BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:

CONCENTRATED ANIMAL FEEDING OPERATIONS (CAFOS): PROPOSED AMENDMENTS TO 35 ILL. ADM. CODE 501, 502 AND 504	))))	R 2012-023

NOTICE OF ELECTRONIC FILING

To: **Attached Service List**

PLEASE TAKE NOTICE that on January 16, 2013, I electronically filed with the Clerk of the Pollution Control Board of the State of Illinois: **ENVIRONMENTAL GROUPS' FINAL COMMENTS** on behalf of Prairie Rivers Network, Illinois Citizens for Clean Air and Water, Natural Resources Defense Council and Environmental Law & Policy Center (collectively, "Environmental Groups") copies of which are attached hereto and herewith served upon you.

Respectfully Submitted,

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ENVIRONMENTAL GROUPS' FINAL COMMENTS

I. Introduction

The Illinois Environmental Protection Agency (IEPA) presented a proposal "In the matter of: Concentrated Animal Feeding Operations (CAFOs): Proposed Amendments to 35 Ill. Admin. Code Parts 501, 502, and 504" (hereinafter, "proposed CAFO rules" or "proposed rules") to the Illinois Pollution Control Board ("IPCB" or "Board") on March 1, 2012. These proposed rules are an attempt to bring the Illinois National Pollution Discharge Elimination System (NPDES) program for CAFOs into compliance with federal law under the Clean Water Act.

The United States Environmental Protection Agency (USEPA) issued regulations regarding pollution discharges from CAFOs in 2003, and subsequently revised those regulations in 2008 and 2012.[1] The federal rules establish the standards that apply to CAFOs that seek permits directly from USEPA, including 1) the requirement to obtain a permit prior to discharge, 2) what an NPDES permit must include (including standards for the nutrient management plan (NMP) that serves as the effluent limitation for that facility), 3) recordkeeping and reporting requirements, and 4) standards for land application from both permitted CAFOs and unpermitted CAFOs seeking to use the agricultural stormwater exemption.

The USEPA regulations also apply to NPDES permits issued by states with delegated authority under the Clean Water Act.[2] Accordingly, Illinois is required to revise its regulations to adopt the requirements of the federal rule.[3] The USEPA final rule[4] establishes the minimum standards that a state must meet for CAFO NPDES permitting, but it is well-settled that a state maintains the authority to adopt water pollution standards that are more protective than the federal baseline.[5]

[1] See, USEPA, "Concentrated Animal Feeding Operations (CAFO) - Final Rule," available at: http://cfpub.epa.gov/npdes/afo/cafofinalrule.cfm.
[2] 40 CFR 123.25 and references throughout USEPA Final CAFO Rule, Ex. 24.
[3] 40 CFR § 123.62 (e) and 77 Fed. Reg. 44494, 44,496 (Jul. 30, 2012) ("The deadline has passed by which states were required to make any changes to their approved state NPDES program legal authorities necessary to conform to the 2008 CAFO Rule. States that have not yet done so must make the necessary changes to conform to the 2008 CAFO Rule, less the vacated provisions.").
[4] USEPA Final CAFO Rule, Ex. 24.
[5] 33 USC § 1370 (2012). (The Clean Water Act does not "preclude or deny the right of any State or political subdivision thereof or interstate agency to adopt or enforce (A) any standard or limitation respecting discharges of pollutants, or (B) any requirement respecting control or abatement of pollution; except that if an effluent limitation,

Illinois presents unique circumstances that must be considered when adapting the federal minimum rule to local conditions. First, Illinois boasts a particularly intensive livestock industry. This state is the fourth largest hog producer in the country, and routinely inventories over a million cattle and calves.[6] The magnitude of our livestock industry necessarily means that the state will have a lot of manure waste to deal with and needs strong rules to protect water quality and our quality of life. Second, Illinois has an abundance of surface waters: nearly 120,000 stream miles and over 300,000 lake acres.[7] Third, Illinois has been extensively tile-drained,[8] which allows pollution to reach surface waters more quickly and easily.[9] Fourth, Illinois' relatively long winters create a narrower window within which to safely land-apply manure. Finally, Illinois is governed by the Illinois Environmental Protection Act, which establishes additional water pollution protections that the Board must consider when adopting this CAFO rule.

A. Illinois Pollution Control Board Authority

IPCB is specifically directed to adopt whatever regulations are necessary to enable the State of Illinois to implement the NPDES program.[10] Those regulations "shall be consistent with the applicable provisions of [the Clean Water Act] and regulations pursuant thereto."[11] As discussed above, the CAFO regulations at issue in this rulemaking are required in order for the State to maintain its NPDES authority, and must be at least as stringent as the federal regulations.

