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RULE ADOPTIONS

**AGRICULTURE
DIVISION OF AGRICULTURAL AND NATURAL RESOURCES**

41 N.J.R. 1171(a)

Adopted New Rules: N.J.A.C. 2:91

Criteria and Standards for Animal Waste Management

Proposed: March 3, 2008 at 40 N.J.R. 917(a).

Adopted: February 17, 2009 by the State Board of Agriculture and Alfred Murray, Acting Secretary, Department of Agriculture.

Filed: February 18, 2009 as R.2009 d.88, **with substantive and technical changes** not requiring additional public notice or comment (see N.J.A.C. 1:30-6.3).

Authority: N.J.S.A. 4:9-38, 4:27-19 and 2A:58-10 et seq.

Effective Date: March 16, 2009.

Expiration Date: March 16, 2014.

Summary of Public Comments and Agency Responses:

The Department received five comments from the public during the comment period concerning the adoption of N.J.A.C. 2:91. The commenters are listed below. The following is a summary of the comments received and the Department's responses. Each commenter is identified at the end of the comment by a number, which corresponds to the following list:

1. Barbara Sachau, resident, Morris County
2. Clifford Lundin, Supervisor, Sussex County Soil Conservation District
3. William Minervini, resident, Burlington County
4. Emerson Eisele, resident, Salem County
5. Richard Nieuwenhuis, President, New Jersey Farm Bureau

Comments shown in quotation marks are the verbatim statements as received by the Department; comments not shown in quotation marks have either been summarized or condensed for the purpose of clarity.

I. Summary, Economic, Agriculture Industry Impact Statements, Regulatory Flexibility Analysis and General Comments

1. COMMENT: The commenter states that "I oppose self certification on Animal Waste Plans. Fees are an essential part of this program. The public has a right to see what fees for documentation are being proposed here. The public also should know what the fine schedule is and there should be fines for those who do not comply. This Dept works only for farmers and screws every other New Jersey taxpayer to pay for costs that should be paid by agribusiness profiteers. The fee and fine schedule is essential. It is clear we need huge fines to make these programs effective." "Agribusiness polluters pollute to a great degree what with animal waste, toxic pesticides, etc. This industry cannot be trusted at all to clean itself up." (1)

RESPONSE: The Department does not agree with the commenter concerning self certification in certain circumstances. In fact, the Department and the United States Department of Agriculture (USDA)--Natural Resources Conservation Service (NRCS) realized that there was not enough conservation technical assistance staff to assist the number of operations that would be impacted by these rules (approximately 10,000+ animal operations). Therefore, the Department developed a program that provides technical assistance tools--including an Animal Waste Management (AWMP) template (electronic and hard copy), education and outreach sessions in each agricultural county after rule adoption and a tiered AWMP approval process that would rely on self-certification for those operations with eight to 299 Animal Units (AU) with animal densities less than one AU per acre. Operations with animal densities greater than one AU per acre and any operation with 300 or more AUs must have their AWMPs reviewed to ensure consistency with the NRCS New Jersey-Field Office Technical Guide standards and be approved by the local Soil Conservation District. In addition, operations with 300 or more AUs must forward their approved Comprehensive Nutrient Management Plans to the Department for certification. With respect to fees for this program, the public has a right to know that the Department did not propose administrative fees in these rules due to the fragile nature of the livestock industry in the State and in recognition of the fact that there will be costs associated with AWMP implementation. As to "huge fines," the Department considers the penalty points and penalty fines that are outlined in the table in Subchapter 4, Penalties and Enforcement to be the appropriate level. Fines range from \$ 250.00 to \$ 1,000 per day.

2. COMMENT: The commenter states "I saw when humane standards for farm animals were proposed, how quickly inhumane standards from 1935 were allowed to continue. It is clear agribusiness thinks only of itself and nobody else. The industry pressure from this relatively small industry is immense. We cannot allow these agribusiness profiteers to continue with their inhumane animal abusing, polluting practices."(1)

RESPONSE: The Humane Treatment of Domestic Livestock standards are outside of the scope of this rule proposal. The Criteria and Standards for Animal Waste Management rules establish the criteria and standards for the proper disposal of animal wastes, including wastes generated from aquaculture.

COMMENT: "I am writing in favor for Environmental Friendly Animal Waste Rules. I have reason to believe animals should be kept out of the flood plains, wetlands and all bodies of water except water pools dug in a safe zone where runoff cannot find its way into our State's waters. I am a member of the Farm Bureau and I believe no person has a right to pollute our waters." (4)

RESPONSE: The Department agrees with the commenter that the management of animals as related to water access is very important. Accordingly, the rules require that, with the exception of aquatic farms, no farm shall allow livestock in confined areas to have access to waters of the State unless such access is controlled in accordance with part IV of the New Jersey Department of Agriculture (NJDA) Best Management Practices (BMP) Manual. In addition, it is highly recommended, although not required at this time, that animals in areas that are not "confined" be fenced from adjacent water bodies.

3. COMMENT: Manure should be injected into the soil at the time of application. This would prevent storm water runoff pollution. Plus applying it in one application would save the farmer time and money. (4)

RESPONSE: The Department agrees with this comment. Immediate incorporation of fertilizer and manure is suggested in one of the many Best Management Practices for Nutrient Management in the NJDA BMP Manual.

4. COMMENT: The commenter states "Every co-agency consulting on this proposal has financial interests in allowing continued pollution. No consult was made with any member of the general public." (1)

RESPONSE: The Department does not agree with the commenter concerning involvement of parties with "financial interests in allowing pollution" and absence of public participation in this rulemaking. The rules were developed utilizing Department, the United States Department of Agriculture--Natural Resources Conservation Service, Rutgers Cooperative Extension and Department of Environmental Protection staff and resources. The draft rules were first released to the public for informal review in September 2004. Three regional public outreach meetings were held (North, Central and South) in 2005. The revised draft was released again to the public for a second informal review in May 2006. The rules were finalized and proposed in the March 3, 2008 New Jersey Register subject to a 60-day public comment period.

5. COMMENT: The commenter states "Aquaculture is a horribly polluting industry (sic), producing inferior fish to wild fish and requiring [page=1172] huge amounts of wild fish to be caught to be fed to the aquacultured fish--hardly a good deal. No amounts of taxpayer dollars should be used for this horribly polluting industry at any time in any way. This industry is a loser with fish having lice and endless toxic chemicals to raise them." (1)

RESPONSE: The Department does not agree with the commenter as the information provided is not factually correct. Seventy-six percent of all aquaculture production in New Jersey is bivalve molluscan shellfish, which are filter feeders that receive no chemical or therapeutic treatment. In fact, these shellfish leave discharge water cleaner than the incoming water. A growing body of scientific research indicates that shellfish culture and culture systems provide microhabitats for marine organisms and they may actually confer a net environmental benefit from their activity while generating economic benefit to the State.

A New Jersey Pollutant Discharge Elimination System (NJPDES) permit is required for any coldwater finfish aquaculture facility producing more than 25,000 pounds of fish per calendar year or feeding more than 5,000 pounds of fish in a calendar month. The NJPDES permit is also required for warm water finfish aquaculture facilities producing more than 100,000 pounds of fish per calendar year. There are no private fish farms in New Jersey that exceed these thresholds.

Domestic industrial fisheries for Gulf and Atlantic menhaden from which fish meal and fish oil are derived for aquaculture and numerous other commercial applications are regulated under Federal sustainably managed fisheries plans. The remainder of the issues brought forth by the commenter relate to net pen culture of salmon in open ocean environments. Although salmon aquaculture has received considerable media attention in recent years, net pen salmon farms are not found in or near New Jersey.

6. COMMENT: The commenter states "I note the endless general taxpayer fees paying for agribusiness costs. The amount of general taxpayer dollars going to agribusiness welfare is enormous. They get local money, state money, county money and federal money--adding up to a gravy train which nobody bothers at any level to add up. These people are among the richest in any county. Meanwhile, agribusiness does not want to pay for a thing. They want welfare over and over and over again."(1)

RESPONSE: Agribusiness and the use of tax money in connection with the agricultural industry are outside of the scope of this rule proposal.

7. COMMENT: In general I support the Department's efforts and the proposed rules. The rules represent a balanced approach in meeting the requirements of the Federal Clean Water Act. (2)

RESPONSE: The Department thanks the commenter for the support and agrees with this comment.

8. COMMENT: I applaud the Department's efforts to utilize the services of Soil Conservation Districts as an approval agency and as a depository for the AWMPs and the Comprehensive Nutrient Management Plans (CNMPs). (2)

RESPONSE: The Department thanks the commenter and clarifies that Soil Conservation Districts (SCDs) will approve high-density AWMPs and CNMPs, just as they currently approve Farm Conservation Plans. However, SCDs will not approve self-certified AWMPs and will not serve as a depository of plans, as they do not currently serve as a plan depository. Farm Conservation Plans are filed at local USDA--Natural Resources Conservation Service offices.

9. COMMENT: I would suggest that the final version of the rules be modified to provide that a copy of all self-certified AWMPs be also forwarded to the local Soil Conservation District. As written there is currently no one location where an interested party can determine if an operation has complied with the rules. By providing that a copy of the self-certified AWMP be provided to the District, there will be a central depository for each county for all levels of plans. This could be implemented by a minor amendment to proposed N.J.A.C. 2:91-3.4(e). (2)

RESPONSE: The Department appreciates the commenter's suggestion but does not agree and clarifies that Soil Conservation Districts do not currently serve as local depositories for Farm Conservation Plans. Those plans are filed at local USDA--Natural Resources Conservation Service offices. Local Rutgers Cooperative Extension offices will serve as depositories for declaration pages that must be filed by operators who are required to develop and implement self-certified AWMPs, with copies of the declaration pages provided to the NJDA. High-density AWMPs and CNMPs will be filed in the same manner as approved Farm Conservation Plans--with the local USDA- Natural Resources Conservation Service office.

10. COMMENT: As you are aware, Soil Conservation Districts currently receive no direct funding from the State of New Jersey. Many Districts also do not receive funds from their counties. I would suggest that a SCD be authorized under the proposed rules to collect a reasonable fee for the review and approval of an AWMP and a CNMP. The fee should be tied to the cost of providing the services rendered. (2)

RESPONSE: The Department thanks the commenter but does not agree with this comment. In developing these rules, the Department responded to the strong objection regarding fees and decided not to include them. Soil Conservation Districts will approve high-density AWMPs and CNMPs in the same way that they currently approve Farm Conservation Plans. The NJDA has eliminated all administrative fees from these rules and does not intend to authorize the SCDs to collect fees for the review and approval of the plans required by these rules, as the SCDs do not currently collect fees for reviewing and approving Farm Conservation Plans.

11. COMMENT: The commenter states "Farms that receive or apply 50 tons of animal waste must have a plan approved by NJ DEP. I think we need to monitor any bribes in this kind of monitoring too. 142 tons is too high a standard of pollution to allow at any time. The threshold of 7 dairy cows is far too high a standards." (sic) (1)

RESPONSE: The Department does not agree with the commenter's analysis. The rules establish a minimum threshold of eight animal units (one AU or Animal Unit equals 1,000 pounds of live body weight calculated on an annual average basis) to be consistent with the thresholds set by the USDA--Natural Resources Conservation Service as it relates to the ranking and qualification for the New Jersey Environmental Quality Incentive Program (EQIP), regarding dairy and other livestock. The threshold is also consistent with those set in other surrounding states, such as Maryland and Delaware. One-hundred-forty-two tons of manure is equivalent to the approximate annual manure production of seven adult dairy cows, just below the threshold that would trigger the AWMP requirements. All agricultural animal operations will have to follow the general requirements of the rules. Operations below the threshold with one to seven AUs or those receiving or applying less than 142 tons of animal waste per year, are strongly encouraged, but not required to develop a self-certified Animal Waste Management Plan.

12. COMMENT: The commenter states "There should never be 3 years allowed to develop a plan. 1 year maximum is long enough for compliance." (1)

RESPONSE: The Department believes that the timeframes are reasonable since all farms are required to implement the general requirements of the rules within 12 months of the effective date of these rules. In addition, operations with eight to 299 AUs or those receiving or applying 142 or more tons of animal waste per year are required to develop a self-certified or high-density Animal Waste Management Plan within 18 months of the effective date of these rules. The plans must be completely implemented within 36 months of the effective date of these rules. Operations with 300 or more AUs are required to have a CNMP developed and completely implemented within 36 months of the effective date of these rules and must receive certification from the NJDA. The Department believes that the majority of livestock farms with more than 300 AUs have already developed and implemented a CNMP, although some may have to be updated.

13. COMMENT: The commenter states "A game farm must come under these rules as well as all equine facilities. Growing deer is animal units. Growing horses for "breeding" (where they end up shipped off to die in grisly slaughterhouses sent by uncaring profiteering owners) also needs regulations since animal waste is produced. We cannot allow deer game farms and horses to escape mandatory inspections for pollution and standards to be kept." (1)

RESPONSE: The Department clarifies that game farms are regulated by the New Jersey Department of Environmental Protection, Division of [page=1173] Fish and Wildlife (N.J.A.C. 7:25-4) and are outside the scope of these rules. Equine facilities are regulated by these rules, as equine is livestock.

14. COMMENT: The commenter states "This plan takes precedence over any right to farm act on all pollution actions by agribusiness profiteers. Evidently the agribusiness profiteers are looking for a loophole to continue polluting by putting right to farm act as primary. It is not and should not be primary at any time." "Penalty violations shall be noted

in local newspapers and be open for public inspection and put on the official website as violators so the public can follow the pollution practices of their profiteering neighbors. Agribusiness cannot be trusted not to pollute. (1)

RESPONSE: The Department disagrees with the apparent basis for the commenter's position as it is not accurate. Farmers are not entitled to Right-to-Farm (RTF) protections unless they are in compliance with all relevant local, State and Federal rules and regulations. Once these rules are adopted, farmers must be in compliance if they seek Right-to-Farm protection regarding practices related to animal waste management. It is anticipated that the criteria and standards set forth in these rules could potentially serve as the Agricultural Management Practice for Animal Waste Management if considered and adopted by the State Agriculture Development Committee.

Official RTF determinations are made during the open public monthly meetings of the county agriculture development boards.

15. COMMENT: The commenter states "NJAC2:91-3.4 must be reduced down to 50 AU's not 299 AU's. NAC (sic) 2:91-3.7 farms apply 50 tons & up are mandatorily required to develop AWMP which has to be approved by NJ DEP. No self certifying (sic) plans are acceptable to the general population of this state, which has seen more than its share of corruption." (1)

RESPONSE: The Department considers the commenter's assertions to be inaccurate, as stated. The Department increased the threshold of AUs to include a larger tier than first proposed in 2004 due to the limited technical resources available to implement the rules. However, doing so did not negate the requirement for Animal Waste Management Plans. The Department actually enhanced the regulation by requiring a certified technical review of self-certified plans for animal operations with animal densities greater than one AU per acre to ensure conformance with the New Jersey Field Office Technical Guide (NJ-FOTG) and requiring a CNMP for all animal operations with more than 300 AUs regardless of animal density.

16. COMMENT: The commenter states "NJAC 2:91-3.9 - No exemptions for anything are allowed. None." "NJAC2:91-3.10 The amount of animal waste on a farm is a public record fully available for all or any members of the public to see. It is not a state secret hidden away for insiders. This kind of provision (sic) is why we have the high level of corruption present in NJ Govt today. No secrecy please." "All hearings on violations shall be publicly noticed on the website and in the newspaper and noticed to the entire public."(1)

RESPONSE: The Department disagrees as to the exemptions and considers that the limited exemptions are reasonable and offer a balanced approach that recognizes valid differences between the exempt circumstances (*inter alia* agriculture fairs, veterinarian hospitals persons regulated by NJDEP) and farms that generate, handle or receive animal waste. Also the Department does not agree that this process involves "secrecy." All farms are required to implement the general requirements of the rules within 12 months of the effective date of these rules. Operations below the threshold of eight AUs or those receiving or applying less than 142 tons of animal waste per year, are strongly encouraged, but not required to develop a self-certified Animal Waste Management Plan. The New Jersey Department of Agriculture is bound to follow the requirements of Federal and State law but will hold confidential only that information included in a self-certified AWMP, high-density AWMP and CNMP, which constitutes proprietary commercial or financial information, or is otherwise protected from disclosure under 7 CFR 205.501 and 205.504 or the Open Public Records Act, N.J.S.A. 47:1A-1 et seq. Hearings and violations will be handled in accordance with the Penalty Enforcement Law, N.J.S.A. 2A:58-10 et seq., or, if appealed, as contested cases under the Administrative Procedures Act, N.J.S.A. 52:14B-1 et seq.

17. COMMENT: The commenter states "These proposed rules are very favorable to agribusiness and of no help at all in having clean water/air or soil. They have been developed for self interest and financial gain for agribusiness. They need to toughen up."(1)

RESPONSE: The Department disagrees and believes that these rules provide a reasonable, practical and affordable approach to meeting the mandate for reducing non-point source pollution from farms as outlined in the Federal Clean Water Action Plan. The Department has provided some flexibility regarding non-compliance in cases where the operator's ability to take corrective action is beyond his or her control, including, but not limited to, weather conditions, need for professional assistance or need for special machinery. The Department provides for enhanced penalties of double the amount of the original penalty if the violation causes an impairment to water quality as determined by the Department using the criteria set forth in N.J.A.C. 7:9B-1.14 and 7:9C-1.7.

18. COMMENT: "Pg 10- We want effluents kept from state waters also during chronic and chatastrophic storms."(1)

RESPONSE: The Department does not disagree. AWMPs and CNMPs do consider the two-year and 10-year, 24-hour storm event as part of addressing stormwater management to protect water quality on farms.

19. COMMENT: "The livestock sector of this industry is not at all "vital" to this state - - not at all. Factually this is a very very tiny industry(1)

RESPONSE: The Department disagrees and estimates that of the more than 10,000 animal operations in the State, over 7,000 are equine operations. In 2007, Rutgers University conducted a study of the economic impact of the Equine industry and found that it contributes \$ 1.1 billion dollars to the State's economy. \$ 647 million or 59 percent is generated by equine operations (farms and stables that house equine animals) and by horse owners who board their animals on equine operations. Racing-related operations produce \$ 278.2 million, while non-racing operations account for \$ 262.4 million in economic impact. Other livestock, poultry and their products contribute approximately \$ 92 million to the State's economy.

20. COMMENT: The Department is not assisting farmers but rather requiring farmers to have an AWMP in some capacity. Assist implies support or aid. We recommend that the language of this sentence be clarified and recommend that "assist" be removed and "establish criteria and standards for" be inserted. (5)

RESPONSE: The Department appreciates the commenter's interpretation. Although the structure of the rule requires the development and implementation of AWMPs and CNMPs, the Department has concurrently developed tools to assist the livestock industry with rule compliance, including a BMP Manual and plan template. The Department finds the suggested language to be consistent with the intent of the rule; however, as the Summary is final upon publication, it cannot be changed.

21. COMMENT: We support the Department's decision to waive fees for these rules. The additional costs of complying with these regulations are already burdensome to farmers financially. (5)

RESPONSE: The Department agrees with this comment and thanks the commenter.

22. COMMENT: Indicate the full title of the Memoranda of Agreement (MOA) and the complete date that it was signed in agreement. In addition, it is our understanding that the State Soil Conservation Committee also entered into the MOA and should also be included in the statement. The sentence may then read: "To further implement the NJDEP/USEPA agreement, the Department, the State Soil Conservation Committee and NJDEP entered into a Memorandum of Agreement entitled "Agricultural Point and Nonpoint Source Pollution Prevention and Abatement" on June 30, 2000 (MOA) that established roles and responsibilities in meeting the mandate for reducing non-point source pollution from farms as defined at N.J.A.C. 2:91-2.1."(5)

RESPONSE: The commenter is correct about the complete title of the agreement however, as the Summary is final upon publication, it cannot be changed.

COMMENT: While NJDEP has the authority to issue permits they must first require those permits. We recommend replacing the word "issue" with "require." Additionally, under N.J.A.C. 7:14A-2.5(d) the NJDEP specifically states their authority to impose appropriate management measures "to achieve and maintain" applicable water quality [page=1174] standards. We recommend that "to achieve and maintain" be used instead of "to maintain". (5)

RESPONSE: While the Department appreciates the suggested clarification it considers the language contained in the rule to be accurate. In addition, as the Summary is final upon publication, it cannot be changed.

