M E M O R A N D U M

To: Jo Lynn Traub, Director
Division of Water
U. S. EPA Region V

From: Kevin H. Elder, Executive Director
Livestock Environmental Permitting Program
Ohio Department of Agriculture

Date: December 22, 2006

Issue: Setbacks from Surface Drains

In May and June 2005, your staff sent a list of technical and legal issues to the Ohio Department of Agriculture (ODA) to be addressed by ODA in rules to be adopted by this Department for the administration of the NPDES program for Concentrated Animal Feeding Operations (CAFOs). ODA, with assistance from Ohio EPA, addressed most of the issues identified by your staff with regulatory and statutory changes. However, ODA maintains that certain technical issues identified by U.S. EPA should be resolved based on USDA Natural Resource Conservation Service standards or other appropriate technical standards, as guidance for development of the applicable technical standard. This Memorandum explains ODA's position on one such issue.

USEPA listed this comment on OAC 901:10-2-14 Appendix A, Table 2: In OAC 901:10-2-14 Appendix A, Table 2, the setbacks applicable to surface application and surface incorporation within 24 hours or direct injection in proximity to "field surface drains" do not conform with 40 CFR 412.4(c)(5).

The federal rule regarding setback requirements states as follows:

> *Setback requirements.* Unless the CAFO exercises one of the compliance alternatives provided for in paragraph (c)(5)(i) or (c)(5)(ii) of this section, manure, litter, and process wastewater may not be applied closer than 100 feet to any down-gradient surface waters, open tile intake structures, sinkholes, agricultural well heads, or other conduits to surface waters.
>
> (i) *Vegetated buffer compliance alternative.* As a compliance alternative the CAFO may substitute the 100-foot setback with a 35-foot wide vegetated buffer where applications of manure, litter, or process wastewater are prohibited.
>
> (ii) *Alternative practices compliance alternative.* As a compliance alternative, the CAFO may demonstrate that a setback or buffer is not necessary because implementation of alternative conservation practices or field-specific conditions will provide pollutant

> reductions equivalent or better than the reductions that would be achieved by the 100-foot setback.

40 C.F.R. 412.4(c)(5).

The Preamble to the Federal Rule promulgating 40 C.F.R. Section 412.4 (68 Fed. Reg. 7176 (Feb. 12, 2003)) provides the rationale behind the land application effluent guidelines or BMPs for Large CAFOs covered by Subparts C and D (beef, dairy, heifer, swine, poultry and veal). The Preamble states:

> EPA is promulgating only those BMPs that are appropriate on a nationwide basis, while giving States and permittees the flexibility to determine the appropriate practices at a local level to achieve the effluent limitations.

68 Fed. Reg. 7212 (Feb. 12, 2003).

In USEPA's guidance document "Managing Manure Guidance for Concentrated Animal Feeding Operations," published December 1, 2004 (hereinafter referred to as "Manure Guidance"), page 4-21, USEPA states that a state may develop alternative conservation practices which meet the requirements of 40 C.F.R. 412.4(c)(5)(ii) as follows:

> State-Developed Alternative Conservation Practices. In some cases, a state may develop a list of alternative conservation practices that, in tandem with phosphorous-based technical standards for land application, have been evaluated and demonstrated to provide pollutant reductions better than the 100-foot setback. CAFOs should check to see whether their permitting authority has collected data and information that could be used to demonstrate that certain conservation practices provide pollutants reductions equivalent to or better than the reductions that would be achieved by the 100-foot setback. A state may also provide CAFOs with information or may specify suitable methods to facilitate the CAFO's demonstration.