However, the Illinois Environmental Protection Act does not limit the Board's rulemaking authority to that which is required in order to comply with federal requirements.[12] The Act specifically states that "The provisions of this Act authorizing implementation of the regulations pursuant to an NPDES program shall not be construed to limit, affect, impair, or diminish the authority, duties and responsibilities of the Board […] to regulate and control pollution of any kind, to restore, to protect or to enhance the quality of the environment, or to achieve all other purposes, or to enforce provisions, set forth in this Act or other State law or regulation."[13]

The General Assembly granted the Illinois Pollution Control Board the responsibility to "determine, define and implement the environmental control standards applicable in the State of Illinois."[14] The scope of the Board's authority is quite broad, limited only in that regulations adopted by the Board must promote the purposes and provisions of the Illinois Environmental

or other limitation, effluent standard, prohibition, pretreatment standard, or standard of performance is in effect under this Act [33 USCS §§ 1251 et seq.], such State or political subdivision or interstate agency may not adopt or enforce any effluent limitation, or other limitation, effluent standard, prohibition, pretreatment standard, or standard of performance which is less stringent than the effluent limitation, or other limitation, effluent standard, prohibition, pretreatment standard, or standard of performance under this Act [33 USCS §§ 1251 et seq.]"). See also, U.S. Steel Corp. v. Train, 556 F.2d 822, 830 ("the states are allowed to impose more stringent limitations, including water quality standards, treatment standards, or schedules of compliance.") and Leder, Tr. 10/30/12, p. 199, 215-216.

[6] Ex. 12, pp.1 and 3.

[7] Illinois Integrated Water Quality Report and Section 303(d) List (2010 Draft), Ex. 11, pp. 102 and 105.

[8] James Prefiled Testimony 10/16/12, p. 6.

[9] Leder Prefiled Testimony, p. 2. See also, Answers to Prefiled Questions From Environmental Groups directed to Dan Heacock, Attach. 5 at 4 (8/14/2012) and Technical Support Document (TSD) at 20.

[10] 415 ILCS 5/13 (b) (1). See also, 415 ILCS 5/28.2.

[11] 415 ILCS 5/13 (b) (1).

[12] Peabody Coal Co. v. Ill. Pollution Control Bd., 36 Ill. App. 3d 5, 13-14 (Ill. App. Ct. 5th Dist. 1976).

[13] 415 ILCS 5/11 (c).

[14] 415 ILCS 5/5 (2012). See also, 35 Ill. Admin. Code 101.106 (2012).

Protection Act.[15] With regard to water pollution, the Illinois Environmental Protection Act contains the specific purpose to "restore, maintain and enhance the purity of the waters of this State in order to protect health, welfare, property, and the quality of life, and to assure that no contaminants are discharged into the waters of the State, as defined herein."[16]

When promulgating regulations, the IPCB must consider, among other things, the nature of the State's receiving waters as well as the technical feasibility and economic reasonableness of the regulations.[17] As we will show below, Illinois' waters are severely polluted by discharges from CAFOs, and the IPCB must in this instance adopt rules that go beyond the minimum federal requirement in order to further the purposes of the Illinois Environmental Protection Act and protect water for Illinois citizens. The regulations the Environmental Groups propose are technically feasible and economically reasonable, and will much more effectively control water pollution than what has been proposed by the IEPA or the Agricultural Coalition.

II. CAFOs are one of the most significant threats to Illinois' water quality

USEPA data shows that agriculture, including CAFOs, is the leading contributor of pollutants in the nation's waters.[18] Livestock waste from CAFOs contains a variety of harmful constituents that can impact the environment and human health, including pathogens, sediment/siltation, oxygen depleting substances, pharmaceuticals, disinfectants, and nutrients.[19] Nutrient pollution from nitrogen and phosphorus is a serious problem in Illinois and across the nation.[20] It is one of the main causes of water quality impairment nationwide, affecting drinking water supplies, aquatic life, and recreational water quality.[21] According to the State-EPA Nutrient Innovations Task Group:

> The amount of nutrients entering our waters has dramatically escalated over the past 50 years, and nutrients now pose significant water quality and public health concerns across the United States…nitrogen and phosphorus pollution has the potential to become one of the costliest, most difficult environmental problems we face in the 21st century…[22]

Livestock activities are named as one of the top five primary contributors to nutrient pollution in the United States.[23] Agricultural row crops are identified as another leading source because only a fraction of the nutrients from manure and chemical fertilizers applied to crops is taken up by plants, which results in the excess becoming "a waste product in the environment."[24] USEPA estimates that confined animals generate 3 times more raw waste than is generated by humans in

[15] 415 ILCS 5/13 (a).
[16] 415 ILCS 5/11 (b).
[17] 415 ILCS 5/27 (a).
[18] Statement of Reasons (SoR) at 2 and Attach. B (2003 USEPA CAFO Rule) at 7181.
[19] SoR Attach. B and Illinois EPA's Answers to Prefiled Questions of Environmental Groups Directed to Bruce Yurdin) Ex. 7, at 1.
[20] SR at 2.
[21] SR at 2 and Ex. 19 (An Urgent Call to Action: Report of the State-EPA Nutrient Innovations Task Group, 2009), at 6.
[22] Ex. 19 at 1 and SR at 2.
[23] Ex. 19 at 15.
[24] Ex. 19 at 17.