COMMENT: The N.J.A.C. is cited incorrectly. It should state the general requirements section of the rules as "N.J.A.C. 2:91-3.1" not "N.J.A.C. 2:90-3.1." (5)

RESPONSE: The Department thanks the commenter for the correction of the typographical error in the Summary, noting that the text of the rule contains the proper cite and as the Summary is final upon publication, it cannot be changed.

23. COMMENT: This is the first time that the term "New Jersey Best Management Practices Manual" appears in the document; however, the acronym "NJ BMP Manual" should read "NJDA BMP Manual" as this is how the New Jersey Department of Agriculture Best Management Practices Manual (NJDA BMP Manual) is defined in Subchapter 2-Definitions. (5)

RESPONSE: The Department appreciates the commenter's clarification. Although the commenter is correct, as the Summary is final upon publication, it cannot be changed.

24. COMMENT: To maintain consistency with the title of "Part IV. Directory of Best Management Practices for Water Quality Protection on the Farm" as it appears in the NJDA BMP Manual and the APPENDIX of these rules, it is suggested that "Part 4" as it appears in paragraph 13 of the Summary be changed from Arabic numerals to Roman numerals and appear as "Part IV." (5)

RESPONSE: Although the Department understands the basis for the commenter's suggested change, as the Summary is final upon publication, it cannot be changed.

25. COMMENT: NJFB supports these rules upholding the Right-To-Farm Act and urges the Department to make every effort to encourage the State Agriculture Development Committee (SADC) to develop an Agricultural Management Practice as soon as possible to support the protections and benefits of the Right-To-Farm Act for the associated practices for animal waste management. This can provide a significant Right-To-Farm protection against public and private nuisance suits. (5)

RESPONSE: The Department agrees with this comment and thanks the commenter.

26. COMMENT: What happens if the person reporting contacts the NJDEP for the alleged violation of these rules? Will NJDEP then contact the NJDA to investigate the farm in question before NJDEP investigates the alleged violation? If any animal feeding operation (AFO) can be considered a concentrated animal feeding operation (CAFO), then a farm in violation that is impacting water quality may be deemed by the NJDEP as a CAFO and required to obtain an NJPDES permit. NJDA must be contacted for alleged violations FIRST. While we have raised these questions before, to date, we have not received answers that satisfy our concerns. (5)

RESPONSE: The Department thanks the commenter for the questions and anticipates a cooperative and coordinated effort with the Department of Environmental Protection (DEP) regarding the implementation of these rules. To date, there has been collaboration on non-point source pollution issues on farms, as the DEP does reach out to the Department on these issues. The Department expects that coordination to continue once these rules are adopted.

27. COMMENT: Will the "relevant parts" of the 2008 edition that are subject to rulemaking be available at no cost or will the complete NJDA BMP Manual 2008 edition be available at no cost to farmers? NJFB recommends that the entire 2008 edition be available farmers at no cost. (5)

RESPONSE: The Department agrees with this comment. The NJDA BMP Manual 2008 edition will be available to farmers at no cost.

28. COMMENT: It is anticipated that a greater number of landowners will disallow the application of animal waste to their fields where manure applications would exceed 142 tons annually. Many livestock farms cooperate with neighbors who provide land for the application of animal wastes. The proposed rules may deter neighbors from accepting animal waste applications onto their fields, as they would then be either encouraged or required to develop an animal waste plan themselves. If neighbors disallow the application of animal wastes onto their fields this could reduce the land available for animal waste application and result in greater dependence on off-farm disposal of animal waste. The loss of this land-base could severely impact livestock producers financially, as a result of the increased expense of off-farm disposal. Additionally, we feel reiterating the availability of technical and financial assistance would be prudent. It is critical that the Department seek sources of financial aid for technical assistance and cost-sharing to assist farmers. (5)

RESPONSE: The Department understands the concerns expressed by the commenter but believes that strongly encouraging or requiring the development and implementation of AWMPs is the most responsible approach to protecting water quality on farms. As noted in the rule Summary, tools are being developed to assist with rule compliance, as well as education and outreach sessions in each of the agricultural counties to assist operators with plan development. It is anticipated that Federal funding will continue to be available through Farm Bill Programs and possibly State cost-share programs for plan implementation.

29. COMMENT: The Regulatory Flexibility Analysis states at 40 N.J.R. 917(a), 921 that "the development of CNMPs will most likely require technical assistance." Under what circumstances, if any, would farms be likely to need the services of a New Jersey licensed professional engineer in order to develop or implement CNMPs? (3)

RESPONSE: The Department believes that, if and when technical assistance from a licensed professional engineer is necessary during the development and/or implementation of a CNMP, such assistance will most likely be available through the USDA-NRCS.

30. COMMENT: The development of different CNMPs is expected to be very fact intensive and, as a consequence, the Department does not believe that it is possible to accurately predict the combination of circumstances, which may require the services of a New Jersey licensed professional engineer. The same fact specific difficulties in predicting technical needs are expected to occur in connection with various implementation issues. For these reasons the Department is not able to respond with specific circumstances requested by the commenter.

Under what circumstances, if any, would farms be likely to need the services of a person certified through the State of Maryland Nutrient Certification Program in order to develop CNMPs? (3)

RESPONSE: The Department is aware that CNMPs will be developed by professional conservation planners who are certified to develop and implement such plans. It is possible that some of those professionals may have been certified through Maryland's Program.

N.J.A.C. 2:91-1.1(a)

31. COMMENT: We recommend that the Department change the statement "to protect water quality by:" to "to protect water quality and public health by:" as N.J.A.C. 2:91-1.1(a)4 and 5 also address public health concerns that are not specific to water quality protection alone. (5)

RESPONSE: The Department agrees with this comment and has made the change upon adoption.

32. COMMENT: Because proposed N.J.A.C. 2:91-1.1(a)4 and 5 address concerns not limited to water quality, the second sentence of proposed N.J.A.C. 2:91-1.1(a) should be changed by inserting the words "and otherwise promote the public health, safety, and general welfare" immediately after "to protect water quality." (3)

RESPONSE: The Department acknowledges the position of the commenter and added the words "and public health" upon adoption but believes that the additional language suggested goes beyond the purpose and scope of the rules.

N.J.A.C. 2:91-1.1(b)

33. COMMENT: Because proposed N.J.A.C. 2:91-3.7 and 3.8 apply to "farms receiving or applying . . . animal waste" whether or not those farms have animals, the words "and to farms receiving or applying animal waste" should be added at the end of the first sentence of proposed N.J.A.C. 2:91-1.1(b). (3)

RESPONSE: The Department agrees with this comment and has added the language upon adoption.

34. COMMENT: Because facilities with animal waste may be regulated by the New Jersey Department of Environmental Protection [page=1175] (NJDEP) under N.J.A.C. 7:14A through the individual New Jersey Pollutant Discharge Elimination System (NJPDES) permits, as well as CAFO General Permit #NJ0138631, the second sentence of proposed N.J.A.C. 2:91-1.1(b) should be changed by inserting the words "for example," immediately before "CAFO General Permit #NJ013831." (3)

RESPONSE: The rule addresses the Department's responsibilities and the Department declines to accept the suggested language.

35. COMMENT: Alternatively, the second sentence of proposed N.J.A.C. 2:91-1.1(b) should be changed by replacing all the words following "facilities" with the words "exempt under N.J.A.C. 2:91-3.9." (3)

RESPONSE: The Department disagrees with this comment and believes that there is value to the regulated community in the actual identification of those regulated facilities, which are not subject to the rules. The list is provided in the first subchapter to provide more clarity than is provided through reference to another part of the rules.

36. COMMENT: We suggest that definitions for "surface waters of the State" be included in the definitions section of the rules. Surface waters of the State, as defined in the Surface Water Quality Standards rule N.J.A.C. 7:9B, include artificial water bodies (that is, manmade ponds, ditches, etc.). Some farmers may be unaware that their manmade pond is considered a surface water of the State. Additionally, since the language "surface waters of the State" is specifically used in N.J.A.C. 2:91-1.1(a) and 3.1(b) to establish manure storage area setbacks from surface waters, please define the term in order to avoid possible confusion about what constitutes a "surface water of the State." (5)

RESPONSE: The Department notes that the term "waters of the State" is defined in Subchapter 2 of the rules and means all surface and ground waters in New Jersey, but does not include closed system aquatic farms. This definition is contained in the Aquaculture Development Act (N.J.S.A. 4:27-1 et seq.) and was used intentionally. N.J.A.C. 2:91-1.1(a) uses the term "waters of the State," which is defined in the rules. N.J.A.C. 2:91-3.1(b) uses the term surface waters of the State, to differentiate between ground water and surface water when referring to "waters of the State" in this instance.

N.J.A.C. 2:91-2.1

37. COMMENT: The term "land application" appears to be used in proposed N.J.A.C. 2:91-3.1(c) and (d) only, and the proposed N.J.A.C. 2:91-2.1 definition of "land application" includes the words "for the purpose of soil improvement and utilization of nutrients by plants." Is it NJDA's position that if "animal waste" (as defined in proposed N.J.A.C. 2:91-2.1) is applied on land for some other purpose (such as simple disposal of the waste), the facility is regulated by the NJDEP under N.J.A.C. 7:26 or 7:26A, and therefore excluded by proposed N.J.A.C. 2:91-1.1(b) and 3.9 from regulation under proposed N.J.A.C. 2:91? How will NJDA determine whether or not the purpose of applying the waste is "soil improvement and utilization of nutrients by plants?" (3)

RESPONSE: The Department emphasizes that all farms are required to follow the general requirements of the rules. These requirements include the land application of animal waste, when it is being performed in accordance with the principles of the NJDA BMP Manual. The Manual includes 15 BMPs related to the proper management of nutrients. The Department assumes that those operators that apply manure to their land do so in harmony with the definition of "land application."

N.J.A.C. 2:91-3.1(b)

38. COMMENT: Rule language should be added that specifically address farms where permanent manure storage structures already located within 100 linear feet from surface waters of the State. (5)

RESPONSE: The Department does not believe that the suggested change is necessary. It anticipates that the majority of permanent manure storage structures were designed and sited in conformance with a CNMP. The CNMP would take into account adjacent waterways when determining the best location for the structure. In the rare cases that a manure storage structure is within 100 linear feet of a surface water body, BMPs, such as filter strips, can be implemented to mitigate any potential non-point source pollution impacts.

N.J.A.C. 2:91-3.3

39. COMMENT: It is suggested that the acronym for animal units (AU), be incorporated into the section heading.(5)

RESPONSE: The Department agrees with this comment and has incorporated the acronym into the section heading upon adoption.

N.J.A.C. 2:91-3.4

40. COMMENT: Similar to N.J.A.C. 2:91-3.3; it is suggested that the acronym for animal units (AU) and animal densities (AD) be incorporated into the section heading. (5)

RESPONSE: The Department agrees with this comment and has incorporated the acronyms into the section heading upon adoption.

N.J.A.C. 2:91-3.4(c)7

41. COMMENT: NJFB opposes inclusion of the Premises Identification Number as a requirement in the various animal waste management plans. Premises registration is one component of the National Animal Identification System (NAIS), which is voluntary program that livestock owners may choose to participate in by registering their premises with the State. Since Premises Identification Number (PIN) is assigned only to farms that are voluntarily enrolled it is suggested that "if available" be added at the end of the statement or that the Premises Identification Number be eliminated from the rules. Farmers may perceive this statement as a requirement for farms to have a Premises Identification Number (PIN) when it is in fact, not required at this time. (5)

RESPONSE: The Department agrees with this comment and has added the language "if available" upon adoption. This is consistent with the position of the United States Department of Agriculture (USDA). During rule development by the Department, the intention of the USDA was to implement certain aspects of the National Animal Identification System on a mandatory basis. The position of USDA has changed and the Premises Identification Number (PIN) is now considered voluntary by USDA.

N.J.A.C. 2:91-3.4(c)8iii

42. COMMENT: Grammatical error-recommend change "Crop-yield" to "crop-yield." (5)

RESPONSE: The Department agrees with this comment and has made the change upon adoption.

N.J.A.C. 2:91-3.4(e)1

43. COMMENT: Proposed N.J.A.C. 2:91-3.4(e)1 should also require the declaration page to be provided by the Department, already for the self-certified Animal Waste Management Plan to include the name, physical address and phone number of farm, the name and mailing address of the owner/operator, and the Premises Identification Number as assigned by USDA. (3)

RESPONSE: The Department agrees with this comment. The declaration page contains all of the information as suggested by the commenter. However, the Premises Identification Number is required if it is available, as this is a voluntary program of the USDA.

N.J.A.C. 2:91-3.5(b)2 and 3.6(c)2

44. COMMENT: Proposed N.J.A.C. 2:91-3.5(b)2 and 3.6(c)2 should also require the plan to include the name and mailing address of the owner or operator. (3)

RESPONSE: The Department agrees with this comment and has made the change upon adoption.

N.J.A.C. 2:91-3.5(b)6

45. COMMENT: Grammatical error- recommend change "Size" to "size." (5)

RESPONSE: The Department agrees with this comment and has made the change upon adoption.

N.J.A.C. 2:91-3.5(b)7

46. COMMENT: NJFB opposes inclusion of the Premises Identification Number as a requirement in the various animal waste management plans. Premises registration is one component of the National Animal Identification System (NAIS), which is voluntary program that livestock owners may choose to participate in by registering [page=1176] their premises with the State. Since Premises Identification Number (PIN) is assigned only to farms that are voluntarily enrolled it is suggested that "if available" be added at the end of the statement or that the Premises Identification Number be eliminated from the rules. Farmers may perceive this statement as a requirement for farms to have a Premises Identification Number (PIN) when it is in fact, not required at this time. If the PIN requirement is kept in the rules then add the word "and" to the end of the amended statement. (5)

RESPONSE: The Department agrees with this comment and has added the language "if available" upon adoption. See the Response to Comment 41 for more information. The Department also agrees to add "and" to the end of the Paragraph.

N.J.A.C. 2:91-3.6

47. COMMENT: Since this is the beginning of a new threshold section, restate the acronym for animal units (AU) in the section heading. (5)

RESPONSE: The Department agrees with this comment and has made the change upon adoption.

N.J.A.C. 2:91-3.6(a)

48. COMMENT: This deviates from the section heading grammatically. Replace "greater" with "more." (5)

RESPONSE: The Department agrees with this comment and has made the change upon adoption.

N.J.A.C. 2:91-3.6(c)

49. COMMENT: NJFB opposes inclusion of the Premises Identification Number as a requirement in the various animal waste management plans. Premises registration is one component of the National Animal Identification System (NAIS), which is voluntary program that livestock owners may choose to participate in by registering their premises with the State. Since Premises Identification Number (PIN) is assigned only to farms that are voluntarily enrolled it is suggested that "if available" be added at the end of the statement or that the Premises Identification Number be eliminated from the rules. Farmers may perceive this statement as a requirement for farms to have a Premises Identification Number (PIN) when it is in fact, not required at this time. (5)

RESPONSE: The Department agrees with this comment and has added the language "if available" upon adoption. See the Response to Comment 41 for more information.

50. COMMENT: Proposed N.J.A.C. 2:91-3.6(c) should also expressly require the CNMP to include "the number and type of animals confined." This information would help the NJDA, the soil conservation districts and others evaluate whether the facility (which may have far more than 300 animal units) is a "concentrated animal feeding operation" that is regulated by the NJDEP under N.J.A.C. 7:14A, and therefore excluded by proposed N.J.A.C. 2:91-1.1(b) and 3.9 from regulation under proposed N.J.A.C. 2:91. (3)

RESPONSE: The Department does not believe this suggested addition is explicitly necessary because CNMPs are broad plans unique to animal operations that include a great deal of information. N.J.A.C. 2:91-3.6 sets forth the information contained in these plans in a very general way. The number of confined animals on the farm would be likely to be noted in the plan. This number would be expected to vary throughout the year and would be necessary information to have during the development of the plan, since the goal of the plan is to ensure that both production and natural resource protection goals are achieved.

N.J.A.C. 2:91-3.6(c)9

51. COMMENT: It is unclear whether the Department means nutrient, manure or animal waste utilization activities when stating "other utilization activities" (5)

RESPONSE: The Department considers that "other utilization activities" means alternative uses of manure when land application opportunities are limited, such as using manure for energy production or methods to reduce the weight, volume or form of manure to reduce transportation costs and create a more valuable product.

N.J.A.C. 2:91-3.6(g)

52. COMMENT: The time frame for filing a CNMP amendment, when the number of AUs increases, should be increased to 45 days. This would provide additional time for the producer to determine the necessary changes to the plan to accommodate an increase in livestock. It would also provide more time for the appropriate agent to review the CNMP and the completion of the administrative tasks associated with filing the CNMP. Thirty days is not sufficient time to change, approve and file the amended CNMP. (5)

RESPONSE: The Department disagrees with this comment and will continue to allow 30 days for the CNMP updates that will be necessary if the number of animal units increases by 25 percent. This timeframe was discussed with the Animal Waste Rule Advisory Committee, which included several animal operators who agreed with this timeframe. If the Department finds that the timeframe is problematic, changes can be made when the rule is updated.

N.J.A.C. 2:91-3.7

53. COMMENT: I would suggest that the criteria for farms receiving waste as contained in proposed N.J.A.C. 2:91-3.7 be tied to an amount of waste received per acre of farmland, and not be tied to a strict tonnage figure. A small farming operation receiving 142 tons of animal waste could have a significant water quality impact. There must be a minimum acreage provided. (2)

RESPONSE: The Department disagrees with this comment. The Department decided to use animal units, animal density and manure tonnage to set the thresholds for requiring AWMPs and CNMPs. Farms receiving or applying less than 142 tons of animal waste per year are encouraged, but not required to develop and implement a self-certified

AWMP. One-hundred-forty-two tons of manure is equivalent to the approximate annual manure production of seven adult dairy cows, just below the threshold that would trigger the plan requirements. All farms are required to follow the general requirements of the rules, which include the land application of animal waste being performed in accordance with the principles of the NJDA BMP Manual. In addition, it would be very difficult to set thresholds based upon parcel acreage, since 100 percent of the acreage would most likely not be available for the land application of manure.

N.J.A.C. 2:91-3.7(d)

54. COMMENT: Grammatical error--remove "meets" from the sentence. (5)

RESPONSE: The Department agrees with this comment and has made the change upon adoption.

N.J.A.C. 2:91-3.8

55. COMMENT: The requirement in proposed N.J.A.C. 2:91-3.8(a)2 that the farm develops a "self-certified AWMP . . . in accordance with N.J.A.C. 2:91-3.5" is confusing because proposed N.J.A.C. 2:91-3.5 requires a "high-density AWMP," not a "self-certified" AWMP. Was "in accordance with N.J.A.C. 2:91-3.4 meant? (3)

RESPONSE: The commenter is correct. N.J.A.C. 2:91-3.8(a)2 should state a self-certified AWMP in accordance with N.J.A.C. 2:91-3.4. The error has been corrected upon adoption.

56. COMMENT: Farms developing a self-certified AWMP under proposed N.J.A.C. 2:91-3.8 should be required to file a signed declaration page with Rutgers Cooperative Extension (RCE) as if those farms were subject to proposed N.J.A.C. 2:91-3.4. (3)

RESPONSE: The Department disagrees with this comment. Farms receiving or applying 142 or more tons of animal waste per year are required to develop and implement a self-certified AWMP, but are not required to file a declaration page with the local RCE because the Department believes that the recordkeeping requirements for hauling animal waste that are required will be more informative than the plan itself. In addition all farms are required to follow the general requirements of the rules, which include the land application of animal waste being performed in accordance with the principles of the NJDA BMP Manual.

57. COMMENT: Farms receiving or applying 142 to 6,076 tons of animal waste per year at an average rate of more than 20 tons per year per [page=1177] acre of available farmland should be required to develop and submit a high-density AWMP as if those farms were subject to proposed N.J.A.C. 2:91-3.5. Farms receiving or applying 6,077 or more tons of animal waste per year should be required to develop and submit a CNMP as if those farms were subject to proposed N.J.A.C. 2:91-3.6. (3)

RESPONSE: The Department disagrees with this comment. It would be very difficult to track average application rates per acre of available farmland per year on every farm in the State. The Department believes that these rules provide the most reasonable, practical and affordable approach to meeting the mandate for reducing non-point pollution from farms as outlined in the Federal Clean Water Action Plan.