ODA's Response: ODA is amending OAC 901:10-2-14 Appendix A, Table 2, to replace the reference to "field surface drains" with a reference to "field surface furrows" and is amending OAC 901:10-1-01 to replace the term "drainageway" with the term "field surface furrow". Together, these amendments remove the confusion regarding the meaning of the term "field surface drain" in the old version of OAC 901:10-2-14, which was never intended to refer to permanent conduits or waters of the State, but rather refers to temporary features used in agriculture to prevent ponding in crop fields that are destroyed by surface incorporation or direct injection of manure. Field surface furrows are sometimes referred to as "field surface drains" or "drainageways" in other regulatory

contexts but ODA recognizes that these alternative terms may be confusing in the context of this rule. [1]

ODA agrees that main surface drains that are permanent are an actual or potential "conduit to surface waters" as described in 40 C.F.R. 412.4(c)(5). Under ODA's program, the setback requirement for surface application of manure is 100 feet (35 feet with a vegetative buffer) from a permanent main surface drain, because a main surface drain is a surface water of the State. See amended OAC 901:10-2-14 and Appendix A, Table 2 (citing to the definition of "surface waters of the State" in OAC 3745-1-02(B)(77) that includes "all streams, lakes, reservoirs, ponds, marshes, wetlands or other waterways which are situated wholly or partially within the boundaries of the state, except those private waters which do not combine or effect a junction with natural surface or underground waters.") These provisions are consistent with 40 C.F.R. 412.4(c)(5).

In contrast to a permanent surface drain, a field surface furrow means:

> An area of short-term low-gradient non-erosive concentrated surface water runoff which occurs during or shortly after precipitation events and is not a river, stream, ditch or grassed waterway. Field surface furrows are areas that are normally planted with crops each year.

OAC 901:10-1-01(KK). Field surface furrows are temporary, as they are destroyed every year due to tillage/planting practices and are "cut back into" the field annually. Field surface furrow locations can, and do, vary from year to year and are generally installed around planting time. Their use is derived from Natural Resource Conservation Service (NRCS) Conservation Practice Standard Code 607, which was developed to be used predominantly in Northwest Ohio to remove standing water from crops during the growing season. The systems are usually made up of small, temporary lateral surface furrows that convey water to main surface drains (collectors).

Under ODA's program, the setback requirement for surface application of manure is 35 feet from field surface furrows except where manure is surface incorporated or injected. See O.A.C. Rule 901:10-2-14 and Appendix A, Table 2. The setback requirement for the incorporation or injection of manure is 0 feet from a field surface furrow. See O.A.C. Rule 901:10-2-14 and Appendix A, Table 2.

The difference in the rule is based on the fact that the furrows are destroyed in the surface incorporation/injection process. As a typical example, manure from a dairy would be applied in late summer or early fall after silage has been chopped. If the farmer follows Ohio NRCS Field Office Technical Guide-Conservation Practice Standard 633 for liquid manure application and works the top 3-5 inches of the soil or uses an Aerway type system, any field surface furrow that was present in the field will be destroyed at the time

[1] The term drainageway is defined by the Ohio Department of Natural Resources, Division of Soil and Water for use in sediment control and agricultural pollution. This term is also used by Ohio EPA in in that Agency's use designations for waters of the state."

of application and will have to be reconstructed in the following spring. As a result, setbacks do not apply for nonexistent field surface furrows.

ODA's rule is an alternative conservation practice standard which takes into account the appropriate practices for Ohio as envisioned by the Manure Guidance and the Preamble. The State-developed alternative conservation practice under 40 C.F.R. Section 412.4(c)(5)(ii), is based on the NRCS Conservation Practice Standard Code 633 for Ohio which was developed specifically for waste utilization in Ohio. Because field surface furrows are located where crops are growing, these areas remain eligible for application of commercial fertilizers to compensate for lack of nutrients, even if setbacks are enforced. Liquid manure application by means of injection or incorporation poses less environmental risk than applying commercial fertilizer in the field surface furrows because commercial fertilizer is more soluble and is generally broadcast or surface applied.

M E M O R A N D U M

To: Jo Lynn Traub, Director
Division of Water
U. S. EPA Region V

From: Kevin H. Elder, Executive Director
Livestock Environmental Permitting Program
Ohio Department of Agriculture

Date: December 22, 2006

Issue: Soil Sampling Depth

In May and June 2005, your staff sent a list of technical and legal issues to the Ohio Department of Agriculture (ODA) to be addressed by ODA in rules to be adopted by this Department for the administration of the NPDES program for Concentrated Animal Feeding Operations (CAFOs). ODA, with assistance from Ohio EPA, addressed most of the issues identified by your staff with regulatory and statutory changes. However, ODA submits that certain technical issues identified by U.S. EPA should be resolved based on USDA Natural Resource Conservation Service standards or other appropriate technical standards, as guidance for development of the applicable technical standard. This Memorandum explains ODA's position on one such issue.