the United States.[25] While much of this manure is land applied as fertilizer for crops, "significant portions end up in our nation's waters."[26] Data shows water quality impairments are greatest where "crops are intensively cultivated and where livestock operations are concentrated." [27] For example, "USDA's analysis of 1997 Census of Agriculture data indicates that a considerable portion of the manure nutrients generated at larger animal production facilities exceeds the crop nutrient needs, both at the farm and local county levels." [28] As Dr. Kendall Thu notes, "larger operations produce the greatest amount of excess nutrients and must transport roughly 60 to 70 percent of the nitrogen and phosphorus they generate off-site."[29] Consolidation trends in the industry toward larger operations with less available land to spread manure produces excess manure nutrients leading to increased water pollution.

This pattern of pollution is observable in Illinois. Illinois' 2012 Integrated Water Quality Report and Section 303(d) List identifies Animal Feeding Operations (AFOs) as one of the top ten potential leading sources of impairment of streams and inland lakes. [30] Note, however, that this still may be an underestimate of the total surface water impacts caused by AFOs because only 14.7 percent of streams and 47 percent of total pond and lake acreage in Illinois were assessed.[31] For purposes of the assessment, AFOs are defined as "open area feedlots or animal holding buildings and impervious areas based upon satellite land use."[32] Hence, this source category consists of livestock facility production areas, but does not take into account water quality impacts from facility land application areas. The actual contribution of AFOs is more significant.

The Illinois EPA is unaware of the actual whereabouts of a vast majority of livestock operations in the state,[33] making it difficult to account for their total impact. According to USEPA,

> the Illinois EPA has serious deficiencies in its program for determining compliance or noncompliance with applicable program requirements. Illinois EPA does not have inspection and surveillance procedures sufficient to determine compliance or noncompliance with applicable program requirements.[34]

Nor has the Illinois EPA been conducting periodic inspections of CAFOs that may be subject to NPDES regulation.[35] The agency has a very low inspection rate of livestock operations and CAFOs,[36] inspecting only about 150-200 operations per year.[37] The Illinois EPA could not

[25] SR Attachment B at 7180.
[26] Ex. 19 at 16.
[27] SR Attachment B at 7181.
[28] SR Attachment B at 7181.
[29] Thu, 10/30/12 Prefiled Testimony at 3.
[30] Ex. 11 (Illinois Integrated Water Quality Report and Section 303(d) List, December 20, 2011), at Tables C-37 and C-40.
[31] Ex. 11 at 1-2.
[32] Ex. 11 at Table C-33.
[33] Ex. 7 at 3.; Ex. 8 (Illinois EPA's Answers to Prefiled Questions of Environmental Groups Directed to Dan Heacock) at 1; Thu, 10/30/12 TR at 143: 14-20.
[34] Ex. 14 (September 28, 2010 Letter from USEPA to JEPA re: Petition to Withdraw the Illinois NPDES Program and USEPA Investigation Report) at 20.
[35] Ex. 14 at 20.
[36] James, 10/30/12 TR at 248: 13-24.
[37] Ex. 7 at 3; James, 10/30/12 TR at 248: 21-24.

provide a calculation of how many of the estimated 24,500 livestock facilities would be defined as CAFOs or what universe of facilities had discharged in the past.[38]

While estimates suggest there are between 500 and 3,500 CAFOs in Illinois with at least 350 to 400 being large facilities,[39] the agency has only reviewed and approved 35 CAFO nutrient management plans.[40] Because the Illinois EPA has reviewed only very small percentage of livestock facility waste management plans, identifying AFO land application areas as sources of impairment is not possible. This being said, crop production is listed as one of the top three potential leading sources of impairment of streams and inland lakes in Illinois.[41] Because both USEPA and USDA data show that a significant portion of the manure nutrients generated at large animal production facilities commonly exceed crop nutrient needs, it is within reason to surmise that livestock waste used as fertilizer is a contributing factor in the impairment of surface waters where crop production is identified as a source. Hence, while AFOs are identified by the Illinois EPA as one of the top ten potential leading sources of impairment of streams, they likely contribute an even greater amount of nutrient pollution when land application is taken into account.