N.J.A.C. 2:91-3.8(a)4

58. COMMENT: We recommend that "hauling requirements" be replaced with "record-keeping requirements for hauling" since this statement requires that records of transfer, quantities of manure, names and addresses of manure sources be kept and not the manner in which manure is transferred between farms. (5)

RESPONSE: The Department agrees with this comment and has made the clarifying change upon adoption.

N.J.A.C. 2:91-3.10

59. COMMENT: Additional language should be added to the confidentiality statement to clarify that self-certified animal waste management plans (SCAWMP) are not subject to OPRA as the plans are solely maintained by the owner/operator. (5)

RESPONSE: The Department disagrees with this comment, as it is understood that the Open Public Records Act only applies to records or files held by government entities. Self-certified AWMPs will not be held by any government entity. They will only be held by the farm owner/operator. In addition, any exemptions from disclosure contained in other State or Federal laws, regulations or resolutions of the Legislature and the Governor also apply to exempt gov-

ernment records from disclosure in the State of New Jersey. Therefore, the confidentiality provisions provided by the USDA-NRCS would be upheld in New Jersey.

Summary of Changes Upon Adoption:

1. There is a change in N.J.A.C. 2:91-1.1(a) to add the phrase "and public health" to more completely identify the reasons to require the use of best management practices.
2. There is a change in N.J.A.C. 2:91-1.1(b) to clarify the farms to which the rules apply by adding "and to farms receiving or applying animal waste."
3. There is a clarifying change in N.J.A.C. 2:91-3.3 to incorporate the acronym for animal units (AU) into the section heading.
4. There is a clarifying change in N.J.A.C. 2:91-3.4 to incorporate the acronyms for animal units (AUs) and animal densities (ADs) into the section heading.
5. There is a change in N.J.A.C. 2:91-3.4(c)2, to add to the self-certified AWMP the "name and address" of the owner or operator.
6. There is a change in N.J.A.C. 2:91-3.4(c)7 to qualify the requirement for the Premises Identification Number by adding "(if available)."
7. There is a grammatical correction in N.J.A.C. 2:91-3.4(c)8iii to change "Crop-yield" from upper case to lower case.
8. There is a change in N.J.A.C. 2:91-3.5(b)2 to add to the high-density AWMP the "name and address" of the owner or operator.
9. There is a grammatical correction in N.J.A.C. 2:91-3.5(b)6 to change "Size" from upper case to lower case.
10. There is a change in N.J.A.C. 2:91-3.5(b)7 to qualify the requirement for the Premises Identification Number by adding "(if available)."
11. There is a change in N.J.A.C. 2:91-3.6 section heading to incorporate the acronym AUs for animal units.
12. There is a grammatical change in N.J.A.C. 2:91-3.6(a), to replace "greater" with "more."
13. There is a change in N.J.A.C. 2:91-3.6(c)2 to add to the Comprehensive Nutrient Management Plan the "name and address" of the owner or operator.
14. There is a change in N.J.A.C. 2:91-3.6(c)3 to qualify the requirement for the Premises Identification Number by adding "(if available)."
15. There is a change in N.J.A.C. 2:91-3.7(d) to correct a typographical error by removing the word "meets".
16. There is a change in N.J.A.C. 2:91-3.8(a)2 to correct a typographical error by changing N.J.A.C. 2:91-3.5 to 3.4.
17. There is a change in N.J.A.C. 2:91-3.8(a)4 to clarify the reference to "hauling requirements" by replacing "hauling requirements" with "recordkeeping requirements for hauling."
18. To clarify the language in N.J.A.C. 2:91-3.3(e)1, the Department has changed the text required in the Declaration page to include the appropriate reference to the defined term "farm" and specify the penalty section of the rule. The certification language is changed to:

"Certification: I hereby certify that I am the operator of the above identified farm, (as defined in N.J.A.C. 2:91). I further certify that I have developed and implemented a Self-Certified Animal Waste Management Plan for this farm in accordance with the requirements of N.J.A.C. 2:91.

I further certify that the foregoing statements made by me are true and the information provided in this document is true, accurate and complete. I am aware that if any of the foregoing statements made by me are willfully false, I am subject to punishment, including but not limited to the penalties contained in N.J.A.C. 2:91-4.1."

Federal Standards Statement

Executive order No. 27 (1994) and P.L. 1995, c. 65 require State agencies that adopt, readopt or amend State regulations that exceed any Federal standards or requirements to include in the rulemaking document a comparison with Federal law. There are no Federal laws or regulations governing waste management activities on farms encompassed in the proposed new rules except aquatic farms, which are subject to Concentrated Aquatic Animal Product Effluent Guidelines at 40 CFR Part 451. Under these guidelines, coldwater finfish facilities that feed more than 5,000 pounds of feed during the calendar month of maximum feeding and facilities that produce more than 20,000 pounds of coldwater finfish per year are regulated under the Federal statute. For warmwater finfish, facilities that are comprised of closed ponds with no discharge and facilities that produce more than 100,000 pounds per year are regulated. Operations that comply with the requirements of 40 CFR Part 451 are specifically exempt from the requirements of these new rules. As a result, only those operations not regulated by the Federal standards will be subject to these rules.

While the Clean Water Act and the Clean Water Action Plan address the restoration and protection of the nation's waters from point sources, it directs individual states to address non-point sources of pollution. Confined animal feeding operations (CAFOs) are considered point sources of pollution and must comply with the Federal Effluent Limitation Guideline that prohibits discharges to State waters except during chronic or catastrophic storm events. CAFOs are required to obtain permits in accordance with 40 CFR 122.23 and 122.24 and are regulated in New Jersey by the NJDEP pursuant to N.J.A.C. 7:14A-2.13. CAFOs are defined based upon the number of animals contained on the farm (generally 1,000 animals units or greater). These rules will regulate animal feeding operations that are not defined as CAFOs.

The USDA does provide for voluntary, incentive-based development and implementation of AWMPs using the Federal technical standards as contained in the NRCS Field Office Technical Guide. Although the Federal FOTG standards are not currently mandatory under Federal law, the proposed new rules nevertheless incorporate standards that are recognized and encouraged by the NRCS. These rules, therefore, meet but do not exceed the Federal standards. Thus, no Federal standards analysis is necessary.

Full text of the adopted new rules follows (additions to proposal indicated in boldface with asterisks ***thus***; deletions from proposal indicated in brackets with asterisks *[thus]*) follows:

[page=1178] CHAPTER 91

ANIMAL WASTE MANAGEMENT

SUBCHAPTER 1. PURPOSE AND SCOPE

2:91-1.1 Purpose and scope

(a) These rules set forth the requirements for the development and implementation of self-certified Animal Waste Management Plans (AWMPs), high-density AWMPs and Comprehensive Nutrient Management Plans (CNMPs) for farms that generate, handle or receive animal waste. The rules in this chapter require the use of best management practices to protect water quality ***and public health*** by:

1. Controlling animal access to the waters of the State;
2. Storing manure at least 100 linear feet from surface waters of the State;
3. Applying manure using proper nutrient management practices;
4. Minimizing odors from manure storage and application areas;
5. Controlling vectors and fomites; and
6. Optimizing the beneficial use of nutrients from manure and bedding materials.

(b) These rules only apply to farms with animals identified in the definition of "livestock" at N.J.A.C. 2:91-2.1 ***and to farms receiving or applying animal waste***. These rules do not apply to facilities regulated by the New Jersey De-

partment of Environmental Protection under N.J.A.C. 7:26 (solid waste management rules), 7:26A (solid waste recycling rules) and 7:14A (CAFO General Permit #NJ0138631).

(c) Aquatic farms that comply with the provisions of the Aquaculture Management Practices at N.J.A.C. 2:76-2A.11 and who possess an aquatic farmer license pursuant to N.J.A.C. 2:89 shall be deemed in compliance with the requirements of this chapter.

(d) Nothing in this chapter shall be construed to alter or compromise the goals, purposes, and provisions of, or lessen the protections afforded to farmers by, the Right to Farm Act, P.L. 1983, c. 31 (N.J.S.A. 4:1C-1 et seq.), and any rules adopted pursuant thereto.

SUBCHAPTER 2. DEFINITIONS

2:91-2.1 Definitions

For the purpose of this chapter, the following words and terms shall have the meanings described below, unless the context clearly indicates otherwise.

"Agricultural management practices (AMP)" means practices which have been recommended by the State Agriculture Development Committee, and adopted pursuant to the provisions of the Administrative Procedure Act, N.J.S.A. 52:14B-1 et seq.

"Animal density (AD)" means the number of animal units per acre of available farmland for pasturing animals and other land available for application of animal waste. For purposes of determining available farmland, only farmland actually used for pasturing or in which animal waste is actually applied can be counted, and specifically excludes land containing structures, woodlands and waters of the State.

"Animal unit (AU)" means 1,000 pounds of live body weight calculated on an annual average basis. In lieu of calculating the actual weight of each animal, the following conversion chart may be used for determining the animal units on farm:

Animal Unit Equivalentents and Manure Production

All Values Calculated from Midwest Plan Service - MWPS-18,20000 (by the American Society of Agricultural Engineers)

Note: Animals not identified in the list shall be calculated based on species, production goals, breed or accepted species weights as determined by RCE.

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"Animal waste" means livestock manure, unconsumed feed and associated bedding materials and animal carcasses from normal mortalities of livestock on a farm. For the purpose of these rules, animal waste shall be free of plastic, metal, glass or other non-biodegradable materials with the exception of de minimis quantities which result from agricultural activities. This definition specifically excludes Waste Class 5: Regulated Medical Waste, as found in N.J.A.C. 7:26-3A.6, which includes contaminated animal carcasses, body parts and associated animal bedding materials that were

known to have been exposed to infectious agents during research, including research at veterinary hospitals, production of biologicals, or testing of pharmaceuticals.

"Appropriate agent" means a person outside of the U.S. Department of Agriculture (USDA) who is authorized by NRCS to provide technical assistance in the delivery of technical services to implement agricultural programs in the United States Department of Agriculture authorized by Federal farm legislation.

"Aquaculture" means a form of agriculture involving the propagation, rearing and subsequent harvesting of aquatic organisms in controlled or selected environments, and the subsequent processing, packaging and marketing, and shall include, but is not limited to, activities to intervene in the rearing process to increase production such as stocking, feeding, transplanting and providing for protection from predators. Aquaculture is a water dependent activity but shall not include the construction of facilities and appurtenant structures that might otherwise be regulated pursuant to any State or Federal law or regulation.

"Aquatic farm" means any leased or privately owned water system and associated facilities and appurtenant structures capable of holding and/or producing cultured aquatic stock. It may also refer to more than one facility and may include both hatchery and grow-out components, multi-species farms, processing, packaging and marketing.

"Aquatic organism" means an animal or plant of any species or hybrid thereof and includes gametes, seeds, eggs, sperm, larvae, juvenile, and adult stages any of which is required to be in water during that stage of its life. This definition does not include birds and mammals.

"Best management practices (BMPs)" mean activities, procedures and practices prescribed in an AWMP or CNMP which incorporates criteria and standards of the NRCS NJ-FOTG, NJDA BMP Manual or any site specific recommendations made by NJAES.

"Certification" means a written authorization from the Department to implement a CNMP approved by the local district. The certification is valid for five years from the date of issuance.

"Composting" means the aerobic, biological decomposition of organic matter, including manure, leaves, bedding and crop residues. It is a natural process that can be enhanced and accelerated by selecting organic waste "recipes," as set forth in the NJ-FOTG, with proper carbon/nitrogen balance; mixing to provide proper aeration; and monitoring to assure that ideal moisture levels and temperatures are maintained. These extra steps provide optimal conditions for the microbes that transform "raw" on-farm wastes into a relatively stable soil amendment/crop nutrient.

"Comprehensive Nutrient Management Plan (CNMP)" means a conservation plan that is a grouping of conservation practices and management activities which will help to ensure that both production and natural resource protection goals are achieved on the farm. The CNMP shall conform to the NRCS NJ-FOTG and be approved by the District in accordance with N.J.A.C. 2:91-3.6.

"Confined areas" means housed lots, feedlots, confinement houses, stall barns, milk rooms, milking centers, cowyards, barnyards, medication pens, dry lots, exercise yards and stables.

"Department" means the New Jersey Department of Agriculture.

"District" or "Soil Conservation District" means a soil conservation district established in accordance with the Soil Conservation Act, N.J.S.A. 4:24-1 et seq., which is the official soil conservation district for the county or region in which the farm is located. Contact information for each local soil conservation district can be found at <http://www.state.nj.us/dep/dwq/pdf/soilcondist.pdf>. For the purposes of these rules, the District is an agent of the Department.

"Farm" means parcels of land where livestock is housed, kept, stabled, confined, fed, or otherwise maintained or any parcel that receives or applies animal waste. A farm may include parcels owned, leased or otherwise available to a person.

"Fomite" means inanimate objects that serve to carry infections or toxins from one animal to another.

"High-density Animal Waste Management Plan (High-density AWMP)" means the plan developed by the farm operator utilizing the NJDA BMP Manual, for the management of animal waste. The plan shall be reviewed by the local soil conservation district to ensure conformance with the NJ-FOTG in accordance with N.J.A.C. 2:91-3.5.

"Land application" means the application of animal waste on land for the purpose of soil improvement and utilization of nutrients by plants.

"Livestock" means all aquaculture organisms, cattle, horses, ponies and other domestic equidae (mules and similar members of the horse family), swine, sheep, goats, llama, poultry, fowl, ratites (big birds such as emus, ostriches), rabbits and small ruminants as defined in N.J.A.C. 2:8-1.2(a).

"Natural Resources Conservation Service (NRCS)" means the technical agency of the USDA, authorized by Public Law 46 of the 74th Congress (7 U.S.C. §6962) for the conservation of agricultural and related natural resources. Contact information for the New Jersey NRCS field offices can be found at <http://www.nj.nrcs.usda.gov/contact/>.

"New Jersey Agricultural Experiment Station (NJAES)" means an arm of Rutgers, the State University, conducting research in agriculture and related natural resources, as authorized by N.J.S.A. 4:16-1 and N.J.S.A. 18A:65-3.

"New Jersey Department of Agriculture Best Management Practices Manual (NJDA BMP Manual)" means the document entitled "On-Farm Strategies to Protect Water Quality," which was published in 2003, utilized as a planning and assessment tool for agricultural best management practices, published by the New Jersey Association of Conservation Districts, in cooperation with the Department, SSCC, and [page=1180] USDA-NRCS which is available by contacting New Jersey Department of Agriculture, P.O. Box 330, Trenton, New Jersey 08625.

"New Jersey Field Office Technical Guide (NJ-FOTG)" means the USDA-NRCS technical reference, as amended and supplemented, customized for the State of New Jersey, prescribing practices and standards for the conservation and management of soil, water and related natural resources which is available at http://efotg.nrcs.usda.gov/efotg_locator.aspx?map=NJ.

"Person" means any natural individual, society, association, board, venture, partnership, corporation, limited liability company, cooperative, company, organization, institution and governmental instrumentality recognized by law for any purpose whatsoever.

"Rutgers Cooperative Extension (RCE)" means an arm of Rutgers, the State University, providing educational services in agriculture and related natural resources.

"Self-Certified Animal Waste Management Plan (self-certified AWMP)" means the plan developed by the farm operator utilizing the NJDA BMP Manual for the management of animal waste in accordance with N.J.A.C. 2:91-3.4. The plan shall be self-certified by the owner or operator and the declaration page filed with RCE.

"State Agriculture Development Committee (SADC)" means the committee established pursuant to N.J.S.A. 4:1C-4 et seq.

"State Soil Conservation Committee (SSCC)" means the committee established pursuant to the Soil Conservation Act, N.J.S.A. 4:24-1 et seq.

"Technical service provider (TSP)" means NRCS-certified professionals outside of the USDA that help agricultural producers apply conservation practices on the land pursuant to 16 U.S.C. §3842(b).

"USDA" means the United States Department of Agriculture.

"Vector" means a living organism that serves to carry infections or toxins from one animal to another.

"Waters of the State" means all surface and ground waters in New Jersey but does not include closed system aquatic farms.

"Woodland" means an area of land covered with a large and thick collection of growing trees.

SUBCHAPTER 3. ANIMAL WASTE MANAGEMENT REQUIREMENTS

2:91-3.1 General requirements

(a) With the exception of aquatic farms, no farm shall allow livestock in confined areas to have access to waters of the State unless such access is controlled in accordance with part IV of the NJDA BMP Manual, incorporated herein by reference as the chapter Appendix.

1. Copies of the NJDA BMP Manual may be obtained by contacting the local District or one of the NRCS Field Offices or by contacting RCE at Rutgers Cooperative Extension, Rutgers, The State University of New Jersey, 88 Lipman Drive, New Brunswick, NJ 08901-8525.

2. A copy of this document is also on file in the NJDA office in the Division of Agricultural and Natural Resources, Health and Agriculture Building, Market and Warren Streets, Trenton, NJ 08625.

(b) Manure storage areas shall be located at least 100 linear feet from surface waters of the State, measured perpendicular to the watercourse from the top of bank outwards. Manure storage areas shall be designed to eliminate direct point source discharges to waters of the State except for stormwater discharges to surface water that occurs above a 25-year, 24-hour storm event.

(c) Land application of animal waste shall be performed in accordance with the principles of the New Jersey Department of Agriculture (NJDA), Best Management Practices (BMP) Manual Part IV.

(d) No livestock that have died from a reportable contagious disease listed in N.J.A.C. 2:2-1.1 or as a result of an act of bio-terrorism shall be disposed of, composted or made part of any land application without first contacting the State Veterinarian. In addition, no animal waste associated with livestock that have died from a reportable contagious disease listed in N.J.A.C. 2:2-1.1 or as a result of an act of bio-terrorism shall be disposed of, composted or made part of any land application without first contacting the State Veterinarian.

(e) Any person entering a farm to conduct official business related to these rules shall follow the bio-security protocol set forth below.

1. Vehicle: To avoid transporting infectious agents or toxins from one farm to another, vehicles shall be driven and parked in areas to avoid surfaces traveled by animals, farm equipment and farm vehicles. Car windows shall remain closed to prevent flying insects from getting inside vehicle.

2. Protective clothing: Clean cloth or disposable Tyvek coveralls shall be worn at each site. Cleaned and disinfected rubber boots or disposable boots are required. These items shall be changed or cleaned and disinfected between sites. If more than one species or group is housed on a site, each area shall be treated as a different site.

3. Equipment: All equipment shall be thoroughly cleaned and disinfected upon arrival and prior to leaving a site, except that new equipment, if clean, need not be disinfected upon arrival.

4. Order of inspection: The owner or manager of the site shall be consulted to determine the order for the site visitation. The areas with the lowest risk of exposure to infectious agents shall be visited first.

5. Cleaning: All organic debris (urine, feces) shall be removed and surfaces that have been exposed to organic debris must be thoroughly washed preceding disinfection to be effective. Disinfectants shall be applied only after removal of contaminated organic matter. Detergents shall be used on non-disposable boots and equipment to facilitate the removal of organic debris from these objects. Tools used to clean these items must also be cleaned and then disinfected prior to

additional use. Washed surfaces shall be allowed to dry before applying disinfectants. Efficient cleaning removes almost 99 percent of the agent from a contaminated object.

6. Disinfecting: Detergents shall be rinsed off thoroughly prior to the application of disinfectants to avoid any potentially hazardous chemical reactions. The use of disinfectants that have the broadest spectrum of activity, including efficacy on porous surfaces with organic debris, and contact safety is ideal. No single disinfectant will satisfy all considerations. Disinfectant properties should be evaluated with regard to the intended areas of use. Disinfectants shall be allowed to remain on treated surfaces for a minimum of seven minutes.

2:91-3.2 Aquatic farms

(a) Aquatic farms which comply with the Aquaculture Management Practices Manual set forth at N.J.A.C. 2:76-2A.11 and who possess an aquatic farmer license pursuant to N.J.A.C. 2:89 shall be deemed in compliance with the requirements of this chapter.

1. An electronic copy of the Aquaculture Management Practices is available at <http://www.jerseyseafood.nj.gov/aquacultureamp.pdf>.

