintain records). <ul style="list-style-type: none"> - Date of application. - Time of application. - Pesticide brand/product name. - Pesticide formulation. - EPA registration number. - Active ingredient(s). - Restricted-entry interval (REI). - Rate per acre or unit. - Crop, commodity, stored product or site that received the application. - Total amount of pesticide applied. - Size of area treated. - Applicator's name. - Applicator's certification number. - Location of the application. - Method of application. - Target pest. - Carrier volume per acre. Additional optional records: <ul style="list-style-type: none"> - Full or alternate-row application. - Weather conditions. - Pest monitoring records and predictive model timing used. - Follow-up evaluation of action taken.

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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
3.19) Do you consider the effects of insecticide use on beneficial insect populations?	Use reduced-risk insecticides and delay timing of insecticide application to allow natural enemy (NE) population to build.	Reduced-risk materials used, timing of insecticide application delayed to allow NE populations to build, and targeted “hot spot” spray applications used.	Beneficial insect management is not considered.		
3.20) Do you provide habitat to enhance populations of beneficial natural enemies?	Plantings of ground covers/mulches under plants and in drive rows for alternative nutrient management and natural enemy habitat. Provide and sequence flowering plants for nectar and pollen rewards season-long, and provide nesting habitat around plantings to enhance pollinator and natural enemy populations.	Ground covers/mulches used under plants.	Beneficial insect management is not considered.		
3.21) Do you manage cultural practices to enhance populations of beneficial natural enemies?	Use alternate-row mowing method for insect control, NE enhancement and pollinator preservation. Maintain mow-free strips around planting perimeter for natural enemy and pollinator preservation.	Maintain mow-free strips around planting perimeter for natural enemy and pollinator preservation.	Beneficial insect management is not considered.		
3.22) Do you augment natural enemy populations?	Release of biological control organisms, when appropriate.		Beneficial insect management is not considered.		
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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
3.23) Whom would you contact if you had an agricultural pollution emergency?	Call 911 or sheriff, fire or emergency services department, or the MDA Agriculture Pollution Emergency Hotline: 1-800-405-0101, or the MDEQ Pollution Emergency Alerting System: 1-800-292-4706.		Would not contact state or local authorities. ⁴		Farm emergency plan on file, or local emergency telephone numbers immediately available.

Water Use

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) If your ground-water and surface water pumps have a combined capacity to pump more than 70 gallons per minute (100,000 gallons per day) for agricultural purposes, have you registered and reported water use to the state of Michigan?	Pump capacity is less than 70 gallons per minute (100,000 gallons per day). Or, Register and report annual water use to Michigan Department of Agriculture.		Pump capacity is greater than 70 gallons per minute (100,000 gallons per day) and producer does not report water use to the state of Michigan. ¹³		Farm records indicate compliance.
4.02) Is there an unused well located in the cropping area?	No unused well, or abandoned well properly sealed.		Unused, unsealed well in cropping area. ¹		Unused well(s) properly sealed.

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Irrigation Management Practices (If you do not use irrigation, skip this section.)

Risk question	Low Risk – 3 (recommended)	Medium Risk – 2 (potential hazard)	High Risk – 1 (significant hazard)	Your Risk	Records or evidence for MAEAP verification
System Management					
5.01) Have all irrigation systems been evaluated for application uniformity?	All irrigation systems have been evaluated for uniformity in the past 5 years. Corrections are made to the system to improve uniformity.	Some irrigation systems have been evaluated for uniformity. Remainder of systems scheduled to be evaluated within 5 years.	Irrigation system uniformity has not been evaluated.		Uniformity tests on file. Schedule for evaluating systems that have not been evaluated.
5.02) Are all sprinkler systems operated to minimize drift and off-target application?	All sprinkler systems are operated to minimize drift and off-target application. No off-target irrigation application present.	Most sprinkler systems operated to minimize drift and off-target application. Few off-target irrigation applications occur.	Sprinkler systems are often operated under windy conditions. Water is sprayed over roads, adjacent property or structures.		No field evidence of off-target applications.
5.03) Is noise control provided when needed?	Noise control is provided when needed.	In most areas of concern, noise control is provided when needed.	Noise control is not provided when needed.		
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Irrigation Management Practices (If you do not use irrigation, skip this section.)

Risk question	Low Risk – 3 (recommended)	Medium Risk – 2 (potential hazard)	High Risk – 1 (significant hazard)	Your Risk	Records or evidence for MAEAP verification
Record Keeping					
<p>5.04) Are proper irrigation system management records collected and retained for use in decision making and for reference in case of complaints?</p>	<p>Irrigation system management records are collected and retained, including:</p> <ul style="list-style-type: none"> -Crop type and location. -Source of the water used. -Date and amount of each irrigation water application. -All system inspections and repairs that influence uniformity and leaks. -Calibration of fertigation and chemigation. equipment, if used. -Records on system uniformity evaluation. 	<p>Most of irrigation system management records are collected and retained. Plan to maintain complete irrigation records.</p>	<p>Few or no irrigation system management records are collected and retained.</p>		<p>Irrigation records on file, or plans to maintain records.</p>
<p>A boxed risk level indicates the level required for environmental assurance verification (MAEAP verification). Bold print indicates a violation of state or federal regulation. Bold italic print indicates conformance with Right-to-Farm guidelines.</p>					