Other sources of information show pollution problems from livestock facilities are wide-spread. For example:

- According to Illinois EPA Livestock Facility Investigation Annual Reports, over 52 percent of the facilities that were inspected by the Illinois EPA between 2001 and 2010 had at least one regulatory violation.[42]
- Between 2001 and 2010, approximately 316 livestock facilities were found to be causing potential violations of water quality standards.[43]
- From 1999 to 2009, the Illinois EPA investigated a total of 36 documented fish kills attributable to livestock waste releases.[44]
- According to the Illinois EPA's August 21, 2012 Post Hearing Comments, 70 percent of the facilities visited by the agency in 2006 had one or more regulatory violations.[45]
- In 2008 alone, there were eight fish kills attributable to livestock operations.[46]
- Since 2009, numerous other livestock waste-related fish kills have been documented. The Illinois EPA's Livestock Facility Investigation Annual Reports from 2010 and 2011 show livestock related fish-kills in Effingham and McLean counties.[47]

[38] Ex. 12 (Illinois Agriculture, USDA, NASS, Illinois Field Office; printed 4/1/11); Yurdin, 8/21/12 TR at 116 and 146-147.
[39] Yurdin, 9/20/12Affidavit of Bruce J. Yurdin at 2.
[40] Ex. 13 (Illinois EPA Issues General Permit for Concentrated Animal Feeding Operations, April 2004); Ex. 14 at 13; Yurdin, 8/21/2012 TR at 84-86; Ex. 7 at 4; see also Thu, Prefiled Testimony Attachment 4 at 6.
[41] Ex. 11 at Table C-37 and Table C-40.
[42] Ex. 7 at 3; James, 10/30/12 Prefiled Testimony at 2.
[43] Ex. 7 at 3.
[44] Ex. 7 at 2.
[45] Yurdin, Illinois EPA 8/21/12 Post Hearing Comments at 1.
[46] James, 10/30/12 Prefiled Testimony at 2; Ex. 16 (Illinois EPA Livestock Program 2008 Annual Report).
[47] Ex. 15 (Illinois EPA Livestock Program 2011 Annual Report); Ex. 7 at 2 (providing link to Illinois EPA Livestock Program 2010 Annual Report).

- In July of 2012, an estimated 63,000 fish "suffocated to death" on a stretch of Beaver Creek in Iroquois County believed to be caused by liquid hog waste entering the stream.[48]

Descriptions of various other types of regulatory violations can be found in enforcement cases adjudicated before the IPCB and in Illinois circuit courts. Dr. Stacy James provided a number of complaints and enforcement orders involving livestock facilities filed by the Illinois Attorney General's Office.[49] Summaries of those and additional enforcement documents detail common patterns of violations including discharging without NPDES permits, improper land application, and inadequate lagoon systems or waste storage.[50]

While there is substantial documentation of water pollution in enforcement cases, many more water quality violations may go undetected or undocumented because they are not reported or fully investigated.[51] This is because Illinois EPA inspections are typically conducted in response to complaints by citizens. Numerous citizens commented on wide-spread pollution problems observed at CAFOs and frequent mismanagement of manure in conjunction with the unresponsiveness of the agency to their complaints.[52] One public commenter noted numerous livestock facility discharges documented and reported by citizens with little agency response.[53] He expressed concerns that in more sparsely populated areas where residents are more afraid of retaliation, discharges may not be reported. Dr. Kendall Thu testified that roughly 30 percent of CAFOs surveyed during citizen flyovers had problems, but that none would have been discovered nor their discharges documented without citizen aerial surveillance.[54] Another complained of the Illinois EPA's "after the fact regulatory system," mentioning that "even when a facility is poorly sited and a disaster waiting to happen, the Illinois EPA won't step in until after disaster occurs."[55] Ken Turner stated that he wrote many letters to the Illinois EPA regarding concerns about a proposed CAFO in his area, but received a letter back from the Agency that stated no action would be taken until after the facility polluted.[56] It was later discovered that the facility was "designed to discharge" and ultimately polluted a nearby stream.[57] Diane Ward noted multiple occasions when she observed mismanagement of manure, stating however, that "once livestock facilities are built, no one regulates them until after they pollute."[58]

[48] Ex. 17 (Illinois AG Asked to Take Action Over Swine Manure Release, August 2012); Ex. 18 (It's Devastating, Watseka Times Republic, July 2012).
[49] James, 10/30/12 Prefiled Testimony Attachments 1-9, 15-16, 24-29.
[50] See Detailed summaries of significant enforcement cases (Attachment 1).
[51] Ex. 7 at 3.
[52] Christos Gegas, 8/21/12 TR at 18; Scott Hays, 10/23/12 TR at 71; Leland Ponton, 10/23/12 at 74; Dianne Ward, 10/23/12 TR at 78; Susan Turner, 10/30/12 TR at 12-17; Karen Hudson, 10/30/12 TR at 26-32; Matthew Alschuler on behalf of Beverly McPhillips, 10/30/12 TR at 36-40; Cindy Bonnett, 11/14/12 TR at 19-24; Matthew Alschuler, 11/14/12 TR at 24-34; Kathy Hicks, 11/14/12 TR at 45-47; Ken Turner, 11/14/12 TR at 53-61; Susan Tuner, 11/14/12 TR at 66-71.
[53] Alschuler, 11/14/12 TR at 24-34.
[54] Thu, 10/30/12 TR at 221-223.
[55] Alschuler on behalf of McPhillips, 10/23/12 TR at 38: 13-20.
[56] Turner, 11/14/12 TR at 56-57.
[57] Turner, 11/14/12 TR at 57.
[58] Ward, 10/23/12 TR at 81-82.