2. A copy of this document is on file in the NJDA office of the Director, Division of Agricultural and Natural Resources, Health and Agriculture Building, Market and Warren Streets, Trenton, NJ 08625.

2:91-3.3 Farms with one to seven animal units ***(AUs)***

(a) Farms with one to seven AUs are required to implement the general requirements at N.J.A.C. 2:91-3.1 ***[within 12 months of the effective date of these rules]* *by March 16, 2010***.

(b) Farms with one to seven AUs are encouraged, but not required, to develop and implement a self-certified AWMP in accordance with N.J.A.C. 2:91-3.5.

(c) Farms with one to seven AUs having documented evidence of a direct discharge of animal waste into waters of the State, as determined by NJDA following an evidentiary hearing, shall comply with the requirements set forth in N.J.A.C. 2:91-3.6. Anyone who is aggrieved by a determination pursuant to this section shall, upon written request transmitted to the Department within 20 days of that determination, be afforded the opportunity for a hearing thereon in the manner provided for contested cases pursuant to the Administrative Procedure Act, N.J.S.A. 52:14B-1 et seq., and the Uniform Administrative Procedure Rules N.J.A.C. 1:1.

1. Requests for hearings shall be sent to Director, Division of Agricultural and Natural Resources, N.J. Department of Agriculture, P.O. Box 330, Trenton, New Jersey 08625-0330.

(d) New farms or farms meeting the one to seven AU threshold after ***[the effective date of these rules]* *March 16, 2009,*** shall implement the general requirements at N.J.A.C. 2:91-3.1 within 12 months of date when the farm meets the one to seven AU threshold.

[page=1181] 2:91-3.4 Farms with eight to 299 animal units ***(AUs)*** with animal densities ***(ADs)*** less than or equal to one AU per acre

(a) Farms with eight to 299 AUs and ADs less than or equal to one AU per acre shall:

1. Implement the general requirements at N.J.A.C. 2:91-3.1 ***[within 12 months of the effective date of these rules]* *by March 16, 2010***;

2. Develop a self-certified AWMP consistent with the NJDA BMP Manual ***[within 18 months of the effective date of these rules]* *by September 16, 2010***; and

3. Implement the plan completely ***[within 36 months of the effective date of these rules]* *by March 16, 2012***.

(b) New farms or farms meeting the AU and AD thresholds after *[the effective date of these rules]* **March 16, 2009**,* shall implement the general requirements at N.J.A.C. 2:91-3.1 within 12 months of date they meet the AU and AD thresholds in this *[Section]* **section*** and shall implement the requirements of this *[Section]* **section*** within 36 months from the date the farm reaches the thresholds set forth in this section.

(c) A self-certified AWMP shall include, but not be limited to, the following:

1. The name, physical address and phone number of the farm;
2. The owner or operator **name, address**,* signature and date;
3. Records of action plan activities as set forth in worksheet E of the NJ-BMP Manual;
4. A list of BMPs proposed;
5. The size and location of manure storage area(s);
6. The size and location of composting area(s);
7. The Premises Identification Number as assigned by USDA **(if available)***; and
8. Nutrient management records for each field. Records must include:
 - i. The field number, field name, physical address or other means of identification;
 - ii. The number of acres;
 - iii. The *[Crop]* **crop***-yield;
 - iv. The type of manure applied, the date of application, and the weather conditions;
 - v. The total amount of manure applied;
 - vi. The date manure is incorporated into the field;
 - vii. The type of fertilizer applied, the date of application, and the weather conditions; and
 - viii. A declarations page meeting the requirements of (e) below.

(d) The self-certified AWMP shall be developed by the farm owner or operator or a person authorized to act on their behalf.

(e) A copy of the self-certified AWMP shall be signed by the owner or operator and the declaration page shall be filed with RCE. RCE will provide a copy of the declaration page to the NJDA.

1. The declaration page shall include the following statement:

["As the owner/operator of the farm, I certify that, to the best of my ability, I have developed this self-certified Animal Waste Management Plan for my farm and will implement and maintain the provisions of the plan within the appropriate timeframes. I also certify, under penalty of law, that the information provided in this document is true, accurate and complete. I am aware that there are significant penalties for submitting false, inaccurate or incomplete information."]

***"Certification: I hereby certify that I am the operator of the above identified farm, (as defined in N.J.A.C. 2:91). I further certify that I have developed and implemented a Self-Certified Animal Waste Management Plan for this farm in accordance with the requirements of N.J.A.C. 2:91.**

I further certify that the foregoing statements made by me are true and the information provided in this document is true, accurate and complete. I am aware that if any of the foregoing statements made by me are willfully false, I am subject to punishment, including, but not limited to the penalties contained in N.J.A.C. 2:91-4.1."*

2. Incidents involving false swearing or false reporting in the documents required by these rules may be referred by the Department for prosecution pursuant to N.J.S.A. 2C:28-3.

(f) A copy of the self-certified AWMP shall be retained on the farm.

(g) The owner or operator shall review and update the plan and make changes as necessary for continued conformance with the NJDA BMP manual.

(h) Should the AD increase to greater than one AU per acre, or the number of AUs exceed 299, the owner or operator shall be required to comply with the requirements set forth in N.J.A.C. 2:91-3.5 or 3.6, respectively.

2:91-3.5 Farms with eight to 299 animal units with animal densities greater than one AU per acre

(a) Farms with eight to 299 AUs and AD greater than one AU per acre shall:

1. Implement the general requirements at N.J.A.C. 2:91-3.1 *[within 12 months of the effective date of these rules]* ***by March 16, 2010***;

2. *[Within 18 months of the effective date of these rules]* ***By September 16, 2010***, develop a high-density AWMP consistent with NJDA BMP Manual and the NJ-FOTG standards, incorporated herein by reference, and submit to the local district for review. If the high-density AWMP meets the NJ-FOTG standards, then the SCD will approve the plan.

i. Copies of the NJ-FOTG are available from the NRCS Field Offices and the State Office at 220 Davidson Ave, 4th Floor, Somerset, NJ 08873.

ii. An electronic copy of this document is available at <http://www.nrcs.usda.gov/technical/efotg/>.

iii. A copy of this document is also on file in the NJDA Office of the Director, Division of Agricultural and Natural Resources, New Jersey Department of Agriculture, Health and Agriculture Building, Market and Warren Streets, Trenton, New Jersey 08625;

3. File the original high-density AWMP with the local NRCS office once approved by the local district;

4. Retain a copy of the approved high-density AWMP on the farm; and

5. Implement the plan completely *[within 36 months of the effective date of these rules]* ***by March 16, 2012***.

(b) A high-density AWMP shall include, but not be limited to, the following:

1. The name, physical address and phone number of the farm;

2. The owner or operator ***name, address,*** signature and date;

3. Records of action plan activities as set forth in worksheet E of the NJ - BMP Manual;

4. The list of BMPs proposed;

5. The size and location of manure storage area(s);

6. The *[Size]* ***size*** and location of composting area(s);

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7. The Premises Identification Number as assigned by USDA ***(if available)*; *and***

8. The Nutrient management record for each field. Records must include:

- i. The field number, field name, physical location or other means of identification;
- ii. The number of acres;
- iii. The crop-yield;
- iv. The type of manure applied, the date of application, and the weather conditions;
- v. The total amount of manure applied;
- vi. The date manure is incorporated into the field; and
- vii. The type of fertilizer applied, the date of application, and the weather conditions.

(c) The high-density AWMP may be developed by the farm owner or operator or a person authorized to act on their behalf.

(d) The owner or operator shall review and update the plan and make changes as necessary for continued conformance with the NJDA BMP manual and the NJ-FOTG.

(e) Should the number of AUs exceed 299, the owner or operator shall be required to comply with the requirements set forth in N.J.A.C. 2:91-3.6.

(f) New farms or farms meeting the AU and AD thresholds after ***[the effective date of these rules]* *March 16, 2009*** shall implement the general requirements at N.J.A.C. 2:91-3.1 within 12 months of date they meet the AU and AD thresholds in this section and shall implement the [page=1182] requirements of this section within 36 months from the date the farm reaches the thresholds set forth in this section.

2:91-3.6 Farms with 300 or more animal units ***(AUs)***

(a) Farms with 300 or ***[greater]* *more*** animal units shall:

1. Implement the general requirements at N.J.A.C. 2:91-3.1 ***[within 12 months of the effective date of these rules]* *by March 16, 2010***; and

2. Develop a CNMP in consultation with the NRCS, TSP, or an appropriate agent, which conforms to the NJ-FOTG, and submit the CNMP to the local District for review and approval in accordance with (b) and (c) below.

i. Copies of the NJ-FOTG are available from the NRCS Field Offices and the State Office at 220 Davidson Ave, 4th Floor, Somerset, NJ 08873.

ii. An electronic copy of the NJ-FOTG is available at http://efotg.nrcs.usda.gov/efotg_locator.aspx?map=NJ.

iii. A copy of this document is on file in the NJDA Office of the Director, Division of Agricultural and Natural Resources, New Jersey Department of Agriculture, Health and Agriculture Building, Market and Warren Streets, Trenton, New Jersey 08625.

(b) If a District approved CNMP was developed and implemented between October 1, 2001 and ***[the effective date of this rule]* *March 16, 2009***, full implementation of such plan shall suffice to comply with these rules until modifications are needed to the plan in accordance with (g) below.

(c) The CNMP shall include the following:

1. The name, physical address and phone number of the farm;
2. The owner or operator ***name, address,*** signature and date;
3. The Premises Identification Number as assigned by USDA ***(if available)***;
4. Manure and wastewater handling and storage that addresses collection, storage, treatment and/or transfer practices;
5. Land treatment practices;
6. Nutrient management that identifies source, amount, timing and method of application of nutrients by field;
7. Recordkeeping that documents and demonstrates implementation activities associated with CNMPs;
8. Feed management activities that address nutrient reduction in manure; and
9. Other utilization activities.

(d) The District shall approve the CNMP when it is in conformance with the standards and criteria of the NJ-FOTG. Once approved by the District, the owner or operator shall provide a copy of the CNMP to the Department for certification along with a signed authorization releasing the plan to the Department on a form provided by the NRCS for this purpose.

(e) Upon receiving the approved CNMP, the Department shall issue a certification to the applicant. The Department shall retain a copy of the certification and CNMP and mail the original to the owner or operator. The owner or operator shall retain a copy of the certification and CNMP on the farm.

(f) The certification shall be valid for a period of five years. An application for certificate renewal shall be filed with the Department on forms developed by the Department for such purposes no later than 30 days prior to the expiration of the certification.

(g) The owner or operator shall review the CNMP annually to assure compliance with the rules. An updated CNMP shall be filed within 30 days of the occurrence an increase in the number of AUs by 25 percent. All revised CNMPs shall comply with the provisions of (c) through (f) above.

(h) ***[Within 36 months of the effective date of these rules]* *By March 16, 2012***, the CNMP shall be completely implemented.

(i) New farms and/or farms meeting the 300 AUs or more threshold after ***[the effective date of these rules]* *March 16, 2009*** shall implement the general requirements at N.J.A.C. 2:91-3.1 within 12 months of date they meet the 300 or more AUs threshold and shall implement (a) through (h) above within 36 months from the date the farm reaches the 300 or more AUs threshold.

2:91-3.7 Farms receiving or applying less than 142 tons of animal waste per year

(a) Farms receiving or applying less than 142 tons of animal waste per year are required to implement the general requirements at N.J.A.C. 2:91-3.1 ***[within 12 months of the effective date of these rules]* *by March 16, 2010***.

(b) Farms receiving or applying less than 142 tons of animal waste per year are encouraged, but not required to develop and implement a self-certified Animal Waste Management Plan (AWMP) in accordance with N.J.A.C. 2:91-3.4.

41 N.J.R. 1171(a)

(c) Should the amount of manure received or applied increase to 142 tons or more of animal waste per year, the owner or operator shall be required to comply with the requirements set forth in N.J.A.C. 2:91-3.8.

(d) New farms or existing farms who begin receiving or applying animal waste after *[the effective date of these rules]* **March 16, 2009*** shall implement (a) above within 12 months from the date the farm *[meets]* begins receiving or applying animal waste.

2:91-3.8 Farms receiving or applying 142 or more tons of animal waste per year

(a) Any farm that receives or applies 142 tons or more of animal waste per year shall:

1. Implement the general requirements at N.J.A.C. 2:91-3.1 *[within 12 months of the effective date of these rules]* **by March 16, 2010***;

2. Develop a self-certified AWMP *[within 18 months of the effective date of these rules]* **by September 16, 2010**,* in accordance with N.J.A.C. 2:91-3.5****3.4***;

3. Implement the plan completely *[within 36 months of the effective date of these rules]* **by March 16, 2012***; and

4. Maintain the following *[hauling]* **recordkeeping*** requirements **for hauling***:

i. Records of the dates of transfer and quantities of manure; and

ii. Records of the names and addresses of the sources of manure.

(b) New farms or farms that begin receiving or applying 142 tons or more animal waste annually after *[the effective date of these rules]* **March 16, 2009**,* shall implement the general requirements at N.J.A.C. 2:91-3.1 within 12 months of the date they meet the thresholds in this section and shall implement the requirements of this section within 36 months from the date the farm reaches the thresholds set forth in this section.

2:91-3.9 Exemptions

(a) The following are not subject to these rules:

1. An agricultural event or fair approved pursuant to N.J.A.C. 2:33-1.3 that is held within the State of New Jersey;

2. Any person that handles animal waste other than animal waste from livestock, including, but not limited to, dog kennels regulated pursuant to N.J.A.C. 8:23A and game farms regulated pursuant to N.J.A.C. 7:25-4;

3. Veterinarian hospitals or clinics operated by persons licensed pursuant to N.J.A.C. 13:44;

4. Temporary petting zoos;

5. Concentrated animal feeding operations and concentrated aquatic animal production facilities regulated by the New Jersey Department of Environmental Protection (NJDEP) pursuant to N.J.A.C. 7:14A-2.13 and 2.14;

6. Any person regulated by NJDEP under N.J.A.C. 7:26 (solid waste management rules); and

7. Any person regulated by NJDEP under N.J.A.C. 7:26A (solid waste recycling rules).

2:91-3.10 Confidentiality

The New Jersey Department of Agriculture will hold confidential any information included in a self-certified AWMP, high-density AWMP and CNMP, which constitutes proprietary commercial or financial information, or is otherwise

protected from disclosure under 7 CFR Part 205.501 and 205.504 or the Open Public Records Act, N.J.S.A. 47:1A-1 et seq., subject to the limitations set forth therein.

[page=1183] SUBCHAPTER 4. PENALTIES AND ENFORCEMENT

2:91-4.1 Penalty and enforcement provisions

(a) The Department shall investigate alleged violations of the rules and take appropriate action, which may include, but is not limited to, the following:

1. Any person who violates any provision of this chapter, or the requirements of a self-certified AWMP, high-density AWMP or CNMP developed pursuant to this chapter, shall be liable for a civil administrative penalty of up to \$ 1,000 per day for each violation as determined pursuant to the procedures set forth in this section.

2. Where non-compliance is found, the Department may allow the owner or operator up to 60 days to address or correct the non-compliance before imposing a civil administrative penalty. The length of time available to correct the non-compliance shall be based on the following factors:

- i. Inability to perform the corrective action due to circumstances beyond the persons control, including but not limited to weather conditions, need for professional assistance and need for special machinery to complete the corrective action;
- ii. Whether temporary corrective action can mitigate the non-compliance;
- iii. The severity of the non-compliance based upon the point system as set forth in (c) below;
- iv. The severity of the environmental impact caused by the non-compliance; and
- v. Any other mitigating factor.

(b) If a self-certified AWMP, high-density AWMP or CNMP has been developed but not fully implemented, the Department shall determine the status of compliance with this chapter. Where non-compliance is found, the Department shall issue a civil administrative penalty in accordance with (c) below.

(c) The Department shall use the factors described below to determine the amount of a civil administrative penalty under this section. The standards below assign each violation a point value. The total number of points is used to determine the penalty amount per day for each violation. The factors, and the point values assigned to them, are as follows:

1. The seriousness of the violation shall be classified as major, moderate or minor and assigned points as follows:

- i. Major conduct shall include an intentional, deliberate, purposeful, knowing or willful act or omission by the violator and is assigned three points;
- ii. Moderate conduct shall include any unintentional but foreseeable act or omission by the violator and is assigned two points; and
- iii. Minor conduct shall include any conduct not identified in (c)1i or ii above and is assigned one point.

2. The management plan type shall be assigned points as follows:

- i. A violation impacting a self-certified AWMP is assigned one point;
- ii. A violation impacting a high-density AWMP is assigned two points; and
- iii. A violation impacting a CNMP is assigned three points.

(d) The Department shall sum the total points assigned according to the factors in (c) above, and shall determine the penalty amount per day using the following table:

Penalty Points Table

Total Points	Maximum Penalty Amount Per Day
2	\$250
3	\$500
4	\$750
5 or more	\$1,000

(e) If the violation is of a continuing nature, each day during which it continues shall constitute an additional, separate, and distinct offense.

(f) For a violation under this section, the Department may adjust up or down the daily civil administrative penalty amount based on the following factors:

1. The violator's compliance history;
2. The nature, timing and effectiveness of measures the violator takes to mitigate the effects of the violation;
3. The nature, timing and effectiveness of measures the violator takes to prevent future similar violations;
4. Any unusual or extraordinary costs or impacts directly or indirectly imposed on the public or the environment as a result of the violation; and/or
5. Other specific circumstances of the violator or violation.

(g) No assessment shall be levied until after the party has been notified by certified mail or personal service and has been provided an opportunity for a hearing as outlined in (j) below.

(h) Any amount assessed shall take into account the seriousness and duration of the violation and whether the violation involves the failure to develop or to implement a self-certified AWMP, high-density AWMP or CNMP and shall also provide for an enhanced penalty of double the amount of the original penalty if the violation causes an impairment to water quality as determined by the Department using the criteria set forth in N.J.A.C. 7:9B-1.14 and 7:9C-1.7. Any civil administrative penalty assessed under this section may be compromised by the Secretary of Agriculture upon the posting of a performance bond by the violator, or upon such terms and conditions as the Secretary in consultation with the State Board of Agriculture may establish.

(i) Any person who fails to pay a civil administrative penalty in full shall be subject, upon order of a court, to a civil penalty of up to \$ 1,000 for each violation. Each day that the person fails to pay the penalty shall constitute an additional, separate, and distinct offense. Any such civil penalty imposed may be collected with costs in a summary proceeding pursuant to the Penalty Enforcement Law of 1999, P.L. 1999, c. 274 (N.J.S.A. 2A:58-10 et seq.).

(j) Anyone who is aggrieved by a determination pursuant to this section shall, upon written request transmitted to the Department within 20 days of that determination, be afforded the opportunity for a hearing thereon in the manner pro-

vided for contested cases pursuant to the Administrative Procedure Act, N.J.S.A. 52:14B-1 et seq., and the Uniform Administrative Procedure Rules N.J.A.C. 1:1.

1. Requests for hearings shall be sent to Director, Division of Agricultural and Natural Resources, N.J. Department of Agriculture, P.O. Box 330, Trenton, New Jersey 08625-0330.

[page=1184] APPENDIX

PART IV. Directory of Best Management Practices for Water Quality Protection on the Farm

A. Introduction

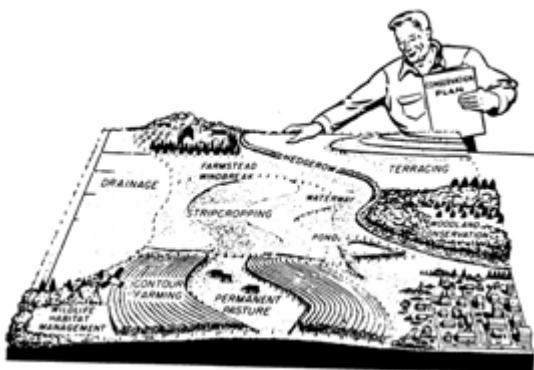
With respect to water quality, a best management practice is a method, measure or practice applied to prevent or reduce surface and ground water pollution.

THIS DIRECTORY OFFERS a "menu" of management options designed to address water quality impacts on farms. These options are called **Best Management Practices** (BMPs). With respect to water quality, a best management practice is a method, measure or practice applied to prevent or reduce surface and ground water pollution. Another term for "best management practice" is "conservation practice," used for many years by the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS). In fact, many "conservation practices" have been in common practice since the Service was created in the dust bowl days.