Irrigation 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
Irrigation Scheduling					
<p>5.05 How do you determine when it is necessary to irrigate and how much water should be applied during each irrigation event (irrigation scheduling)?</p>	<p>Irrigation water is scheduled on the basis of:</p> <ul style="list-style-type: none"> -Available soil water for each unit scheduled. -Depth of rooting for each crop irrigated. -Container capacity for container-grown nursery crops. -Allowable soil moisture depletion at each stage of crop growth. -Measured, estimated or published evapotranspiration data to determine crop water use. -Measure rainfall in each field or block irrigated. 	<p>Irrigation water is scheduled on the basis of observed soil moisture content and/or daily water crop usage.</p>	<p>Irrigation water is applied at a set rate per week if no precipitation is received.</p>		<p>Scheduling system evident by records.</p>
Application practices to avoid runoff and leaching (most applicable to strawberry and small fruit production)					
<p>5.06 Are irrigation application amounts chosen to avoid surface runoff under sprinkler irrigation?</p>	<p>Irrigation application amounts are chosen to avoid surface runoff under sprinkler irrigation.</p>		<p>Excessive runoff occurs on a regular basis.</p>		<p>No field evidence of runoff.</p>
<p>5.07 Are all sprinkler nozzle packages and/or drip emitters matched to the infiltration rate of the soil?</p>	<p>Sprinkler nozzle packages are matched to the infiltration rate of the soil. No irrigation runoff and/or ponding is present.</p>	<p>Most sprinkler nozzle packages are matched to the infiltration rate of the soil. Some irrigation runoff and/or ponding is present.</p>	<p>Sprinkler nozzle packages are not matched to the infiltration rate of the soil. Irrigation runoff and/or excessive ponding in low areas is commonly visible.</p>		
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Irrigation 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
<p>5.08 Are split applications of nitrogen fertilizer used when nitrogen is used in an irrigated field?</p>	<p>Split applications of nitrogen fertilizer are used when nitrogen is used in an irrigated field. N application does not exceed MSU recommendation.</p>		<p>Nitrogen fertilizers are applied through irrigation on the basis of visual crop symptoms. Total N applied exceeds MSU recommendation.</p>		<p>Split applications of N indicated in records.</p>
<p>5.09 Are appropriate backflow prevention devices in place and properly maintained if fertigation or chemigation is used?</p>	<p>Backflow prevention safety devices are used and properly maintained if fertigation or chemigation is used.</p>	<p>Backflow prevention devices are almost always used and/or properly maintained.</p>	<p>Backflow prevention devices are not used and/or properly maintained.</p>		<p>Operational backflow devices field confirmed.</p>
<p>5.10 Is excess irrigation avoided?</p>	<p>Irrigation water applications in excess of the quantity of water needed to replace the soil/substrate moisture deficit are avoided.</p>	<p>Excess irrigation water applications may occur occasionally.</p>	<p>Excess irrigation water applications are common.</p>		
Wellhead Protection					
<p>5.11 Is the irrigation well adequately protected from contamination from pesticides and fertilizers?</p>	<p>Anti-backflow device is installed, and agricultural chemical/fertilizer storage and preparation areas are at least 150 feet from the well.</p>	<p>Anti-backflow device is installed, agricultural chemical/fertilizer storage and preparation areas have secondary containment, but storage and preparation areas are less than 150 feet from the well.¹</p>	<p>No anti-backflow device,¹ no secondary containment and less than 150 feet isolation distance from irrigation well.¹</p>		<p>Isolation distances field confirmed.</p>
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Other Environmental Risks in the Cropping System

Risk question	Low Risk – 3 (recommended)	Medium Risk – 2 (potential hazard)	High Risk – 1 (significant hazard)	Your Risk	Records or evidence for MAEAP verification
6.01 Are conservation and management practices routinely inspected and evaluated?	Owner or trained individual routinely inspects and evaluates conservation and management practices.	Conservation and management practices are informally evaluated during field operations.	Practices are not inspected nor evaluated.		
6.02 Are there other activities, products, processes/equipment, services, by-products and/or wastes in the cropping areas that pose contamination risks to groundwater or surface water?	No	Yes, plan to mitigate the contamination risk.	Yes, but no plan to mitigate contamination risk.		No other environmental risks found in cropping areas.

Fruit System Improvement Action Plan

Develop your cropping system improvement action plan for risks beginning on the inside cover of this bulletin.
Once you have implemented your plan, you can request MAEAP verification of your cropping system.

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Table 1. 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; MDA 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	MDA/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. Agricultural employers must be able to verify compliance.	Each employee must be trained every 5 years	MDA/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 DEQ before the installation is placed into service. Smaller tanks have other requirements to be met.	Annual	MDEQ/Waste and Hazardous Materials Division	
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/Air	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 Bureau	
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/Land and Water Management 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	MDA	

(continued on page 30)

Table 1. (continued)

Other environmental guidelines	Description	Administering agency
Manure management and utilization	<p>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/mda.</p>	MDA
Pesticide utilization and pest control		
Nutrient utilization		
Site selection and odor control for new and expanding livestock production facilities		
Irrigation water use		
MAEAP verification: livestock, farmstead, and cropping systems	<p>MAEAP systems verification is valid for three 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.</p>	MDA

Table 2. Legal citations for environmental risks in Crop*A*Syst for Orchards and Fruit Producers

Foot-note	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 1976	
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	
16	Grade A Milk Law, Public Act 266 of 2001	Storage and Handling of Flammable and Combustible Liquids
Federal Law		
17	Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	
18	Title III of the Superfund Amendments and Reauthorization Act of 1986, also know as the Emergency Planning and Community Right-to-Know Act	
19	Worker Protection Standard for Agricultural Pesticides	
20	Clean Water Act	

Orchard and Fruit System Improvement Action Plan (continued)

Risk question	List high-risk practice(s) from Orchard*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

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: 517-241-4730.



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