USEPA listed this comment on OAC 901:10-2-13: OAC 901:10-2-13 should be revised to provide that soil samples will be collected to a shallow depth, from one to two inches, where manure will be surface applied and subsurface drains are not present. Sharpley, *et al.*, 2003, *Agricultural Phosphorus and Eutrophication*, 2nd ed., USDA Agricultural Research Service (ARS-149), Washington, DC, p. 13 and *Managing Manure at CAFOs*, p.4-4.

ODA's Response: The federal CAFO rule, as revised February 13, 2003, does not specify a soil sampling depth parameter. Rather, 40 C.F.R. 412.4(c)(3), on the issue of soil sampling requirements, states only that soil must be analyzed a minimum of once every five years for its phosphorus content. In setting parameters for best management practices ("BMPs") for the land application of manure, litter and process wastewater, the federal rule states that CAFOs must develop nutrient management plans which both "achieve realistic production goals" and "minimize nitrogen and phosphorus movement to surface waters." 40 C.F.R. 412.4(c)(1), (c)(2), and (c)(2)(i). A part of any nutrient management plan is the soil sampling depth parameter.

The Preamble to the Federal Rule promulgating 40 C.F.R. Section 412.4 (68 Fed. Reg. 7176 (Feb. 12, 2003)) discusses how states are to develop and establish technical standards for nutrient management plans. The Preamble states:

> Permitting authorities have discretion in setting the technical standards that minimize phosphorus and nitrogen transport to surface waters. Technical standards for nutrient management should appropriately balance the nutrient needs of crops and potential adverse water quality impacts in establishing methods and criteria for determining appropriate application rates. The permitting authority may use the USDA Natural Resource Conservation Service (NRCS) Nutrient Management Conservation Practice Standard, Code 590, or other appropriate technical standards, as guidance for development of the applicable technical standard.

68 Fed. Reg. 7209 (Feb. 12, 2003).

USDA's Natural Resource Conservation Service (NRCS) Nutrient Management Conservation Practice Standard, Code 590, for Ohio specifically states that the soil sampling depth for phosphorus shall be 8 inches. USDA's Natural Resource Conservation Service (NRCS) Nutrient Management Conservation Practice Standard, Code 590, for Ohio, page 2, at paragraph 9.a.

In accordance with the Preamble's directive to balance realistic production goals with minimizing the movement of nitrogen and phosphorus to surface waters, ODA has established a soil sampling depth of 6 to 8 inches. Rule 901:10-2-13(A) of the Administrative Code states:

> The manure management plan shall contain information on soils to allow the owner or operator to plan for nutrient utilization at recommended agronomic rates and to minimize nutrient runoff to waters of the state. Soil shall be sampled and analyzed by utilizing the following procedure:
>
> (A)At a minimum, soil samples shall be taken to a uniform depth and the fertility analysis shall include: pH, phosphorus, potassium, calcium, magnesium and cation exchange capacity.

ODA specifies that the soil sampling depth shall be a uniform depth of 6 to 8 inches. This sampling depth of 6 to 8 inches was chosen based on a review of the research on soil sampling depth which takes into account both the agricultural concerns of soil fertility and crop production and the environmental concerns of runoff to surface waters. ODA maintains that one soil sample for phosphorus at a depth of 6 to 8 inches is appropriate to test for soil fertility and crop production as well as runoff to surface waters. ODA's position is supported in the research cited below and is consistent with the Preamble.

As noted above, ODA's soil sampling depth of 6 to 8 inches for phosphorus is consistent with the 8 inches recommended by USDA's NRCS Nutrient Management Conservation Practice Standard, Code 590 for Ohio. The purposes of this NRCS Conservation Practice Standard, Code 590 are consistent with those stated in the Preamble, i.e.:

1. To budget and supply nutrients for plant production.
2. To properly utilize manure or organic by-products as a plant nutrient source.
3. To minimize agricultural non-point source pollution of surface and ground water resources.
4. To maintain or improve the physical, chemical and biological condition of soil.