III. IPCB should adopt the IEPA proposed rule, as improved by Environmental Groups' proposal

By and large, Environmental Groups support the revisions proposed by IEPA, with the exception of revisions we have proposed to comply with the law and protect water quality in Illinois. IEPA's proposed rule misses several key opportunities to improve dire water quality problems across Illinois, and we argue that the Illinois Environmental Protection Act gives the Board the authority and duty to adopt the recommendations Environmental Groups propose to protect our state's critical natural resource.

Our original proposal to modify the IEPA proposal was filed as a public comment on October 17, 2012. [59] Environmental Groups are now submitting an updated version of our proposal as Attachment 2 to this Comment. The revisions to our proposal do not raise any new issues, but seek to remedy formatting issues and clarify language in light of questions and testimony presented at the Board's hearings.

Environmental Groups comments below provide justification for the Board to make amendments to the IEPA proposal in five critical areas:

1. The need for a registration program to create an inventory of CAFOs in Illinois
2. The need to expand the rule's coverage to include impacts to "waters of the State"
3. The need to improve standards for land application of livestock waste
4. The need to address pollution from livestock waste transferred to third parties
5. The need to setback certain CAFO activities in order to protect water resources

Finally, these comments will: 1) respond to questions posed by the Board regarding whether other states require NPDES permits for CAFOs beyond what would be required under federal law; 2) refute the idea that existing regulations are adequately protecting water quality; and 3) explain why Environmental Groups' proposal is economically reasonable.

As discussed above, the Illinois CAFO rules must, at a minimum meet federal requirements. However, the EPA-State Nutrient Task Group notes that federal requirements for the management of concentrated animal feedlots do not go far enough and that they should be applied to a larger portion of animal production operations. [60] Expanding the reach of nutrient management plans and the regulation of the offsite transfer of manure are also deemed necessary.[61] While many states have adopted these approaches, Illinois has not. In fact, to date, the state of Illinois has failed to meet minimum federal Clean Water Act regulatory requirements.

In an investigation conducted by USEPA in response to a citizen dedelegation petition,[62] it was found that "the Illinois EPA NPDES program for CAFOs does not meet minimum thresholds for

[59] PC # The Agricultural Coalition filed its proposed revisions to the IEPA proposal in the form of a Motion to Amend the proposal. Environmental Groups have not formally filed such a motion with regard to our proposed revisions, but respectfully ask the Board to consider Environmental Groups' proposal as of equal dignity with the Agricultural Coalition's proposal. If the Board requires a motion to procedurally accomplish that end, Environmental Groups would readily oblige.
[60] Ex. 19 at 30.
[61] Ex. 19 at 19.
[62] Thu, 10/30/12 Prefiled Testimony, Attachments 4 and 5.

an adequate program."[63] USEPA detailed the deficiencies in Illinois' regulatory program and set forth a number of recommended and required actions the Illinois EPA must take for the state to avoid withdrawal of its authority to administer the Clean Water Act.[64] Unfortunately, while the IEPA's proposed draft CAFO regulations mark an improvement to the state's existing regulatory framework, the required actions mandated by the USEPA for the state to avoid dedelegation cannot be accomplished under the IEPA's draft regulations as written. The Illinois EPA's draft proposal fails to incorporate key regulatory mechanisms that are necessary for an adequate program as was demonstrated by the Environmental Groups throughout the hearing process and will be discussed in more detail below.

As has been described above, Illinois is in the midst of a CAFO pollution crisis. If adopted by the Board, the IEPA's draft regulations will perpetuate this crisis. IEPA's draft proposal sets a framework for a self-regulating CAFO Clean Water Act program. This is in large part due to the fact that a bulk of the requirements designed to control pollution will only apply to CAFOs with NPDES permits or CAFOs seeking the agriculture stormwater exemption in the event of a discharge. The record demonstrates that few, if any, CAFOs will seek NPDES permits on their own volition because, to date, not one livestock facility that has been discovered polluting in Illionois had sought an NPDES permit in advance of the discharge.[65] Beyond this, the IEPA's proposal emphasizes that even if a CAFO has discharged in the past, a permit may not be required.[66] These factors lessen the probability that even known dischargers will obtain NPDES permits to control their pollution. Importantly, the Illinois EPA's proposal does not include a registration program for large unpermitted CAFOs. Because the Illinois EPA is unaware of the actual whereabouts of a vast majority of livestock operations in the state and therefore cannot verify which ones are in fact CAFOs subject to regulatory requirements, under IEPA's proposed rules facilities have the incentive to continue to pollute or manage their waste poorly until caught discharging.[67]