Many of the practices and measures listed in the **Directory** were, in fact, developed by the NRCS. The New Jersey State Office of the NRCS has assembled those practices most pertinent to New Jersey from a very wide national inventory of BMPs. These BMPs for New Jersey have been collected in the NRCS "Field Office Technical Guide" (FOTG) available at www.usda/nrcs/efotg. Each practice or measure contained in the FOTG has a detailed and technical description of the BMP, including the definition, purpose, planning considerations and design criteria.

Other BMPs have been developed by farmers and others in the agriculture industry. These BMPs have been tested and proven to be effective in addressing the problem, but currently are not among the list of practices and measures in the FOTG. Such practices may be innovative and extremely effective; some may not have yet withstood the tests of time or quality control that provide additional assurance of their overall effectiveness.

In most cases, the descriptions of BMPs in the **Directory** do not provide all the information needed to put the measure into practice. Agricultural composting is a good example of a practice that requires far more information than presented here. Some BMPs, such as the installation of a sediment basin or the implementation of an integrated pest management (IPM) program, require substantial technical assistance. Some installations require engineering. The purpose here is to acquaint farmers with the menu of options, and to provide enough information to enable further steps. These further steps may require collecting more data, obtaining technical assistance, or simply securing the proper equipment.



Click here for

image

Some of the BMPs may require state or federal permits to implement. Working in or near wetlands or water bodies, composting and use of pesticides are examples of activities that may require a permit. It is best to check with the Cooperative Extension, Conservation District or Natural Resources Conservation Service office before such a project is initiated.

NOTE: The "best management practices" included in this **Directory** have broad application to a wide range of New Jersey farm enterprises. However, certain commodities, including cranberries, forest products and aquaculture, will have particular concerns and issues that require commodity-specific tools to address them. These are not our focus here; however, Part V of this Guide includes resources and references for these and other more commodity-specific concerns.

B. More on "BMP"s

A BMP may be a practice, such as crop rotation or integrated pest management. Or a BMP may be a structure, such as a manure storage system or a grassed waterway.

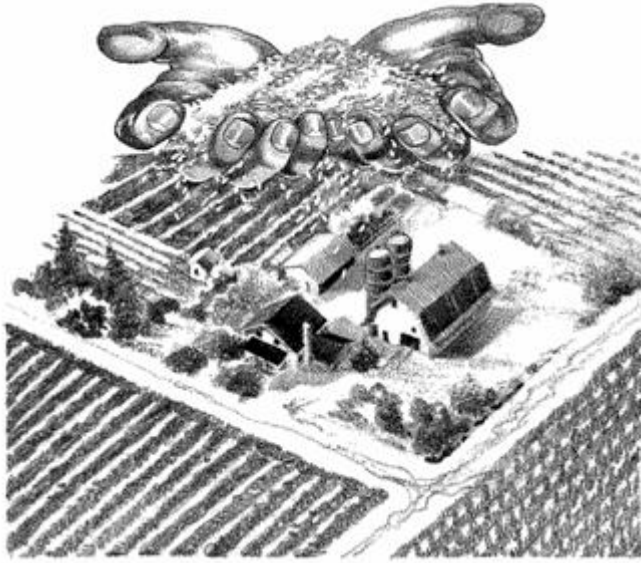
A BMP MAY BE A PRACTICE, that is, a non-structural operation such as crop rotation or integrated pest management. Or a **BMP may be the installation of a structure**, such as a manure storage system or a grassed waterway. A BMP may be used to correct existing problems and/or to prevent future potential degradation of water resources.

Rarely will the use of a single BMP for any land use activity be sufficient to adequately address water quality problems. More often, several BMPs, individually selected to fit the unique characteristics of each site and farming operation, will be required. These practices, when grouped, may be referred to as a "**conservation management system.**"

Rather than focus on individual practices, a conservation management system focuses on the sum of the parts. It takes into account the range of effectiveness of any single practice, its cost, and the resulting overall cost and effectiveness. Some individual practices may not be very effective alone, but, in combination with others, may provide a key function in a highly effective system.

A single BMP may address more than one problem. For example, a riparian (streamside) buffer may remove or reduce nutrient, sediment and pesticide contamination, while also enhancing the biological diversity of plant and animal species. It is also possible that a BMP designed to address one problem may actually contribute to another. For example, a farmer who uses conservation tillage, which can reduce erosion and sedimentation, may wind up applying increased amounts of herbicides to control weed pressure, with potentially detrimental impacts to ground water.

One or more "best management practices" may be selected to eliminate, prevent or reduce farm-related water pollution. Professional technical assistance is recommended to provide a more detailed assessment and a set of recommendations for modifications to farm practices. Worksheets C1-6, provided for use with this **Directory**, offer farmers the opportunity to make appropriate selections from the "menu" of best management practices included here.



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C. Using the Directory

THE BMPS LISTED IN this **Directory** have been organized into sections. These sections address strategies for:

1. erosion and sediment control
2. nutrient management
3. pest and pesticide management
4. livestock barnyard, manure and waste management
5. livestock grazing management
6. irrigation management

In each section, there is a description of specific BMPs that can be incorporated into a management plan to address the problem. Each BMP is described as follows:

- **Name** of the BMP. Those that require structures to be built are designated with an "(s)".
- **Definition** - describes the practice or structural change.
- **Purpose** - describes how the practice protects water quality. Some details about implementation and options are included.
- **Initial Cost** - provides a rough estimate of costs involved in implementing or installing the practice.
 - LOW** - the cost of implementation or installation is less than \$ 1,000; it may cost nothing
 - MEDIUM** - the cost of implementation or installation is between \$ 1,000 and \$ 4,000

HIGH - the cost of implementation or installation is above \$ 4,000

-- **Maintenance Cost** - provides a rough estimate of the annual cost of maintaining the practice or the installation. For most practices, this is estimated on a per acre basis; for structural measures, the estimate will be further defined by the particular site.

-- **Technical Assistance** - indicates whether outside technical assistance is: not required, desirable, or required to implement the practice.

-- **Other Benefits** - gives a partial listing of additional benefits that may be derived from implementing the BMP, including other environmental protections, cost savings or efficiencies. These benefits are useful in planning for the whole farm.

-- **Other Considerations** - gives a partial listing of possible "side effects" and other implications of implementing the BMP that are useful in thinking about the whole farm system.

1. Strategies for Erosion and Sediment Control

Best Management Practices address strategies for managing erosion and sediments, nutrients, pests and pesticides, livestock, barnyard, manure and waste, livestock grazing and irrigation.

Management systems for controlling soil erosion and sedimentation address two resource issues: water quality and soil loss. The erosion and sediment control management practices in this section may also serve to satisfy other concerns, such as nutrient or pest management.

In addressing pollution issues, the first line of defense is to control the problem at the source, that is, to reduce the availability of the pollutant and the opportunity for it to detach from its surroundings. For sediment control, this means employing methods to keep the soil on the field. The next line of defense is to prevent the pollutant, in this case traveling soil particles, from entering a water source.

The following is a list of BMPs that are recommended to reduce or eliminate water pollution from sediments.

Best Management Practices for Erosion and Sediment Control

Conservation cover prevents soil erosion by keeping the soil from being disturbed. Typical plantings are grass, shrubs or trees.

a. Conservation Cover

Definition: establishment and maintenance of permanent vegetative cover on land retired from production.

Purpose: to prevent soil erosion by keeping the soil from being disturbed. A permanent (perennial) cover is not typically cultivated, and the cover protects the soil from exposure. Typical plantings are grass, shrubs or trees. Such plantings may have productive value, such as walnut trees or blueberry bushes.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: not required

Other Benefits: improves soil tilth; decreases pesticide and fertilizer use; may provide economic gain from perennial crops; may enhance wildlife.

Other Considerations: loss of annual cropland acreage if field is planted to a permanent cover.



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[page=1186] **b. Conservation Crop Rotation**

Definition: a planned sequence of growing annual or perennial crops on the same field - the opposite of continuous cropping, where the same crop is grown in the same field year after year.

Purpose: to reduce detachment and transport of sediment by maintaining or improving the physical, chemical and biological conditions of the soil. A sequence of crops is selected to provide a high degree of soil cover and adequate organic residue for maintenance or improvement of soil tilth. Including a legume or grass in a rotation can be very effective for reducing erosion and improving soil structure. Also, rotations decrease loss of dissolved and sediment-attached nutrients and pesticides. Rotations designed for erosion control may differ from rotations planned as components of pesticide and/or nutrient management.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: desirable

Other Benefits: may reduce nutrient loss and need for commercial nitrogen; addition of organic matter increases soil fertility; may disrupt build-up of insect populations, disease life cycles and weeds, thereby reducing applications of pesticides; may maximize water use efficiency; may benefit wildlife; may increase yields; may enhance enterprise diversity.

Other Considerations: when legumes are used in a rotation, the nitrogen supplied should be taken into account to prevent over-application of nitrogen on subsequent crops. Soil fertility levels should be monitored and maintained within acceptable ranges for all crops in the rotation. There are economic and management considerations regarding crop selection, as well.

c. Contour Farming

The ridges and furrows created by contour farming reduce surface runoff by blocking water movement, allowing soil particles to remain in place.

Definition: tilling, planting, cultivating and harvesting crops across the field slope.

Purpose: to reduce surface runoff and transport of sediments. Farming on the contour reduces both velocity and volume of runoff by presence of ridges and furrows that block water movement, allowing soil particles to remain in place. Contour farming may follow the establishment of terraces or diversions.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: desirable

Other Benefits: see pesticide management; see nutrient management; increased infiltration may promote better crop growth and increased soil tilth.

Other Considerations: slowing surface runoff may increase infiltration of pesticides or nutrients.

d. Contour Strip-cropping

Definition: the practice of planting strips of crops across the contour (see contour cropping, above) so that those crops that provide limited soil cover (such as annual row crops like corn) are alternated with those that provide protective soil cover (such as hay).

Purpose: to reduce surface runoff and transport of sediments. Strip-cropping may be designed in a rotation.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: desirable

Other Benefits: if in a rotation, legumes can contribute to soil nitrogen.

Other Considerations: may increase or decrease pesticide and/or fertilizer use.



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e. Contour Buffer Strips

Definition: strips of perennial vegetation on the contour, 15 to 30 feet wide, separating sections of annual row crops.

Purpose: to slow runoff flow, trap sediment, nutrients and pesticides, and increase water infiltration.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: desirable

Other Benefits: vegetation provides food and cover for small upland birds and mammals. Beneficial insects can find habitat in strips, if proper vegetation is chosen.

Other Considerations: slightly reduces amount of crop production acreage, although hay can be harvested from contour buffer strips.

f. Cover Cropping

Definition: a cover of close-growing grasses, legumes or small grains grown primarily for seasonal protection and soil improvement.

Purpose: to control erosion and sedimentation by providing a soil cover, reducing exposure of soil particles; applied when the major crop does not furnish adequate cover, or following harvest; used to cover the soil during winter months; usually planted annually except where used as a permanent cover as in orchards; cover and green manure cropping also serve other important purposes (see below). Sometimes cover crops are seeded by aerial application.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: not required

Other Benefits: see pesticide management; see nutrient management; cover and green manure crops add organic material to the soil, improve infiltration, aeration, tilth and wildlife habitat.

Other Considerations: cost of seeds and additional management.



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g. Critical Area Planting

Critical area planting reduces erosion by providing suitable plant cover on areas that are eroding or likely to erode.

Definition: planting vegetation such as trees, shrubs, grasses or legumes on highly erodible or critically eroding areas.

Purpose: to reduce erosion and sedimentation by providing a suitable plant cover on areas that are eroding or likely to erode. Typically, plantings are perennial.

Initial Cost: medium

Maintenance Cost: low

Technical Assistance: desirable

Other Benefits: see nutrient management; may enhance habitat for wildlife, including "beneficials".

[page=1187] **Other Considerations:** an increase in erosion may occur during establishment of the planting in these areas; loss of cropland area.



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h. Diversion(s)

Channels or drainageways constructed across a slope divert water away from areas where it is excessive to sites where it can be used or disposed of properly.

Definition: a channel or drainageway constructed across a slope.

Purpose: to divert water away from areas where it is excessive to sites where it can be used or disposed of properly and safely. The channel is constructed with a supporting ridge on the downhill side. It intercepts surface runoff water, and reduces runoff volume and velocity by reducing the length of the slope. Diversions are not designed to accommodate a large amount of sediment in the channel, and are not a substitute for other erosion control measures such as terracing. Diversions may be vegetated or nonvegetated and have an outlet.

Initial Cost: medium

Maintenance Cost: low

Technical Assistance: required

Other Benefits: diverts water carrying pollutants such as barnyard waste from surface waters; may improve wildlife habitat; improves crop health and farmability by diverting excess water.

Other Considerations: may increase delivery of pollutants to surface waters.

i. Field Borders

Definition: a strip of perennial vegetation established at the edge of a field.

Purpose: to reduce transport of sediment by providing "anchoring points" for contour rows, terraces, diversions and contour strip farming.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: not required

Other Benefits: may have benefits for wildlife.

Other Considerations:

j. Field Strip-cropping

Definition: systematic arrangement of crops in strips across the general slope (not contour).

Purpose: to reduce delivery of sediments to water bodies by alternating crops that provide limited soil cover with those that provide high soil cover. Since crops are not grown on the contour, there will be areas of concentrated flow. Strip cropping may be done in a rotation.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: desirable

Other Benefits: see pesticide management; see nutrient management; rotation may increase soil tilth.

Other Considerations: areas of concentrated flow potentially may increase delivery of sediments at a more rapid pace. There are crop selection and management considerations as well.

k. Filter Strip

Definition: an area (typically a strip) of vegetation that is planted and maintained as a permanent cover.

Purpose: with regard to control of erosion and sedimentation, the purpose of a filter strip is to capture sediment transported by runoff. Filter strips trap and remove solids, especially coarser grained and organic materials. Filter strips may be installed at the lower edge of fields, upgradient of terraces or diversions, or on fields next to wetlands, streams or ponds. They vary in their effectiveness and maintenance requirements.

Initial Cost: medium

Maintenance Cost: low

Technical Assistance: desirable

Other Benefits: nutrient management; pesticide management; filter strips can also be designed to handle silage juice runoff.

Other Considerations: depending on the function(s) that a filter strip is designed to perform, the degree of efficiency and level of management may vary.

l. Grade Stabilization Structure - Water Control Structure(s)

Grade stabilization structures control erosion in channels and prevent the formation or advance of gullies. They may also enhance habitat.

Definition: a structure used to control the grade and head cutting in natural or artificial channels.

Purpose: to stabilize the grade and control erosion in channels and to prevent the formation or advance of gullies. The structure may be a combination of earth embankment, mechanical spillway, and detention-type structure, and could include an inlet or surface drain component.

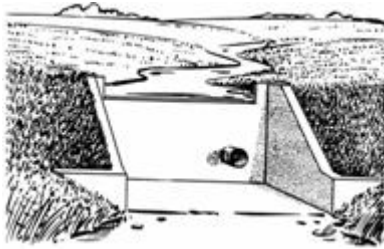
Initial Cost: high

Maintenance Cost: low

Technical Assistance: required

Other Benefits: may enhance habitat.

Other Considerations: attention to fish and wildlife habitat in design and construction; livestock should be fenced out to protect the structure.



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m. Grassed Waterway(s)

Definition: a natural or constructed channel or outlet that is shaped or graded to certain dimensions and vegetated.

Purpose: to provide a stable and controlled outlet for the disposal of runoff. Grassed waterways are planted in a suitable grass/legume mix and may have a stone center. The vegetation slows runoff and filters out sediments; usually installed on sites where additional control is required to manage concentrated runoff, as from diversions.

Initial Cost: medium

Maintenance Cost: low

[page=1188] **Technical Assistance:** required

Other Benefits: see nutrient management; see pesticide management; may provide habitat for beneficials.

Other Considerations: may provide habitat for pests.

n. Mulching

Mulching can reduce runoff and transport of sediment by trapping rain drops, especially in areas that are eroding and/or bare. It may also control weeds and provide nutrients through microbial breakdown.

Definition: applying plant residues or other suitable materials to the soil surface.

Purpose: to reduce runoff and transport of sediment by trapping rain drops, especially in areas that are eroding and/or bare; used to allow vegetation to establish itself, to provide cover where vegetation is not possible or desired, or in association with a crop. Plastic mulches perform some of these functions.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: not required

Other Benefits: mulching conserves moisture, prevents surface compaction or crusting, controls weeds and helps establish plant cover; may provide nutrients through microbial breakdown.

Other Considerations: may lower soil temperature; may introduce weed seeds; plastic mulches do not degrade and must be removed from the field.

o. Outlet or Lined Waterway(s)

Definition: a waterway with an erosion-resistant lining of concrete, stone or other permanent material.

Purpose: to reduce erosion in concentrated flow areas, resulting in the reduction of sediment and other substances delivered to receiving waters. This practice may be a component of a waste management system where barnyard runoff is directed away from sensitive areas.

Initial Cost: medium - high

Maintenance Cost: low

Technical Assistance: necessary

Other Benefits:

Other Considerations:

p. Pasture and Hayland Planting

Definition: appropriate treatment and use of pastureland or hayland.

Purpose: regarding erosion and sedimentation, appropriate planting and management of hay or pastureland will reduce erosion and transport of soil particles. Fields covered in permanent vegetation year round are very resistant to erosion.

Initial Cost: medium

Maintenance Cost: low

Technical Assistance: not required

Other Benefits: may enhance plant vigor; may improve forage and haylage quality leading to improved animal health; may decrease pest and/or nutrient management requirements.

Other Considerations:

q. Residue Management: No-till, Strip Till, Mulch Till, Ridge Till

No-till, strip till, mulch till and ridge till systems are known to reduce erosion and sedimentation by as much as 90% in certain circumstances.

Definition: any tillage and planting system that minimizes physical disturbance of the soil and leaves approximately 30% of the surface covered by plant residue after planting.

Purpose: to reduce runoff causing detachment and transport of sediments. There are a variety of conservation tillage systems including **mulch-till, ridge-till, and strip-till**. Conservation tillage is applicable on sloping, highly erodible cropland, where adequate plant residues are produced. It is known to reduce erosion and sedimentation by as much as 90% in certain circumstances. In mulch-tillage the entire soil surface is tilled; at least 30% residue cover is left on the soil surface immediately following planting. In ridge-tillage, ridges are initially established and then planted year after year, with or without subsequent cultivation; at least 30% residue remains. Ridge-till is appropriate primarily for continuous row crops. Strip-till requires tilling of narrow strips for seeding or transplanting, leaving undisturbed surface residues in between; strip-till may be combined with ridge-till, and is appropriate for vegetable and small fruit crops. No-till is a method of planting in prior crop residue, cover crop or perennial sod crop where the surface of the field is left undisturbed. Specialized equipment is needed.

Initial Cost: low, if equipment is rented; medium if equipment is purchased.

Maintenance Cost: low

Technical Assistance: desirable for start-up

Other Benefits: increases soil tilth; increases soil temperature and moisture retention; may break pest and disease cycles; may decrease available weed seeds (no longer brought to the surface by plowing); reduces compaction; reduces fuel and labor costs and saves time.

Other Considerations: may increase ground water contamination by increased fertilizer and pesticide use and by increasing infiltration rates (but application rates may decrease over time); incorporation of fertilizers and pesticides is more difficult; careful nutrient management is advised; may delay germination due to cooler soil temperatures; residues may serve as host site for pests.



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[page=1189] **r. Riparian Buffer**

Definition: an area of trees and other vegetation located adjacent to and up-gradient from water courses, water bodies and associated wetlands.

Purpose: to protect water quality by preventing streambank erosion, removing sediment, absorbing nutrients and pesticides and allowing better nutrient uptake. When plantings are carefully selected and maintained, and the practice is used together with other nutrient and sediment control practices, riparian buffers are highly effective and low maintenance.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: not required

Other Benefits: may enhance conditions for desirable aquatic plants and animals; may provide commercial timber or forage; may improve wildlife habitat.

Other Considerations:

s. The Nutrient and Sediment Control System (NSCS) is both a biological filter and physiochemical treatment system. The goal of an NSCS is to maximize reduction of total and soluble phosphorus, and reduction of nitrogen, organic matter, bacteria and fine sediments reaching lakes and streams. The system is functional at different levels of efficiency during all seasons under a broad range of ecological, hydrologic and pollutant load conditions.