USDA's Natural Resource Conservation Service Nutrient Management Conservation Practice Standard, Code 590, for Ohio, p. 1. Ohio State University Extension Publication AGF-206-95 (Soil Sampling, Handling and Testing) similarly provides for sampling depth of 0-8 inches.

Finally, ODA's uniform sampling depth of 6 to 8 inches is supported by two recent scientific studies. One study by A. Torbet, T.C. Daniel, J.L. Lemunyon, and R.M. Jones, entitled "Relationship of Soil Test Phosphorus and Sampling Depth to Runoff Phosphorus in Calcareous and Noncalcareous Soils," J. Environ. Qual. 31:1380-1387 (2002), concluded that soil sampling at higher depths, such as 6 to 8 inches, produces more reliable and less variable results of the amount of phosphorus in the soil. Another study by P.D. Schroeder, David E. Radcliffe, Miguel L. Cabrera, and Carolee D. Belew, entitled "Relationship between Soil Test Phosphorus in Runoff: Effects of Soils Series Variability," J. Environ. Qual. 33: 1452-1463 (2004), concluded that there were no statistical differences in the amount of phosphorus runoff measured for all sampling depths.

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Mike Monnin, Ohio-NRCS, Environmental Engineer

M E M O R A N D U M

To: Jo Lynn Traub, Director
Division of Water
U. S. EPA Region V

From: Kevin H. Elder, Executive Director
Livestock Environmental Permitting Program
Ohio Department of Agriculture

Date: December 22, 2006

Issue: Amount of Precipitation = Runoff on Hydrologic Soil Groups C/D

In May and June 2005, your staff sent a list of technical and legal issues to the Ohio Department of Agriculture (ODA) to be addressed by ODA in rules to be adopted by this Department for the administration of the NPDES program for Concentrated Animal Feeding Operations (CAFOs). ODA, with assistance from Ohio EPA, addressed most of the issues identified by your staff with regulatory and statutory changes. However, ODA maintains that certain technical issues identified by U.S. EPA should be resolved based on USDA Natural Resource Conservation Service standards or other appropriate technical standards, as guidance for development of the applicable technical standard. This Memorandum explains ODA's position on one such issue.

USEPA listed this comment on OAC 901:10-2-14(C)(6): For Hydrologic Soil Group C and D soils, OAC 901:10-2-14(C)(6) needs to prohibit surface application of manure if the forecast contains a greater than 50 percent chance of rain exceeding one-quarter inch for a period extending 24 hours after the start of land application. NPDES Permit Writers' Guidance Manual and Example NPDES Permit for CAFOs, p. 4-8, and Managing Manure Nutrients at CAFOs,[1] page O-6 of Appendix M.

ODA's Response: OAC 901:10-2-14(C)(6) states as follows: "Land application of manure shall not occur if the forecast contains a greater than fifty per cent chance of precipitation as determined in "Managing Manure Nutrients at Concentrated Animal Feeding Operations, Appendix M, United States Environmental Protection Agency, EPA-821-B-04-006, August 2004," exceeding an amount of one-half inch for a period extending twenty-four hours after the start of land application. Record weather conditions in the operating record for conditions at the time of application and for twenty-four hours prior to and following application."

[1] U.S. Environmental Protection Agency, "Managing Manure Nutrient at Concentrated Animal Feeding Operations," EPA-821-B-04-009 (December 2004). Referred to here as "Managing Manure Nutrients."

ODA maintains that OAC 901:10-2-14(C)(6) is protective of the environment and consistent with federal law for the following reasons:

1. U.S.EPA's position is not present in any regulation for CAFOs in 40 CFR Part 122 and 40 CFR Part 412. Reference to this position is found only within U.S.EPA's technical guidance entitled "Managing Manure Nutrients at Concentrated Animal Feeding Operations," August 2004. This publication is to be considered with Federal Rules with regard to regulating CAFOs. The technical guidance document contains a Disclaimer at the onset that states, "This is a guidance manual and is not a regulation. It does not change or substitute for any legal requirements. While EPA has made every effort to ensure the accuracy of the discussion in this guidance, the relevant statutes, regulations, or other legally binding requirements determine the obligations of the regulated community. This guidance manual is not a rule, is not legally enforceable, and does not confer legal rights or impose legal obligations upon any member of the public, EPA, States or any other agency. In the event of a conflict between the discussion in this document and any statute or regulation, this document would not be controlling. The word "should" as used in this guidance manual does not connote a requirement, but does indicate EPA's strongly preferred approach to assure effective implementation of legal requirements. This guidance may not apply in a particular situation based upon the circumstances, and EPA, States and Tribes retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance manual where appropriate. Permitting authorities will make each permitting decision on a case-by-case basis and will be guided by the applicable requirements of the CWA and implementing regulations, taking into account comments and information presented at that time by interested persons regarding the appropriateness of applying these recommendations to the particular situation. In addition, EPA may decide to revise this guidance manual without public notice to reflect changes in EPA's approach to implementing the regulations or to clarify and update the text.

2. OAC 901:10-2-14 does not distinguish application procedures based on hydrological soil groups, but instead utilizes an efficient and site-specific approach that *combines an evaluation of the soil type with actual soil moisture conditions* prior to manure application. Appendix B of rule 901:10-2-14, the Available Water Capacity (AWC) chart, is required to be used by any person prior to applying liquid manure. This chart utilizes a field test that determines the amount of liquid manure that can be applied based on the soil type (i.e., sands, loam, silt/loam and clays) and available moisture in the soil at the time of application.

   The four soil columns provided in this chart are structured based on the actual conditions of the soil, taking into account the actual moisture, soil condition (tilth), organic matter and structure of the soil. The soil hydrological groups, which are mapped on larger acreage units, do not consider the soil's tilth, crop

residue or growing crop and actual soil moisture conditions. The intent of this chart is to apply no more liquid than the soil will be able to absorb at the time of application. Federal rules and guidance do not take into consideration the actual soil moisture conditions prior to land application, relying exclusively on weather forecasts and amounts of precipitation.

3. Based on U.S. EPA's interpretation of runoff on hydrological soil group C/D soils, runoff will occur at one-quarter inch of rain. This assumption could also lead one to believe that a liquid manure application of one-quarter an inch (approximately 6,800 gallons per acre) would also cause runoff. ODA staff, as well as Natural Resource Conservation Service (NRCS) and soil and water conservation district (SWCD) staff, have observed liquid applications of one-half inch (13,600 gallons per acre or "gpa") or higher on C/D soils with no runoff even with application from equipment applying manure in a matter of seconds, and not as a typical, steady flow in a storm event. Application in this amount and at this rate succeeds because of compliance with the AWC chart. One-quarter inch of rain or liquid manure application will not cause runoff from C/D soils if AWC requirements are met.

4. Restricting manure application when the 24 hour forecast predicts a 50% chance of one-quarter inch of precipitation further reduces manure application timeframes for producers or applicators. Based on this forecast, there is a good chance that trace amounts or no precipitation will occur. Conversely, a producer or applicator may comply with U.S. EPA restrictions based on predicted weather and apply manure on saturated soils, creating potential runoff.

5. ODA believes that U.S. EPA's technical guidance is overly conservative in predicting when runoff will occur on C/D soils because the curve number value utilized is high. U.S. EPA's analysis is based upon NRCS information found in Chapter 10 of Part 630, "National Engineering Handbook," July 2004. U.S. EPA made several assumptions when determining the curve number utilized for this analysis.

   The first assumption is that an Antecedent Runoff Condition of Class II was chosen, which assumes an average runoff condition. ODA agrees with this assumption, but maintains that the actual determination made by the use of the AWC evaluation at the time of application is more practical than assuming an "average" condition for all applications.

   Next, U.S. EPA assumes a "fallow" condition, "bare soil," crop residue cover around 20%, and a "good" hydrologic condition. U.S. EPA then selected a curve number of 89-90, for both C & D soil groups. See Appendix M-2 of the technical guidance, "Managing Manure Nutrients."