In addition, the IEPA's proposal only requires permitted CAFOs to follow the new technical standards for land application of waste and to prepare, follow, and submit nutrient management plans with the Agency. Both unpermitted and permitted large CAFOs should have to follow the same technical standards and develop, follow, and submit their nutrient management plans to the IEPA. As noted by Arnold Leder, "these plans are considered a best management practice and everyone should have one."[68] In order to "minimize the public health and water quality impacts from AFOs," all AFOs should be required to implement "comprehensive nutrient management plans."[69] According to the Illinois EPA, "[p]oorly managed application of manure can lead to release of nutrients and pathogens to the environment including surface and groundwater."[70] Illinois EPA notes that "historically, the majority of discharges from CAFOs occur from manure handling systems and during the land application of manure" and that "in many cases, the

[63] Ex. 14 at 3.
[64] Ex. 14 at 3.
[65] Ex. 7 at 3.
[66] See Section 502.101(b)(1) of Illinois EPA proposed amendments to 35 Ill. Adm. Code Parts 501, 502, and 504 (March 1, 2012)
[67] Leder, 10/30/12 Prefiled Testimony at 7.
[68] Leder, 10/30/12 Prefiled Testimony at 5-6.
[69] Leder, 10/30/12 Prefiled Testimony, citing Attachment 3.
[70] Illinois EPA, TSD at 26.

discharges could have been prevented through better planning, management, and operation of the CAFO." [71]

In the case of large CAFOs, those without permits pose a greater risk of water pollution problems because they produce the same amount of waste as permitted Large CAFOs but are not subject to the same level of regulatory oversight.[72] "Without access to facility nutrient management plans and plans for the off-site transfer of manure for large CAFOs, it is impossible to ensure adequate cropland is available to dispose of livestock waste to avoid discharges and to prevent water quality impairment from runoff."[73]

Leaving "flexibility" to do the right thing won't be enough. CAFOs have been free to reduce their impacts under the current regulatory system, yet nutrient pollution and illegal discharges persist. While the Agricultural Coalition has argued that the Illinois Department of Agriculture's Livestock Management Facility's Act (LMFA) regulations are enough, this position ignores the very real CAFO pollution impairing many of our rivers, streams and lakes by facilities built and operated under those very LMFA rules. Beyond this, as noted by Dr. Stacy James, LMFA regulations fail to meet a number of federal Clean Water Act requirements.[74]

A. The CAFO rule must include a reporting rule to develop an adequate inventory of CAFOs in Illinois

To date, CAFOs have largely evaded regulation. USEPA has noted that since the inception of the Clean Water Act's NPDES program in the 1970's, only a small number of CAFOs have actually sought pollution control permits, while numerous documented discharges occurred.[75] Nowhere is this situation more glaring than Illinois.

According the 2012 Illinois Integrated Water Quality Report and Section 303(d) List, Animal Feeding Operations are listed as one of the top ten potential leading sources of lake and stream impairment in the state.[76] The Illinois EPA's Livestock Facility Investigation Annual Reports show that over the past ten years a large percentage of facilities violated water quality and effluent limitation standards and many of them had cited violations for not having required NPDES permits. [77] For example, the 2007 report shows that 50 livestock operations violated water quality standards, 31 violated effluent standards, and 33 were in violation for not having NPDES permits.[78]

Given the fact that the Illinois EPA typically only inspects a small percentage of known CAFOs in Illinois once every 5 years, it is reasonable to suspect that many more unpermitted discharges occur without being discovered and documented by the agency.[79] Further, when the Illinois Citizens for Clean Air and Water filed its dedelegation petition, IEPA only had information on

[71] Illinois EPA, TSD at 26 (citing USEPA, 2004, p. 7-1).
[72] Leder, 10/30/12 Prefiled Testimony at 6-8.
[73] Thu, 10/30/12 Prefiled Testimony at 3.
[74] James, 11/14/12 Prefiled Testimony.
[75] SR at 2 and Attachment B (2003 USEPA CAFO Rule), at 7201; see also Heacock 8/21/12 TR at 96.
[76] Ex. 11 (Illinois Integrated Water Quality Report and Section 303(d) List, December 20, 2011), at Tables C-37 and C-40.
[77] Ex. 7 at 3.
[78] Ex. 7 at 2 (providing link to Illinois EPA Livestock Program 2007 Annual Report 2007 Report at 4).
[79] Ex. 7 at 3; James, 10/30/12 TR at 248: 21-24

approximately 30% of the estimated 500 largest CAFOs in the state and agency had no knowledge of the actual whereabouts of the vast majority of livestock operations located throughout Illinois.[80] Without knowing where they are located, the Illinois cannot identify and inspect facilities to determine which ones discharge and therefore are subject to NPDES regulations.