The complete NSCS is a combination of a sediment basin, grassed buffer, a vegetated shallow pond, a deep pond, and a vegetated "polishing" area.

Initial Cost: high

Maintenance Cost: low

Technical Assistance: required

Other Benefits: Will increase habitat value

Other Considerations: Will require over one acre for a drainage area of fifty acres and increase proportionally from there.

t. Sediment Basin(s)

Sediment basins trap and collect sediments and excess water, allowing sediments to settle out of runoff water before it discharges into surface water bodies.

Definition: a depression constructed to collect and store debris or sediment.

Purpose: to trap and collect sediments and excess water and to control runoff. The basin may be dug or constructed as an earthen embankment or a combination of ridge and channels. It allows sediments to settle out of runoff water before it discharges into surface water bodies. The basin needs to be maintained by periodically removing collected materials.

Initial Cost: high

Maintenance Cost: low

Technical Assistance: required

Other Benefits: may increase habitat value if permanently seeded.

Other Considerations: may increase infiltration of soluble materials such as some pesticides.

u. Stream Channel Stabilization Measures

Definition: any of a number of constructed measures along or across natural or constructed waterways.

Purpose: to reduce erosion and sedimentation into water bodies. These measures include: spur dikes, which are fingers of stone that extend into a creek; grade control structures, which control the grade and head cutting in channels by creat-

ing a series of small "waterfalls"; and riprap bank protection, in which layers of large stones are placed along stream banks or crossings. May also include vegetative "bio-engineered" solutions such as installation of organic rolls and mats and plantings of suitable vegetation.

Initial Cost: medium - high

Maintenance Cost: medium

Technical Assistance: required

Other Benefits: may prevent loss of land or damage of facilities located near banks; may maintain capacity or stability of a channel; may enhance habitat.

Other Considerations: some constructed measures, such as riprap, may negatively impact riparian habitat, especially in stream banks.

v. Tree Planting

Definition: planting and maintenance of trees.

Purpose: to reduce erosion and sedimentation by providing stable, perennial cover and root mass.

Initial Cost: low - medium

Maintenance Cost: low

Technical Assistance: not required

Other Benefits: see nutrient management; may attract beneficial insects and birds.

Other Considerations:



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2. Strategies for Nutrient Management

A farm nutrient plan is a comprehensive strategy for addressing nutrient input needs on the farm. It includes information on crop requirements, nutrient availability, proper timing and amount of application and environmental considerations.

Plants must receive sufficient and proper nutrients, at the proper times and in the necessary amounts, in order to grow and produce a crop. Farmers use a variety of amendments, including commercial fertilizers, animal and green manures and composts to assure nutrient availability for crops.

Sound nutrient management not only assures optimum production but also reduces input costs and protects water quality. Additionally, soil tilth and organic matter can be improved by correct manure and sludge application. Input costs are reduced by preventing over-application of commercial fertilizers and manures, while also reducing the amount of nutrients lost to receiving waters. It has been proven that over-application of fertilizers serves no beneficial purpose to the crop. In fact, excess nitrogen fertilizer can be harmful to crop yield and quality.

Research has shown that nitrates are a leading ground water contaminant. Commercial fertilizer and manure are significant sources of nitrates in ground water, as well as nitrates and phosphates in surface waters. Careful management of nutrients will reduce the amount of nutrients available for transport from the field because they will be properly taken up by the plant or stored in the soil. Excess nutrients are lost with surface runoff, and by leaching [page=1190] through the soil into ground water. Erosion and sediment control practices are the primary mechanisms to control the transport of nutrients, especially phosphorus, that are attached to soil particles.

Nutrient Management Plans

A whole farm plan includes a comprehensive strategy for addressing nutrient input needs on the farm. It contains information on crop requirements, nutrient availability, proper timing and amount of application, and environmental considerations. When the source of the nutrients is not commercial fertilizer, it is important to determine the nutrient value and availability of those contributions. For example, the nitrogen contribution of any legume crop should be calculated and credited, and manures and composts should be tested for nutrient content.

Nutrient management includes the following core components:

- a. farm and field maps showing acreage, soils, crops and water bodies
- b. yield expectations
- c. a summary of the nutrient planning resources available to the farmer, including:
 - 1) soil tests results
 - 2) nutrient analysis of manures and composts
 - 3) nitrogen contribution to the soil from legumes (if applicable)
 - 4) other significant nutrient sources
- d. an evaluation of field limitations based on environmental considerations
- e. establishing mix of nutrient sources and requirements
- f. timing and application methods
- g. equipment operation and calibration

Such a plan requires that farmers have a good understanding of crop requirements, soil types and sensitive areas on and near the farm, such as wetlands and shallow aquifers. Nutrient management incorporates this knowledge with a site-specific set of management practices to 1) apply nutrients at rates necessary to achieve realistic crop yields, 2) improve the timing of nutrient application, and 3) use agronomic crop production technology to increase nutrient use efficiency.

The following is a list of the BMPs that are recommended to reduce or eliminate water pollution from crop nutrients.



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Best Management Practices for Nutrient Management

a. Agricultural Composting

The benefits of agricultural composting are many. Compost is an excellent soil conditioner which, when properly managed, is free of weed seeds.

Definition: the aerobic, biological decomposition of organic matter, including manure, leaves, bedding and crop residues. It is a natural process that can be enhanced and accelerated by: selecting organic waste "recipes" with proper carbon/nitrogen balance; mixing to provide proper aeration; and monitoring to assure that ideal moisture levels and temperatures are maintained. These extra steps provide optimal conditions for the microbes that transform "raw" on-farm wastes into a relatively stable soil amendment/crop nutrient.

Purpose: to conserve nutrients produced on the farm; to lower the risk of pollution by stabilizing nitrogen in an organic form, and reducing its loss to ground and surface water.

Initial Cost: low - high

Maintenance Cost: low to high

Technical Assistance: highly desirable for start-up.

Other Benefits: The benefits of agricultural composting are many. Compost is an excellent soil conditioner which, when properly managed, is free of weed seeds. Farmers can lower their risk of nuisance complaints about odor and flies. Compost is often easier to handle than manure. Farmers have the opportunity to create a product with significant economic value; many garden centers, suburban neighbors and landscapers are eager to purchase high quality farm compost.

Other Considerations: Most of the nutrients in agricultural compost are in a stable organic form and are released slowly to growing plants. Nutrient availability, timing, and rates of application need to be accounted for in the overall nutrient management plan. The compost "pad," or site where active composting will take place, should be carefully located and designed. A poorly situated pad, like a poorly situated manure stacking area, can contribute to pollution problems.



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b. Filter Strips

Filter strips-strips of close growing vegetation along a water body-can reduce nutrients in runoff entering the water. They may also provide habitat for wildlife.

Definition: strips of close growing vegetation surrounding or along a water body.

Purpose: to reduce nutrients in runoff entering the water. The width of the vegetative strip will depend on soil characteristics, type of vegetation used, topography and hydrology.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: desirable for initial information

Other Benefits: see pesticide management; may provide wildlife habitat.

Other Considerations:

[page=1191] **c. Conservation Crop Rotation**

Definition: the successive planting of different crops in the same field -- the opposite of continuous cropping.

Purpose: one purpose of crop rotation is to reduce the need for nitrogen fertilizer by planting a legume. Also, continuous applications of manure can result in the build-up of excessive levels of phosphorus; crops in an unmanured part of the rotation may take up phosphorus, thereby reducing the potential for loss by run-off of excess phosphorus. Rotation is valuable for controlling soil erosion, building soil tilth, increasing yields and eliminating or reducing certain diseases or pests.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: desirable for start-up

Other Benefits: see erosion and sediment management; see pesticide management; may improve soil fertility.

Other Considerations:

d. Cover Cropping

Definition: the practice of planting a crop primarily for protecting and improving the soil between periods of regular crop production.

Purpose: regarding nutrient management, to provide nutrients for subsequent crops, thus reducing the total amount of additional nutrients necessary; to take up all the excess nutrients left in the field after the harvest of the main crop (called a "catch crop"); also, to utilize excess nutrients from the field, thus reducing the amount of nutrients that may leach to ground water. Annual cover crops are either harvested, plowed under, grazed or killed with herbicides before the primary crop is planted. Perennial cover crops, between trees and vines in orchards, for example, are left in place and managed by mowing.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: not required

Other Benefits: see erosion and sediment management; weed pest control.

Other Considerations:



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e. Equipment Calibration

Proper and timely adjustment of equipment used to apply nutrients can minimize the chance of over-application of fertilizer and manure.

Definition: proper and timely adjustment of equipment used to apply nutrients.

Purpose: to minimize the chance of over-application of fertilizer and manure. Calibration insures that recommended rates are being applied.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: desirable for start-up

Other Benefits: this practice also applies to calibration of pesticide application equipment.

Other Considerations: should be done annually, and whenever fertilizer or pesticide is changed.

f. Fertilizer Storage, Handling and Containment

Definition: the management of fertilizer substances on the farm.

Purpose: to assure safety and prevent spills and leaks in which uncontrolled amounts of fertilizer might leach or run off into surface or ground water. Fertilizer storage areas, valves and containers should be secured when not in use. Dry fertilizer should be stored inside a structure or device capable of preventing it from getting wet. Liquid fertilizer should be stored in containers approved for and compatible with the fertilizer being stored. Fertilizer storage areas should be located away from wells, areas that are very porous, and any surface water bodies.

Initial Cost: low - medium

Maintenance Cost: low

Technical Assistance: not required

Other Benefits: may improve health and safety.

Other Considerations: storage areas should be inspected annually to ensure safety.

g. Green Manure Cropping

Providing fertility through enriching the soil with naturally occurring amendments "feeds the soil, then the soil feeds the plant."

Definition: the practice of planting a grass or legume crop primarily to be plowed down for its contribution to soil fertility.

Purpose: to provide nutrient value to the subsequent crop.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: not required

Other Benefits: moisture retention; enhances soil tilth and organic matter; reduces soil salinity; may reduce need for purchased fertilizer.

Other Considerations: may increase costs (seed and labor); plowdown may provide excess nitrogen.

h. Intercropping

Intercropping-the growing of two or more crops simultaneously on the same field-adds nitrogen and other nutrients to the soil. Inter-cropping of certain crops is also intended to improve yields per acre and provide "crop insurance".

Definition: the growing of two or more crops simultaneously in a specific pattern or fashion on the same field.

Purpose: regarding nutrient management, the purpose of intercropping is to add nitrogen and other plant nutrients to the soil. Legumes and grass crops are often used. Seeding in of the second crop may be done at various stages of the main crop's development.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: desirable for start-up

Other Benefits: may reduce weeds.

Other Considerations: intercropping of certain crops is also intended to improve yields per acre and to provide "crop insurance" in case of a crop failure.

[page=1192] **i. Nutrient Budgeting**

Definition: evaluation of the contributions of all sources of nutrients to the needs of a particular crop.

Purpose: to encourage the use of manure and other agricultural wastes, and other nutrient-contributing practices (e.g., cover cropping, planting legumes) and to avoid application of excess nutrients. Nutrient budgeting accounts for the contributions of all sources of nutrients, so that additional commercial fertilizers and/or animal manures are only applied to make up a lack. Testing of manures, composts, effluents as well as green manure and legume contributions can be performed. Management that focuses on providing fertility through enriching the soil with naturally occurring amendments "feeds the soil, then the soil feeds the plant".

Initial Cost: low

Maintenance Cost: low

Technical Assistance: required for start-up

Other Benefits: may reduce costs of purchased inputs; may promote recycling of on-farm wastes.

Other Considerations:



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j. Nutrient Record Keeping

Definition: a system of documenting field, crop and nutrient application data.

Purpose: to provide historical and planning data in order to make informed decisions about nutrient applications that are resource-protecting and efficient. Record keeping is an important part of a nutrient management plan. Useful forms are available from technical assistance providers.

Initial Cost: none

Maintenance Cost: not applicable

Technical Assistance: not required

Other Benefits: helps to make efficient use of both manures and purchased inputs.

Other Considerations:

k. Plant Tissue Testing

Definition: a test that determines the nutritional status of plant tissues.

Purpose: to determine existing or potential nutrient problems. Plant tissue testing is an excellent tool for determining exact plant nutrient needs for many essential nutrients including nitrogen, phosphorus, potassium, calcium, magnesium, iron, zinc, manganese, copper, boron, molybdenum, chlorine, sulfur and others. Though not routinely done on all crops, testing may help diagnose nutrient deficiencies.

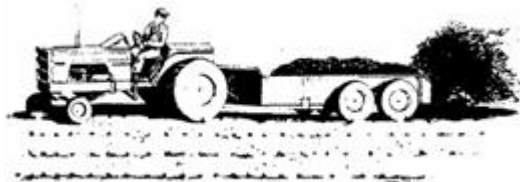
Initial Cost: low

Maintenance Cost: not applicable

Technical Assistance: required

Other Benefits:

Other Considerations:



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l. Proper Timing and Application Methods

Proper timing and application of fertilizers in environmentally sensitive ways can avoid runoff and maximize plant uptake.

Definition: a set of practices that addresses the application of nutrients in environmentally sensitive ways.

Purpose: to protect water resources by selecting the best fertilizer, properly timing and locating applications to avoid runoff and maximize plant uptake. Manure and fertilizer should not be applied on frozen ground; they should be incorporated immediately. Fertilizer nitrogen is best applied just before the period of maximum uptake by crops, and in amounts matching the ability of the crop to take it up. Application under rainy conditions or when soil is saturated should be avoided. Application to very shallow soils or to exposed bedrock also should be avoided. Sometimes split applications are effective. In selecting fertilizers, less leachable forms and slow release varieties are advantageous both for water protection and effectiveness. Banding, which is the application of fertilizer along the row, close to the plant, rather than broadcasting, is an effective method of crop fertilization that can reduce nutrient loss.

Initial Cost: none

Maintenance Cost: not applicable

Technical Assistance: not required

Other Benefits: may enhance efficient use of fertilizers.

Other Considerations:

m. Soil Nitrate Testing

Definition: a test that determines the soil nitrate-nitrogen concentrations immediately prior to side- or top-dressing with nitrogen fertilizer.

Purpose: to avoid the application of excess nitrogen fertilizer by determining crop nitrogen needs.

Initial Cost: low

Maintenance Cost: not applicable

Technical Assistance: required (soil testing lab)

Other Benefits:

Other Considerations: may reduce farm fertilizer and labor costs.

n. Soil Testing

Definition: determination of nutrient content of a soil sample by a laboratory.

Purpose: to avoid excessive use of nutrients while ensuring that the right amounts are applied for desired crop yield. At least one soil sample for each field and crop type should be tested for phosphorus, potassium, calcium, magnesium and soil pH, and any other nutrients of concern for the planned crop. Nitrogen application should not be based on a routine soil test prior to planting a crop; a special nitrogen soil test is needed during the growth of the crop. Soil tests should be updated on a regular basis, and before fertilizers are applied; results will change over time, depending on fertilizer and other additions, precipitation, runoff, leaching, erosion and crop uptake.

Initial Cost: low

Maintenance Cost: not applicable

[page=1193] **Technical Assistance:** required

Other Benefits: may yield economic savings from reduced fertilizer purchase.

Other Considerations:

o. Yield data

Definition: information about crop yields to determine realistic expectations.

Purpose: to manage nutrient applications to match realistic yield expectations. Yield data is based on yield history and other relevant information provided by the grower. For example, a farmer might average the three highest yields in five consecutive crop years. Information from Rutgers Cooperative Extension can be used when field data is not available.

Increased yield expectations due to new and improved varieties and hybrids should be considered. Yield data will also depend on climatic conditions, available moisture and soil type.

Initial Cost: low

Maintenance Cost: not applicable

Technical Assistance: not required

Other Benefits:

Other Considerations:

3. Strategies for Pest and Pesticide Management

The management of agricultural pests is a major concern to nearly every New Jersey farmer. Pests include insects, weeds, diseases, fungi and vertebrates (e.g., rodents) that can reduce if not destroy crop production. Agriculture has always been faced with the need to limit crop damage due to pests. Since the 1950s, petrochemical-based pesticides have become an important tool for farmers. Of course, pesticides are applied in non-agricultural settings as well, for example on home lawns, golf courses, roadsides and utility rights-of-way.

Wherever pesticides are used, there are concerns about potential impacts to water quality. Negative impacts to surface water bodies have been documented since the 1940's. More recently, studies have shown public and private water supply contamination from pesticides. Because of these and other concerns (e.g., the health and safety of the pesticide handler), pesticides and their application have become increasingly regulated, resulting in higher costs to the grower.

- pesticide application: including the rate, formulation, timing and mode of application (e.g., foliar, injection, surface incorporation)
- pesticide properties: including solubility, mobility, stability, and degradation
- climate: including precipitation, temperature and wind
- soil properties: including composition (% sand, clay and silt; soil organic matter), porosity, moisture content and pore size
- site characteristics: including topography, slope, proximity to water resources
- agricultural management practices: including tillage choices, mixing, loading and storage practices, cover cropping, irrigation/chemigation

Clearly, a goal of any pest management strategy is to reduce risks of contaminating surface and ground water. The basic concept of pest management in this regard is to encourage effective and safe use of pesticides, only when necessary, without causing environmental harm. The most effective approach is, first, to limit the amounts and types of pesticides (availability), and second, to use practices that minimize the movement (detachment, transport and deposition) of pesticides to surface and ground water.



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Pest Management

The management of agricultural pests is a major concern to nearly every New Jersey farmer.

As with nutrient management (see page 33), the most effective approach for environmentally sensitive pest control is to develop and implement **pest management plan**. The goal of pest management is to reduce the impact of pests to tolerable levels. The plan focuses on the assessment of options based on site- and crop-specific data. Developing a whole farm plan that includes sound agricultural management practices for how, what, where and when to apply pesticides will help minimize the problems associated with pesticide use. Natural controls and non-chemical tactics should be emphasized wherever possible. A good plan will maintain a healthy crop with high yield and quality, while protecting water quality and other environmental interests.

At minimum, pest management includes:

- an evaluation of past and current pest problems and cropping history
- an evaluation of the physical and biological characteristics of the site
- evaluation, selection and implementation of appropriate alternative pest management strategies
- proper selection, application and timing of pesticide(s)
- proper mixing, loading, and storage of pesticides

An integral component of pest management is the practice of integrated pest management (IPM). IPM is an approach aimed at reducing pesticide use to the minimum quantity while ensuring high quality crops and protecting human health and environmental quality. IPM includes the selection, integration and implementation of pest control methods based on predicted economic, ecological and sociological consequences. IPM includes the use of pesticides only when pest populations exceed economic thresholds (when making a decent return on the crop is threatened) and only when alternative control tactics are not appropriate or available. An IPM program strives to minimize crop losses by optimizing the use of cultural management techniques and biological pest controls.

A good pest management plan will emphasize natural controls and non-chemical tactics whenever possible, while maintaining a healthy crop with high yield and quality.

Typically, there are four components of an IPM system:

In New Jersey, IPM programs have reduced pesticide use on such crops as apples, strawberries, cranberries, corn, alfalfa, eggplant and potatoes.

-- **pest identification:** all potential pests as well as all beneficial insects are inventoried; particular species or varieties may require special treatment

-- **monitoring:** also known as scouting, the aim is to accurately sample and record pest populations and to identify the location and time where a pest problem may become intolerable

-- **action thresholds:** action thresholds and injury levels are established for each individual pest species. The action threshold is the level at which a control action must be taken in order to prevent damage

-- **methods of prevention and suppression:** include some combination of controls described below to manage pest populations

There are many options for suppressing pests, usually used in combination. These tactics may be grouped in the following categories:

- biological controls
- cultural controls (including host resistance)
- physical and mechanical controls
- chemical controls

[page=1194] IPM guidelines have been established for a number of field crops, fruits and vegetables in New Jersey. New guidelines for other crops are continually being developed. Nonetheless, certain integrated pest management strategies can be successfully employed in a wide variety of situations, even without a certified program in place. Plans may be developed by the producer or by a private crop consultant who may be employed to help develop and implement the plan.

Once pest management has been developed, a variety of best management practices can be employed to implement aspects of the plan. Some plans may include particular IPM strategies that are included in the best management practices that follow. Best management practices that comprise elements of an IPM Program are included below.