ODA believes that a curve number value of 82-85 is more realistic based on experience with Ohio agricultural practices and based on observations of field-specific conditions prior to manure applications. Assuming a crop residue cover around 20% is not consistent with conditions on Ohio fields. Crop residue cover for most fields observed, prior to application, show residue cover ranges from 50% to 80%, which greatly affects the runoff curve number from a practical standpoint and therefore will reduce predicted runoff at the time of application.

Referring to Appendix M-2, ODA maintains that the following apply in Ohio: "Row crop" in "straight rows" and with "crop residue" and a "good" hydrologic soil condition. Using these type and descriptions provides a more realistic curve number value (C soils = 82 and D soils = 85) to more accurately account for the additional crop residue cover that exists prior to application.

In utilizing Appendix 10A of Part 630, "National Engineering Handbook," July 2004, ODA predicts runoff from a rainfall event between 0.5" to 0.6" with a curve number of 82 and between 0.4" to 0.5" for a curve number of 85. In utilizing this appendix and the U.S.EPA curve number of 89, U.S. EPA predicts runoff from a rainfall event of between 0.3"-0.4". Therefore, the average range of precipitation that causes runoff from curve numbers ranging from 82 to 85 is consistent with ODA rules at 0.5 inches of precipitation. U.S.EPA's estimate of one-quarter of an inch is also conservative using this Appendix 10A, which demonstrates that 0.35 inches, on average, will generate runoff when the curve number is assumed at 89.

Furthermore, a 2001 WRC research paper by Hansen & Goyal,[2] and pp. 271-274 in *Soil Erosion Research for the 21st Century, Proc. Int. Symp. (3-5 January 2001, Honolulu, HI, USA), eds. J.C. Ascough II and D.C. Flanagan. St. Joseph, MI: ASAE.*701P0007[3] suggest that manure application improves soil infiltration and reduces runoff because manure improves the soil structure. This is not reflected in the curve numbers provided in Appendix M-2, which would be lowered further than shown above.

6. ODA rules implement additional setback criteria for surface application of manure as compared to manure that may be incorporated or injected. These setbacks are described in Appendix A, Table 2 of rule 901:10-2-14. ODA believes that the additional setbacks (a total of 100' from waters of the State for surface application) will further prevent runoff from reaching waters of the State. U.S. EPA's assumptions in the values and analysis provided in Item 5, above, conclude that "runoff" will occur and that it will automatically enter

[2] "Runoff Water Quality and Crop Responses To Variable Manure Application Rates," Neil C. Hansen, Ph. D. and Sagar Goyal, Ph.D., WRC Research 2001.
[3] Soil Erosion Research for the 21st Century, Proc. Int. Symp. (3-5 January 2001, Honolulu, HI, USA). Eds. J.C. Ascough II and D.C. Flanagan. St. Joseph, MI: ASAE.701P0007

waters of the State. These assumptions are incorrect, but even if correct, fail to account for additional safeguards in OAC 901:10-2-14. Setback distances from environmental features and the use of other best management practices further reduces the likelihood of runoff entering waters of the State.

Conclusion

ODA maintains that utilizing a forecast that predicts a 50% chance of precipitation exceeding one-half inch is accurate, practical, and environmentally protective. First, OAC 901:10-2-14 requires use of the Available Water Capacity chart to account for soil types and the water holding capacity of the soil prior to land application. This is real-time, site-specific analysis of actual field conditions. Many factors go into determining whether precipitation will cause surface runoff that will impact waters of the state, and the difference between one-quarter of an inch of precipitation versus one-half inch of precipitation, is a very small variable. Some of the other variables are: Distance to waters of the State, % residue cover, whether the application is on a growing crop, slope of land, intensity of the rainfall, predicted precipitation versus actual precipitation, soil tilth, subsurface drainage, etc. These additional variables are accounted for in OAC 901:10-2-14, e.g., in setbacks and Appendix B. ODA believes that one cannot simply look at one variable and determine whether runoff will be a concern or not. Furthermore, the variable relied upon by U.S. EPA is based on assumptions that are not consistent with actual agricultural practices in Ohio. Therefore, ODA contends that OAC 901:10-2-14 is reasonable, protective, and consistent with Federal regulations.

Assisted by: Mike Monnin, Ohio-NRCS, Environmental Engineer