The Illinois EPA's regulatory proposal includes "Requirements for Certain CAFOs to Submit Information" under Section 501.505. This Section requires certain CAFOs to submit information to the Illinois EPA if such a requirement is enacted by the USEPA under federal law. Sanjay Sofat explained in his August 21, 2012 Hearing Prefiled Testimony that the Illinois EPA chose a "placeholder approach to minimize conflicting or confusing requirements," because uncertainty existed as to the scope of what a proposed federal reporting rule would require.[81]

Later in the rulemaking process, the Board directed questions to Mr. Sofat on the status of the proposed federal rule. In response to the Board's questions, the Illinois EPA explained that the USEPA recently withdrew its proposal to enact a reporting rule[82] and that the Illinois EPA was not planning to amend its proposal to eliminate the placeholder language that was filed with the Board.[83] Because the Illinois EPA's proposed CAFO reporting requirements were dependent upon the enactment of a federal reporting rule, the placeholder language in Section 501.505 in the agency's draft regulation is now obsolete and does nothing to correct the deficiencies noted by USEPA.

It should be noted, however, that one of the reasons the USEPA chose to withdraw its CAFO Reporting Rule was that it chose to instead rely on information collected from the states.[84] Further, prior to the USEPA's contemplation of a CAFO Reporting Rule, the Illinois EPA committed to USEPA Region 5 that it would enact a CAFO registration program in the current rulemaking to avoid dedelegation of its NPDES permitting program.[85] As noted by Dr. Kendall Thu, the state of Illinois risks withdrawal of its delegated authority to administer the NPDES program should the state not enact a CAFO reporting requirement.[86] Environmental Groups emphasize that, because the Board is charged with adopting regulations necessary to maintain Illinois' NPDES delegation,[87] to comply with that law, the Board must correct the deficiencies in the IEPA proposal necessary to avoid dedelegation by USEPA.

Section 403(c)(3) of the Clean Water Act requires the Administrator of the USEPA to withdraw an approved state NPDES program if it is determined that the state is not administering the program with applicable requirements and the state fails to take corrective action. The criteria

[80] Thu 10/30/12 Prefiled Testimony, Attachment 4 at 5.
[81] Sofat, Prefiled Testimony at 11.
[82] Sofat, Answers to Board Questions at 6; see also Thu, 10/30/12 Prefiled Testimony at 4, citing USEPA, NPDES CAFO Reporting Rule Final Action, 77 Fed. Reg. 42679-42682, July 20, 2012 [hereafter CAFO Reporting Rule].
[83] Sofat, Answers to Board Questions at 6
[84] Thu, 10/30/12 Prefiled Testimony at 6, citing CAFO Reporting Rule Final Action; Thu, 10/30/12 TR at 166: 8-13; 169-170: 22-9; 177-178: 9-178.
[85] See Thu, 10/30/12 Prefiled Testimony at 5, citing Attachment 6 (Illinois EPA Response to USEPA Investigation, November 2010) at 3 and Attachment 7 (IL/EPA Work Plan Agreement, February 2011) at 5.
[86] Thu, 10/30/12 Prefiled Testimony at 4-6.
[87] 415 ILCS 5/13 (b) (1) and 5/28.2.

for withdrawal include, among other things, when a state fails to exercise control over activities required to be regulated and failure to inspect and monitor activities subject to regulation.[88] Under the Clean Water Act's NPDES regulations, a state must have a program which is capable of making comprehensive surveys of all facilities and activities subject to the Director's authority to identify persons subject to regulation who have failed to comply with permit application or other program requirements.[89]

In an investigation conducted by the USEPA in response to a dedelegation petition filed by the Illinois Citizens for Clean Air and Water, it was found that the state of Illinois does not have a statewide comprehensive survey of CAFOs which may be subject to NPDES permit requirements[90] and that Illinois "needs to fulfill its long-standing commitment" to compile an inventory of CAFOs.[91] It was also found that the Illinois EPA has serious deficiencies in its program to determine compliance and noncompliance with applicable program requirements.[92] In essence, the USEPA mandated that the Illinois EPA compile a statewide comprehensive inventory of CAFOs and to fix the deficiencies in its regulatory program so that the agency can determine which facilities are operating in violation of NPDES permitting requirements.[93]

The Board should note that in its dedelegation petition investigation report, USEPA stated that "[t]he Clean Water Act, § 402(c)(2), requires states with approved NPDES programs, including Illinois EPA, to administer their programs in accordance with § 402 of the Act and the regulations EPA established under § 304(i)(2) of the Act at all times" [emphasis added].[94] USEPA also stated that "[w]hile the petition and EPA's review were focused on Illinois EPA's implementation of the NPDES program for CAFOs, any action to withdraw Illinois' program would affect the entire program, not just the element pertaining to CAFOs [emphasis added]."[95] USEPA further noted that the Illinois EPA had issued 1713 individual NPDES permits for point sources other than CAFOs and many more under general NPDES permits.[96]