The following is a list of the BMPs that are recommended to reduce water pollution from pesticide storage and use.



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Best Management Practices for Pest and Pesticide Management

a. Appropriate Biological Controls

Appropriate biological controls include the use of natural predators to help keep pest populations in check.

Definition: use of natural enemies, including predators, parasites and diseases to help keep pest populations in check.

Purpose: to reduce or eliminate pests by introducing biological control agents that may not be native to the area, or not present in sufficient quantities, into the environment. For example, beneficial mites are commercially available and can be released in the field. These must be introduced before pest numbers are out of control, and periodic re-releases are usually needed. These agents include parasites, predators or disease pathogens such as bacteria, fungi and viruses.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: required for initial information and start-up

Other Benefits:

Other Considerations:



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b. Appropriate Cultural Controls

Definition: use of various farming practices that impact pest populations.

Purpose: to destroy or remove a pest's habitat by such practices as plowing, crop rotation, manipulation of planting and harvest dates, animal housing sanitation and manure management, and tillage. For example, alfalfa fields with significant numbers of alfalfa weevils may be harvested early to avoid further losses and reduce weevil populations. Crop rotation can be extremely effective in breaking up pest life cycles (e.g. the Colorado potato beetle). Various methods can be employed to destroy breeding refuges and over-wintering sites, including escaped apple trees for apple maggot. Included in this category are all practices that provide optimum growing conditions for the crop, thereby enhancing plant health and resistance and reducing plant stress. There is a wide range of cultural controls. Not all of them are appropriate on all farms, and farmers need to select carefully.

Examples of cultural controls include the following:

- site selection: choosing sites that are less favorable to pests

- cultivar selection: choosing varieties that are resistant to pests
- crop rotation: rotating away from crops of the same family can prevent weed growth and break up pest cycles
- intercropping: planting a mixture of crops may reduce insect damage, e.g., underseeding broccoli with clover
- cover cropping: can provide shelter for beneficials
- trap cropping: planting crops to attract the pest away from the main crop; for example in tomatoes, trap crops of potatoes and eggplant can be used for Colorado potato beetle
- tillage: provides weed control and may kill some insects and pathogens
- timing and method of planting: may help to avoid a generation of the pest
- sanitation: removal of pest habitat such as cull piles or dropped fruit; for example, potato cull piles provide a place for potato late blight and other diseases to overwinter
- pruning: removes a food source or point for infection and increases circulation
- healthy seed and transplants: avoids introducing pests; use of seed that has been certified disease-free

Initial Costs: low

Maintenance Cost: low

Technical Assistance: not required - desirable

Other Benefits: certain cultural control practices may also improve soil tilth and fertility.

Other Considerations:

c. Appropriate Physical Controls

Definition: use of physical structures or mechanisms to exclude pests from crops.

Purpose: to prevent or reduce crop losses from pest damage by providing physical barriers such as netting over small fruits and screening in greenhouses or milkhouses. Row covers and fencing are also examples.

Initial Cost: low - high

Maintenance Cost: low

Technical Assistance: not required

Other Benefits:

Other Considerations:

d. Calibrate and Maintain Pesticide Application Equipment

Properly calibrating pesticide application equipment assures proper application rates throughout the season, reducing both pesticide waste and the risk of environmental contamination.

Definition: adjustment of application equipment by properly calibrating applicator nozzles; general maintenance of equipment parts.

[page=1195] **Purpose:** to assure proper pesticide application rates throughout the season. Such calibration should occur minimally at the beginning and middle of each season; ideally, each time pesticides or application rates are changed. Improper calibration of application equipment can result in application rates that are significantly different from the intended rate. Low applications can result in poor pest control, yield losses and costly repeat applications. Rates which are too high waste pesticide, reduce profitability and pose a greater risk of environmental contamination than necessary. Higher than recommended application rates also promote the development of pest resistance to the pesticide, do not achieve better pest control and may result in poor pest control. Since nozzle wear can increase application rates and change spray patterns, calibration rates should be checked during the spray season. Even small, hand operated applicators, such as hand-pump sprayers, should be calibrated each season. Sprayer equipment should be maintained regularly.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: desirable for initial information

Other Benefits: lower costs due to less pesticide use.

Other Considerations:

e. Data Collection

Data collection allows farmers to make informed pest management decisions based on knowledge of cropping patterns, current and historical pest problems, pesticide use and soil and physical characteristics of the site.

Definition: inventory of field, crop and pest information.

Purpose: to make informed pest management decisions based on knowledge of cropping patterns, current and historical pest problems, pesticide use and soil and physical characteristics of the site. Attention should be paid to the history of crop production, information on soil types, exact acreages of each field, and information about past pest problems, pesticide use and other information for each field. Additionally, particular attention should be directed to areas where mixing, loading and storage activities take place, and physical limitations such as proximity to well heads and surface water, runoff potential, highly permeable or poorly drained soils, and shallow aquifers.

Initial Cost: none

Maintenance Cost: not applicable

Technical Assistance: not required

Other Benefits: may enhance efficiency and reduce cost

Other Considerations:

f. Pesticide Application Plans and Records

Definition: a procedure for planning and documenting pesticide use that includes specific pesticide selection, application and handling.

Purpose: to assure the proper selection, timing and rates of application to maximize effective and judicious use of pesticides while minimizing unnecessary, excessive or inappropriate uses. Pesticides that are least likely to cause contamination to surface or ground water should be selected. Available models such as NPURG can assist in determining rela-

tive risk from a pesticide given crop, soil, water and topographic conditions. If an evaluation indicates a high risk, consideration of slope, foliar coverage and other risk reducing site factors or management practices such as spot spraying or banding will help. Such plans should also account for proper timing of applications. Replace calendar date scheduled applications with crop, pest and weather specific timing to increase effectiveness and reduce risk as well as waste (from, for example, application before a heavy rain or during windy conditions). Record keeping is an important component of any pesticide use, as well as a legal requirement. Knowing what went on which field and how successful it was in obtaining desired results is useful planning data.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: desirable for start-up

Other Benefits: may enhance wildlife habitat; may contribute to farmer health and safety

Other Considerations:

g. Protect and Enhance Natural Controls

Definition: The encouragement of naturally-occurring populations of biological control agents such as beneficial mites and certain fungi, worms and wasps.

Purpose: to allow natural controls to contribute to pest management by fostering and not destroying their habitat. Natural enemies can be encouraged by providing shelters or food sources. For example, a sod or weedy cover in an apple orchard provides an overwintering site for predatory mites, which control European red mite and two-spotted spider mite. Selecting pesticides that have minimal effect on beneficials is an important consideration; applying only when needed, and carefully scheduling to have the least effect on beneficials, will also encourage native populations of many biological control organisms.

Initial Cost: none

Maintenance Cost: not applicable

Technical Assistance: desirable for initial information

Other Benefits:

Other Considerations: other management practices, such as burning or mowing of field edges, may diminish beneficial populations.

h. Safe Storage, Mixing, Loading and Disposal of Pesticides

Proper storage and handling of pesticides avoids contamination risks associated with accidental spills and misuse of pesticides.

Definition: specific management activities for the proper storage and handling of all pesticides.

Purpose: to avoid contamination risks associated with accidental spills and misuse of pesticides. Surface water, ground water and soil can be contaminated in areas where pesticides are stored under inappropriate conditions, or improperly mixed and loaded into application tanks, where equipment is washed and rinsed after application, and where containers are disposed of improperly. Pesticides should be stored in the original containers with the label intact, in a closed and locked building. Such containers should be recycled where possible. The building should be located at least 200 feet

down-gradient from any surface water body and 150 feet down-gradient from any wellhead. A secondary containment area, such as a curbed, impermeable pad, is recommended to contain any accidental spills or leaks.

[page=1196] Chemical mixing and storing and equipment rinsing stations should be located at least 300 feet away from aquifer and wellhead areas and open water. Backflow prevention devices should be installed and operating properly. Proper warning signs must be posted, and use of an impervious pad to contain spills and facilitate clean-up is desirable. Of course, such materials should be locked and out of reach of children and animals. Mixing and loading areas should be located to minimize the impact of spills. All transfer of pesticides between containers should be conducted over a spill containment surface designed to intercept, retain and recover spills, leaks and wash water. This can be a specially constructed pad or alternate system such as a portable basin.

Initial Cost: medium - high

Maintenance Cost: low - medium

Technical Assistance: required

Other Benefits: may reduce human health and safety risks, may reduce future liability risks

Other Considerations:

Appropriate biological controls include the use of natural predators to help keep pest populations in check.



Convergent Lady Beetle
A. Larva B. Adult

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i. Scout for Pests

Scouting for pests provides an early detection system that locates and identifies potentially serious pest situations before economic losses occur.

Definition: crop monitoring for presence of pests.

Purpose: to accurately sample and record pest populations and to recommend and track control actions based on scouting data. Determining how many pests are present on a crop at a point in time requires that the crop be monitored on a regular schedule. Scouting usually involves visual plant or animal inspections and/or environmental monitoring. Scouting provides an early detection system that locates and identifies potentially serious pest situations before economic losses occur. Used with pest action thresholds, it also helps to avoid unnecessary pesticide applications. Samples are collected according to certain protocols. Often, scouting is done by agribusinesses or private consultants.

Initial Cost: low

Maintenance Cost: low - medium

Technical Assistance: desirable for initial information

Other Benefits: may result in higher quality crop

Other Considerations: a consultant may be hired to perform this function and provide pest management advice.

j. Special Handling of Sensitive Areas

Special handling of sensitive areas involves reducing or eliminating pesticide applications to wet spots, stream sides and areas near well heads.

Definition: with respect to pesticide application, particular attention to and appropriate management of areas such as wet spots, stream sides and areas near well heads; may include avoiding application entirely.

Purpose: to reduce risk of contamination by identifying sensitive areas and reducing or eliminating pesticide applications there. Use of a map locating such areas is helpful, making sure that the applicator is aware of such locations and any specific requirements. New Jersey Department of Agriculture has useful fact sheets about applying high risk pesticides in high risk areas.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: not required

Other Benefits:

Other Considerations: these sensitive areas should be treated with special handling when applying nutrients also, to avoid leaching of nutrients, especially nitrates, into ground water



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4. Strategies for Livestock Barnyard, Manure and Waste Management

Concerns about potential contamination of surface and ground water from livestock focus on two components of farm animal management. The first is on areas or structures where animals are stabled or held and fed or maintained, plus areas used for processing and storage of product (such as feed), manure, facility wastewater (e.g., milkhouse waste, barn and pen cleaning water, animal washing) and other related runoff. These areas are typically centered around the barnyard and are sometimes referred to as "confined animal facilities". The second is on animal grazing areas, particularly riparian, or stream-side zones (see Section 5, below).

Pollutants from confined animal facilities include nutrients, salts, pathogens and organic solids from manure and bedding. Phosphorus is a concern from milkhouse cleaning. Milk itself, if it gets into a stream and decomposes, uses up oxygen, and bacteria growing in milk transmit diseases downstream. Surface waters can be seriously impacted, causing fish kills, anaerobic conditions, eutrophication and unsuitability for drinking, fishing or swimming. Ground water can be contaminated by nutrients and salts from manure storage areas and related runoff seeping into the ground. Silage wastes are extremely concentrated and can be toxic to plant and animal life if discharged directly. Water running from up-slope through a confined animal facility, as well as rain and snow from roofs, increases the volume of facility runoff.

While most livestock manures are applied to cropland, improperly stored or handled manure can pose a direct threat to water resources. Direct runoff from manure stockpiles, leaking or overflowing storage units and barnyards can contribute nutrients (and pathogens; see below) directly into sensitive areas.

Some common disposal practices not only threaten groundwater but also may be illegal.

It has become commonplace to think of manure as a "waste". **Regarding manures as valuable and cost-saving resources that contribute to farm fertility, rather than as a waste, may lead to improved handling and utilization.** As a resource, manures applied to cropland add nutrients and organic matter to soils. But over-application of manures can contribute to water pollution because excess nutrients that are not taken up by the crop leach or runoff. So "waste management" and "nutrient management" are companions in a comprehensive management system and whole farm plan.

[page=1197] As with pest management and nutrient management above, developing a waste management system is the recommended first step. Such a system will address limiting discharges from confined animal facilities by identifying appropriate systems that collect solids, reduce contaminant concentration and reduce runoff. The system will also address management of stored runoff and accumulated solids by identifying an appropriate waste utilization system. Utilizing wastes to the fullest extent possible is a prudent waste management strategy as well as a potentially effective and cost-efficient nutrient management strategy. A good waste management system will include management practices for storage, handling, treatment and disposal of manure and other agricultural wastes. The aim is to minimize the potential impact of the manure-associated pollutants in both ground and surface waters. A waste management system may consist of one or more components, appropriately suited to the particular operation.

Cost effectiveness is a major concern when choosing appropriate waste management practices for a farm. Livestock operations of all sizes may need to or choose to install storage structures, which can be a costly component of a livestock enterprise. There are numerous manure storage systems available; the choice of the system will depend on the location, type and size of the farm operation, available sites and equipment, and economics.

Consider the variety of products commonly used in households and on farms: paints, solvents, oils, cleaners, wood preservatives, batteries, adhesives and pesticides. In addition, some common disposal practices not only threaten groundwater but also may be illegal.

Small, unusable amounts often wind up spilled, buried, dumped or flushed onto farm property. Minimizing the amounts of these substances used on the farm, along with practicing proper disposal practices, can reduce both health risks and the potential for groundwater contamination. Farmers and their families are generally familiar with the hazards of pesticides commonly used in the farm operation, but they may be less aware of the hazards of other chemicals that make many tasks around the home and farm easier or more efficient.

Improper use of hazardous products may cause toxic health effects. Improper storage may allow chemicals to leak, causing potentially dangerous chemical reactions, toxic health effects or groundwater contamination. Improper disposal allows these dangerous chemicals to enter directly into drinking water through surface water or groundwater.

Your drinking water is least likely to be contaminated by your hazardous wastes if you follow appropriate management procedures or dispose of wastes in any location that is **off your farm site**. However, proper offsite disposal practices are essential to avoid risking contamination that could affect the water supplies and health of others.

The following is a list of the BMPs that are recommended to reduce or eliminate water pollution from barnyards, manures and wastes.

Best Management Practices for Barnyard, Manure and Waste Management

A good waste management plan will include management practices for storage, handling, treatment and disposal of agricultural wastes.

a. Combined Waste Facility(s)

Definition: a structure or system for handling more than one type of waste.

Purpose: to meet environmental protection needs by maximizing efficient waste facility design. For example, milkhouse waste may be added to liquid manure or manure run-off storages that already exist. If a facility is being constructed to handle multiple storages, it must be designed to handle the total volume. Milkhouse wash water will dilute manure which makes it easier to pump. Silage leachate also may be combined with other wastes and manures.

Initial Cost: high

Maintenance Cost: medium

Technical Assistance: required

Other Benefits:

Other Considerations: federal cost share may be available



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[page=1198] **b. Diversion(s) - grass or other**

Definition: a drainageway constructed across a slope to divert surface runoff.

Purpose: to divert water away from barnyard, bunker silage storage areas and other heavy use areas, preventing excessive runoff from carrying organic wastes, sediments and other pollutants to surface water bodies.

Initial Cost: medium - high

Maintenance Cost: low

Technical Assistance: required

Other Benefits: may facilitate barnyard maintenance by reducing surface water

Other Considerations: will require periodic maintenance to remove debris and assure stability.

c. Filter Strip

Filter strips are areas of vegetation for removing sediment, organic matter and other contaminants from runoff and wastewater.

Definition: a strip or area of vegetation for removing sediment, organic matter and other contaminants from runoff and wastewater.

Purpose: to trap organic materials from concentrated livestock areas by trapping them in the vegetative material of the filter strip. Properly located filter strips may also filter pollutants from controlled overland flow treatment of liquid wastes. Filter strips must be managed and maintained. Saturated filter strips will not function properly.

Initial Cost: medium - high

Maintenance Cost: medium

Technical Assistance: desirable

Other Benefits: may provide wildlife and/or beneficials habitat

Other Considerations: will require maintenance.

d. Heavy Use Area Protection(s)

Definition: installation of semi-impervious or hard impervious surfaces in heavily used areas.

Purpose: to prevent degradation and to stabilize areas intensely used by livestock, and to allow for collection, management, and utilization of animal wastes, thereby reducing migration of contaminants to surface water bodies. Grading and surfacing of heavily used areas helps protect them from erosion, trampling, rutting or other deterioration, and helps prevent the collection of pollutants. Concrete or asphalt paving will be necessary if runoff is to be collected for treatment. Compacted gravel or other earth materials may otherwise be sufficient to stabilize the ground surface. Drainage and runoff control devices and filter strips may be components of heavy use area protection.

Initial Cost: medium - high

Maintenance Cost: low

Technical Assistance: desirable

Other Benefits:**Other Considerations:****e. Manure Composting**

Manure composting prevents water contamination by biologically treating organic wastes. The by-product of this process is a safe-to-use soil amendment.

Definition: the process of controlled and accelerated aerobic biodegradation and stabilization of livestock manures. (See also, Agricultural Composting, under Nutrient Management)

Purpose: to prevent water contamination by biologically treating organic wastes. The by-product of this process is a safe-to-use soil amendment. Composting stabilizes nutrients and reduces pathogens, making them less likely to leach into surface or ground water. Active composting usually takes place in windrows, static aerated piles or in-vessel structures. Passive "composting", with no active effort to manage or monitor the process, is not an effective or acceptable technique for managing organic wastes high in nitrogen. Successful composting requires careful attention to: site selection and design, selection and carbon : nitrogen ratio of ingredients, moisture, temperature, timing, proper equipment and management.

Initial Cost: medium - high

Maintenance Cost: low

Technical Assistance: required

Other Benefits: compost may be used on farm as a soil amendment/crop nutrient or sold commercially.

Other Considerations: needs careful management; there may be odor concerns; there may be regulatory considerations.

f. Manure Storage Facility(s)

Definition: a permanent, constructed structure for temporary storage of animal manures or other organic agricultural by-products.

Purpose: to reduce contaminant loading to surface waters by intercepting and storing polluted runoff from manure stacking areas, barnyards and feedlots. Such structures may be earthen impoundments (ponds), tanks or other facilities constructed of concrete, wood, steel, plastic or other materials. Tanks are used for liquid and slurry wastes and can be open or covered, inside or outside or beneath slotted floors. Stacking facilities are used for solids and may be open or roofed.

Initial Cost: high

Maintenance Cost: medium

Technical Assistance: required

Other Benefits:

Other Considerations: federal cost share may be available.

g. Manure Storage Field Stacking Area

Manure storage facilities reduce contaminant loading to surface water by intercepting and storing polluted runoff from manure stacking areas, barnyards and feedlots.

Definition: a temporary stacking area for solid manures located in a field.

Purpose: to temporarily stockpile manure for at most six months in a location where ground and surface water will be least threatened by contamination. As a component of a waste management plan, such an area is not a substitute for a manure storage structure, but may supplement the storage volume of such a structure. A stacking area allows temporary storage, when weather or field conditions may prevent daily field application, or when waiting to spread until after crop harvest. A well designed, located and managed stacking area may help in the timely application of stored manures, thereby reducing water quality impacts; a poorly designed, sited or maintained area may cause increased water quality problems.

[page=1199] **Initial Cost:** low - medium

Maintenance Cost: low

Technical Assistance: desirable; may be necessary for establishment

Other Benefits:

Other Considerations: site must be carefully selected to avoid negative impacts to ground water, wetlands and other sensitive areas, and to avoid odor problems with neighbors.

h. Plan for Manure and Waste Utilization

Using animal manures or other appropriate by-products on land in an environmentally acceptable manner; maintains and improves soil and plant resources.

Definition: using animal manures or other appropriate by-products on land in an environmentally acceptable manner while maintaining or improving soil and plant resources.

Purpose: to reduce transport of sediment and other pollutants to surface waters by applying wastes to fields where they may be incorporated, allowing crops to use nutrients that might otherwise contaminate ground water. As an essential part of a manure management plan, a waste utilization plan needs to be coordinated with a nutrient management plan that determines the amount, form, placement and timing of waste applications to meet agronomic needs. Technical assistance is useful to evaluate field and other conditions to maximize utilization without compromising water quality.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: desirable

Other Benefits:

Other Considerations:

i. Roof Runoff Management(s)

Definition: a facility for collecting, controlling and disposing of runoff water from roofs.

Purpose: to prevent roof runoff water from flowing into or across concentrated waste areas, barnyards, livestock or equipment laneways or other areas where clean roof runoff could wash contaminants into surface or ground waters.

Such facilities include erosion-resistant channels or subsurface drains installed along building foundations below eaves, and roof gutters and downspouts.

Initial Cost: low - medium

Maintenance Cost: low

Technical Assistance: not required

Other Benefits: may contribute to animal health and safety

Other Considerations:

j. Sediment Basin(s)

Definition: a depression constructed to collect and store polluted runoff.

Purpose: to slow runoff that may contain animal manures. The basin may be dug or constructed as an earthen embankment. It allows solids to settle before runoff is discharged.

Initial Cost: medium - high

Maintenance Cost: low

Technical Assistance: required

Other Benefits: may control erosion and sediment; may enhance nutrient management

Other Considerations: basin will need periodic cleaning or dredging.

k. Silage Leachate Waste Management

Silage leachate may be land applied, alone in diluted form or mixed with manure or other wastes according to a waste utilization plan and a nutrient management plan, paying particular attention to application rates.

Definition: a planned system for collection, storage and disposal of silage wastes in an environmentally acceptable manner.

Purpose: to collect, store and dispose of silage leachate in a manner that minimizes threats to water resources. Silage leachate is an extremely strong organic waste, using up tremendous amounts of oxygen if released into water bodies or into the soil. The best strategy is to prevent or minimize the formation of silage leachate and to safely store and dispose of if any generated. Proper siting and sizing of silage facilities is the first step. Practices such as harvesting the silage at a moisture content that will not result in excessive silage leachate production, covering the silage pile to eliminate rain infiltration, and installing drains and/or diversions to separate ground water and surface water runoff from the ensiled forage are also important. A properly designed waste collection and storage system may combine silage leachate with other agricultural wastes. Leachate may be land applied, alone in diluted form, or mixed with manure or other wastes according to a waste utilization plan and a nutrient management plan, paying particular attention to application rates.

Initial Cost: high

Maintenance Cost: medium - high

Technical Assistance: required

Other Benefits: may have nutrient value as soil amendment

Other Considerations: federal cost share may be available.

[page=1200] **1. Wastewater Treatment System(s)**

Definition: a planned system for biological treatment of wastewater generated in milkhouses, typically consisting of a settling tank, distribution system and treatment system.

Purpose: to reduce threats to water quality by biologically treating organic milkhouse waste. In situations where milkhouse waste is not combined with liquid manures, biological systems for treatment will reduce the amount of suspended solids, biological oxygen demand and dissolved nitrogen that may enter the water table. Such systems are not designed to include waste milk or sewage. An underground treatment system is similar to a traditional septic system. In suitable soils, organic matter treatment beds function like leach fields, using organic matter to absorb the waste.

Initial Cost: high

Maintenance Cost: medium

Technical Assistance: required

Other Benefits:

Other Considerations: regular maintenance is required; discharging milkhouse wastes into a municipal sewer should be considered; this practice may not be effective in treating the cleaning agents used to disinfect the milking system; availability and disposal of organic bedding material must be considered.



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m. Petroleum Product Storage Facility

Definition: a permanent above ground structure for the storage of petroleum products for use in farm machinery.

Purpose: to reduce contaminant loading to surface and groundwater by preventing spills and leakage. Such structures should be made of non-corrosive materials located above ground so they can be periodically examined for leakage.

Initial Cost: High

Maintenance Cost: Low

Technical Assistance: desirable for siting

Other Benefits:

Other Considerations:

n. Hazardous & Household Waste Management

Definition: proper use and disposal of toxic or pathogenic products as a result of domestic use around the farmstead. This includes but is not limited to sewage, paint, solvents, cleaners, preservatives, batteries, adhesives.

Purpose: to reduce the use and encourage the proper disposal of hazardous wastes. Small amounts of these materials can be hazardous to your health especially when found in the drinking water. Proper management can reduce the potential for toxic effects.

Initial Cost: high

Maintenance Cost: medium

Technical Assistance: desirable

Other Benefits: proper use of chemicals can save money

Other Considerations: small amounts of toxic materials can be deadly to humans and animals.

5. Strategies for Livestock Grazing Management

Water quality concerns related to livestock grazing focus on potential impacts to sensitive areas such as streambanks, wetlands, estuaries, ponds and lakeshores. Sensitive areas also include the riparian zone, an extremely diverse and vital vegetated ecosystem along a water body.

Impacts to ground water, surface water bodies and the riparian zone include sedimentation, and the introduction of nutrients, pathogens and organic solids. Healthy riparian and wetland ecosystems rely, in part, on good management of the immediate areas as well as upland areas. Careful selection of grazing management systems, controlled access and vegetative stabilization practices all should be considered in the development of a grazing and pasture management plan.

A grazing management system needs to accommodate the demands of vegetation, terrain and type of livestock operation. A well-designed system supplies and improves grazing lands and facilities, develops appropriate water sources, and protects streambanks and other sensitive water resources. Well-managed pastures are stable, with suitable plantings and minimal erosion. Uncontrolled access to streams and ponds for watering may seem economical and convenient, but cost-efficient alternatives that avoid negative water quality impacts are available. Pasturing systems (for example, rotational grazing) can be designed to maximize forage opportunities while minimizing stresses on land and water systems.

The following is a list of the BMPs that are recommended to reduce or eliminate water pollution from livestock grazing.

Water quality concerns related to livestock grazing focus on potential impacts to sensitive areas such as streambanks, wetlands, estuaries, ponds, and lake shores.

Best Management Practices for Livestock Grazing Management

a. Alternative Water Supply(s)

Definition: several options for livestock watering that keep animals away from streambanks and riparian zones.

Purpose: to protect streambanks, wetlands and riparian zones from adverse impacts from livestock trampling and waste. For example, a pipeline may be installed to convey water to an upland area. A livestock pond can be excavated or constructed with a dam or embankment. A trough or tank, with devices for water control and wastewater disposal may be installed. This practice may encourage better distribution of livestock over the pasture and grazing may be better controlled. In some cases, the development of a well or spring is a positive alternative.

Initial Cost: low - high

Maintenance Cost: low

Technical Assistance: desirable

Other Benefits:

Other Considerations:

[page=1201] **b. Fencing(s)**

Fencing keeps animals from riparian zones and other sensitive water resources, preventing wastes from entering water bodies.

Definition: enclosing or dividing an area of land with a suitable structure that acts as a barrier to livestock.

Purpose: to keep animals from riparian zones and other sensitive water resources, to prevent wastes from entering water bodies, streambank degradation, compaction of soils and loss of vegetation in riparian zones. As part of a grazing management plan, location of fencing should take into account the fact that fencing can have the effect of concentrating animals in particular areas, such as along the fence line, where paths may become channels that concentrate and accelerate runoff. Some fencing, when installed across the slope, can serve to slow down runoff. Exclusion fencing may be accompanied by installation of properly designed and located livestock crossing across streams.

Initial Cost: high

Maintenance Cost: low

Technical Assistance: desirable

Other Benefits: prevention of livestock access to some areas can preserve desirable habitat and plant species.

Other Considerations: Fencing must be installed properly using appropriate materials to be effective.

c. Pasture Management

Definition: proper treatment and use of pastureland.

Purpose: to minimize adverse impacts to ground and surface water by maintaining or improving the quality and quantity of forage, protecting the soil, conserving water and optimizing the use of fertilizers and pesticides on pasture. Practices include postponing grazing or resting grazing land for a prescribed period, which protects pasture areas with bare ground or little ground cover from eroding. Proper pastureland management will minimize movement of sediments from exposed soils and nutrients from manures to ground and nearby surface waters. As vegetative cover increases, the filtering processes are enhanced, trapping more silt and nutrients. Early spring grazing on wet and soft soils should be avoided. Soil testing and proper application of lime, manures and other nutrients are key to healthy pasture management.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: not required

Other Benefits: may enhance crop health and vigor

Other Considerations:**d. Plan for Proper Grazing**

A plan for proper grazing reduces transport of sediments and other pollutants from grazed areas by assuring a healthy and stable vegetative cover.

Definition: A plan for grazing at an intensity that will maintain enough cover to protect the soil and maintain or improve the quantity and quality of desirable vegetation.

Purpose: to reduce transport of sediments and other pollutants from grazed areas by assuring a healthy and stable vegetative cover. Overgrazed pastures result in poor plant cover and plant health, and exposed soils. Deferred grazing and rotational grazing are two practices that encourage proper grazing intensity. Pasturing animals in woodlands should be limited to areas that produce a significant amount of forage that can be harvested without damaging other forest values or creating negative impacts to ground or surface water quality. Wooded areas should be grazed at a rate that maintains adequate cover for soil protection and maintains or enhances the quantity and quality of trees and forage vegetation.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: desirable

Other Benefits: optimum livestock health; improved forage production and quality

Other Considerations: grazing areas may be restricted by eliminating wooded and/or wet areas.

e. Prescribed Grazing (Planned Grazing System)

Definition: a practice in which two or more grazing units are alternately rested and grazed in a planned sequence.

Purpose: to decrease movement of sediments, nutrients and other substances into downstream waters by increasing the quality and quantity of vegetation in grazed areas. With a planned grazing system (e.g., the "Voisin" method, or intensive rotational grazing) livestock spend less time in each pasture or section of pasture. The vegetation helps trap manure.

Initial Cost: low - medium

Maintenance Cost: medium (for management time)

Technical Assistance: desirable

Other Benefits: may yield economic savings; may increase grazing efficiency; may increase and improve quality and production of forage (including season extension); may improve flexibility in a grazing program; grass-based livestock management may decrease manure handling, decrease fertilizer use, require less machinery; may enhance wildlife habitat

Other Considerations: requires increased management; requires supplying livestock water.

f. Riparian Buffer

Definition: an established area of vegetation located next to and up-gradient of water courses, water bodies and associated wetlands.

Purpose: to maintain or improve surface water quality by removing or buffering the effects of sediment, nutrients, organic matter and some pesticides. As a grazing practice, it is most applicable in areas downslope from pastures. Management practices include protecting or establishing vegetation, installing an up-gradient filter strip, installing livestock exclusion fencing, excluding heavy equipment, and designing and installing proper livestock access and crossings. Buffer width varies depending on soil type and vegetative cover; 35 feet is considered minimum. If possible, native species should be planted/encouraged and fertilizers and pesticides should not be used.

Initial Cost: low - medium

Maintenance Cost: low

Technical Assistance: desirable

Other Benefits: may enhance streambank stabilization; may improve wildlife and aquatic habitat (see also, nutrient management, pest management and erosion and sediment control)

[page=1202] **Other Considerations:** may reduce amount of active grazing land; may limit livestock access to water or shade.

g. Stream Crossing

Definition: a stabilized area to provide access across a stream for livestock; may be used for farm machinery.

Purpose: to avoid degradation of streams and streambanks from animal trampling and wastes. Properly designed and installed stream crossings minimize bank and streambed erosion, reduce sediment and enhance water quality. A crossing might be graded and stoned or might consist of a constructed bridge or a culvert.

Initial Cost: low - medium

Maintenance Cost: low

Technical Assistance: desirable

Other Benefits: some stream crossings may enhance wildlife habitat

Other Considerations: may require wetlands permit.

h. Vegetative Stabilization

Vegetative stabilization practices which improve or reestablish vegetative cover on pastures reduce erosion into water bodies.

Definition: practices designed to improve or reestablish vegetative cover on pastures.

Purpose: to reduce erosion into water bodies. Such practices include seeding or reseeding stands of adapted forage species, planting vegetation such as grasses, shrubs or trees on highly erodible or critically eroding areas, brush and weed management and prescribed burning.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: desirable

Other Benefits: may enhance habitat

Other Considerations:

6. Strategies for Irrigation Management

While cranberry producers are the most significant users of irrigation water in New Jersey, other growers irrigate vegetable, fruit, nursery, greenhouse and other specialty crops. While New Jersey typically is blessed with abundant rainfall, irrigation is occasionally necessary. Chemigation, the practice of applying fertilizers and/or pesticides to crops through irrigation systems, is also used by some farmers.

The concern associated with irrigation is the potential movement of pollutants such as sediments, organic solids, pesticides, metals, microbial organisms, salts and nutrients from the land into ground and surface waters. Ground water is particularly vulnerable where coarse textured soils allow high infiltration.

Proper irrigation management will help minimize discharge of pollutants while also reducing water waste and improving water use efficiency. An irrigation management plan will include components that address irrigation scheduling practices, efficient application, proper utilization of tailwater, drainage and runoff, and backflow prevention. The first step in such a plan is the development of a water budget and water balance for the crop to be irrigated. Technical assistance may be required for these calculations.

The following is a list of the BMPs that are recommended to reduce or eliminate water pollution from crop irrigation.

Best Management Practices for Irrigation

a. Backflow Prevention(s)

A backflow prevention system prevents chemical backflow to the water source during chemigation.

Definition: a system to prevent chemical backflow to the water source during chemigation.

Purpose: to prevent contamination of a water source by installing devices that prevent chemicals from entering the irrigation water source in cases when the irrigation pump shuts down. There are several different systems used as backflow preventers such as an air gap, a check valve with vacuum relief and low pressure drain, a double check valve, a reduced pressure principal backflow preventer and an atmospheric vacuum breaker. Factors to consider when selecting a backflow prevention system are the characteristics of the chemical that can backflow, the water source and the geometry of the irrigation system.

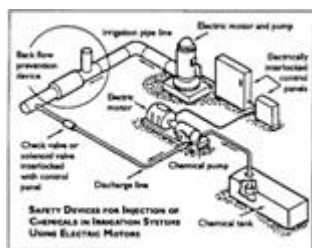
Initial Cost: low - medium

Maintenance Cost: low

Technical Assistance: not required

Other Benefits:

Other Considerations:



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b. Efficient Irrigation System

A planned system of crop irrigation has as its goal the efficient use of water resources. Systems will vary with the type of crop grown, the soils and the topography.

Definition: a planned system of crop irrigation that has as one goal the efficient use of water resources. Systems will vary with the type of crop grown, the soils and the topography.

Purpose: to ensure efficient use and distribution, minimize runoff or deep percolation and eliminate soil erosion. Several kinds of systems, properly designed and operated, can be used. Drip or trickle irrigation is a system in which all necessary facilities are installed for efficiently applying water directly to the root zone of plants by means of applicators (e.g. porous tubing or perforated pipe) operated under low pressure. A typical trickle system has a mainline with a control head, leading to laterals placed in the field. Runoff is reduced in this system, but potential hazards to shallow ground water exist if chemigation is used.

A sprinkler irrigation system applies water by means of perforated pipes or nozzles operated above ground, under pressure. Proper management of such a system controls runoff and prevents negative impacts to downstream surface waters. Chemigation with this system allows management of nutrients, wastewater and pesticides, but poor management may cause pollution of surface and ground water. Surface and subsurface irrigation systems deliver water by surface means, such as furrows, borders, contour levees or ditches, or by subsurface means. Proper management of such systems will prevent downstream pollution associated with runoff and percolation, including elevated temperatures of receiving waters.

[page=1203] **Initial Cost:** medium - high

Maintenance Cost: medium

Technical Assistance: not required

Other Benefits: conserves water; enhances efficient delivery of fertilizer and/or pesticides (known as "fertigation")

Other Considerations:

c. Irrigation Water Management

Definition: determining and controlling the rate, amount and timing of irrigation water in a planned and efficient manner.

Purpose: to minimize the loss of dissolved substances and sediments from the irrigation system to surface or ground water. Effective use of available irrigation water will promote the desired crop response, control water loss and protect water quality. An irrigation management plan will take into account the various and complex factors that need to be considered. The grower must know how to determine when irrigation water should be applied and how to measure or

estimate the amount of water required for each irrigation. Proper scheduling requires consideration of factors such as soil properties, type of crop, its drought sensitivity and status of crop stress, stage of crop development, availability of a water supply and climatic factors such as rainfall and temperature. Proper irrigation also requires the ability to make necessary adjustments to the water stream, rate and time, and management of irrigation runoff.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: required

Other Benefits: conserves water

Other Considerations:

d. Tailwater Recovery System(s)

A tailwater recovery system collects, stores and transports irrigation tailwater for reuse in the farm irrigation distribution system.

Definition: a facility to collect, store and transport irrigation tailwater for reuse in the farm irrigation distribution system.

Purpose: to increase water efficiency and reduce potential for contamination by recovering irrigation water for reuse in irrigation or for proper disposal. Using runoff water to provide additional irrigation or to reduce the amount of water diverted increases the efficiency of irrigation water use. In a tailwater recovery facility, sediments and substances attached to them (e.g. salts, metals, soluble nutrients and pesticides) are trapped, thereby decreasing downstream impacts to water quality. Recovered water with high salt or metal content will have to be disposed of in an environmentally safe manner and location.

Initial Cost: high

Maintenance Cost: medium

Technical Assistance: not required

Other Benefits:

Other Considerations:

e. Water-measuring Device(s)

Definition: an irrigation water meter, flume, weir or other water-measuring device installed in a pipeline or ditch.

Purpose: to measure the rate of flow and/or application of water and the total amount of water applied to the field with each irrigation. Such information can assist the grower in maximizing the efficiency and effectiveness of irrigation scheduling and equipment and provide data with which to consider modifications.

Initial Cost: low

Maintenance Cost: low

Technical Assistance: not required

Other Benefits: conserves water

Other Considerations:

Summary of BMP Contributions to Farm Management Systems

Best Management Practice (BMP)							Best Management Practice (BMP)							
	Erosion & Sediment	Nutrient	Pest & Pesticide	Barrenland, Manure & Waste	Grazing	Irrigation		Erosion & Sediment	Nutrient	Pest & Pesticide	Barrenland, Manure & Waste	Grazing	Irrigation	
agricultural composting		●		●			efficient irrigation system							●
alternate water supply					●		equipment calibration		●					
appropriate cultural controls		○	●				fencing	○					●	
appropriate biological controls			●				fert. storage, handling and containment		●					
appropriate physical controls			●				field borders	●						
backflow prevention					●		field strip-cropping	●	○					
buffer strips	○	●		○			filter strip	●	○		●			
calibrate and maintain pesticide application equipment			●				grade stabilization structure (water control structure)	●						
combined waste facility		○		●			grassed waterway	●	○					
conservation cover	●	○					green manure cropping	○	●					
conservation crop rotation	●	●	○				heavy use area protection	○			●			
contour farming	●						intercropping		●	○				
contour strip-cropping	●	○					manure storage facility	○			●			
cover cropping	●	●	○				manure composting		●		●			
critical area planting	●						manure storage field stacking area		○		●			
data collection			●				mulching	●						○
diversion (grass and other)	●			●			nutrient budgeting	●			●			
							nutrient record keeping		●					

● = primary benefit ○ = additional benefit

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Summary of BMP Contributions to Farm Management Systems

Best Management Practice (BMP)							Best Management Practice (BMP)							
	Erosion & Sediment	Nutrient	Pest & Pesticide	Barrenness, Manure & Waste	Grazing	Irrigation		Erosion & Sediment	Nutrient	Pest & Pesticide	Barrenness, Manure & Waste	Grazing	Irrigation	
outlet or lined waterway	●			○			safe storage, mixing, loading and disposal of pesticides			●				
pasture management	○	○		○	●		scout for pests			●				
pasture and hayland planting	●				○		sediment basin	●			●			
pesticide application plans and records			●				silage leachate waste management				●			
plan for irrigation water management						●	soil nitrate testing		●					
plan for proper grazing	○				●		soil testing		●					
plan for waste utilization		○		●			special handling of sensitive areas		○	●				
plant tissue testing		●					stream channel stabilization measures	●						
prescribed grazing (planned grazing system)	○			○	●		stream crossing	○				●		
proper timing and application methods		●					tailwater recovery system		○	○			●	
protect and enhance natural controls		●					tree planting	●						
residue management: no-till, strip till, mulch till, ridge till	●	○	○				vegetative stabilization	○				●		
riparian buffer	●		○		●		wastewater treatment system				●			
roof runoff management	○			●			water-measuring device						●	
							yield data		●					

● = primary benefit ○ = additional benefit

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