In response to the USEPA investigation, the Illinois EPA committed to "propose a revision in the state livestock regulations…so that livestock producers are required to file basic information with the Illinois EPA."[97] The Agency stated that the "proposed revisions to Subtitle E will allow Illinois EPA to populate a statewide inventory, which then can be used for prioritization of inspections and permitting decisions."[98] In February of 2011, the Illinois EPA entered into a Work Plan Agreement with USEPA for the 2011 and 2012 fiscal year. Under the Agreement, the Illinois EPA was to "develop and maintain a comprehensive inventory of CAFOs and evaluate their regulatory status."[99] To accomplish this, a specific objective under the Agreement

[88] Thu, 10/30/12 Prefiled Testimony at 5, citing 40 C.F.R. §§ 123.63(2)(i), (3)(iii).
[89] Thu, 10/30/12 Prefiled Testimony at 5, citing 40 C.F.R. § 123.26(b)(1).
[90] Thu, 10/30/12 Prefiled Testimony at 5, citing Ex. 14 (USEPA Region 5 Illinois CAFO Investigation Report) at 16.
[91] Ex. 14 at 20.
[92] Ex at 20.
[93] Thu, 10/30/12 Prefiled Testimony at 5, citing Ex. 14 at 16.
[94] Ex. 14 at 4.
[95] Ex. 14 at 5.
[96] Ex. 14 at 5.
[97] Thu, 10/30/12 Prefiled Testimony, Attachment 6 at 3.
[98] Thu, 10/30/12 Prefiled Testimony, Attachment 6 at 3.
[99] Thu, 10/30/12 Prefiled Testimony, Attachment 7 at 2.

was to propose amendments to the state's livestock regulations requiring "all Large CAFOs to register with Illinois EPA."[100]

The Illinois EPA also made a commitment to USEPA to develop list of CAFOs using information from existing sources as an interim step to enacting a CAFO registration program.[101] Although the Illinois EPA was supposed to develop the interim list of CAFOs in the 2011/2012 fiscal year, during this rulemaking process the agency stated that "it is difficult to give an accurate number of CAFOs in Illinois," [102] and that "[n]o comprehensive state or national inventory of Illinois CAFOs exists at this time." [103] The agency reported that it is "attempting to construct" an inventory from Illinois Department of Public Health and Illinois Department of Agriculture records.[104] These data sets, however, do not provide the information necessary for the Illinois EPA to be able to meet NPDES program requirements. As described below, it has been admitted the sources of information they are using are incomplete.

The Illinois Department of Public Health database only includes information on dairy operations[105] and Bruce Yurdin notes that the Illinois Department of Agriculture does not have information on livestock facilities designed and constructed before 1996.[106] In hearing testimony, Dr. Thu noted that the Department of Public Health dairy facility data has not been updated since 2003 and that the Illinois Department of Agriculture does not have data on facilities that have expanded since 1996 in certain circumstances. [107] Therefore, there are livestock facilities that are missed by both data sets.

In addition, the Illinois EPA has had trouble accessing Illinois Department of Agriculture data on a regular basis.[108] Illinois EPA staff have "indicated that it can be difficult to know whether a proposed facility has been constructed and when a facility may go into operation."[109] The agency has also expressed "barriers to creating an inventory [to] include time and resource demands of aggregating data from Agency and other sources…"[110] As such, these are not viable sources of information for the Illinois EPA to rely on in terms of creating and maintaining an updated and comprehensive inventory into the future.

Beyond being incomplete in terms of developing an accounting of all CAFOs in the state, existing sources of information do not contain the requisite information to allow the agency to identify facilities subject to regulation. When asked during the August 21st, 2012 hearing how the Illinois EPA could ensure that large unpermitted CAFOs are applying waste at agronomic rates in accordance with regulatory standards, Daniel Heacock stated that "we're probably not

[100] Thu, 10/30/12 Prefiled Testimony, Attachment 7 at 5.
[101] Thu, 10/30/12 Prefiled Testimony, Attachment 6 at 3.
[102] TSD at 90.
[103] TSD at 90.
[104] TSD at 90.
[105] TSD at 90.
[106] Yurdin, 9/20/12 Affidavit at 2.
[107] Thu, 10/30/12 TR at 220.
[108] Thu, 10/30/12 TR at 220-221, referencing Ex. 17 at 16.
[109] Ex. 14 at 16.
[110] Ex. 14 at 15.

going to be able to assure them individually unless we do an inspection site and look at their records."[111]

Arnold Leder testified to one instance when he was working on a CAFO enforcement case and the facility was required to have a waste management plan in accordance with the LMFA. He recalled, "the CAFO said, 'yes, I have a nutrient management plan. It's up here on my shelf someplace.' He didn't know where it was. He couldn't find it during the meeting, and he wasn't particularly following it, you know."[112] When asked by the Illinois EPA if he ever had a chance to look at the plan prepared under the LMFA, Mr. Leder said "No, I didn't. I mean, he couldn't find it. We actually ended up working with him to develop a nutrient management plan." [113]

Because unpermitted CAFOs are not required to submit their waste management plans to the Illinois EPA currently, or under their draft regulatory proposal, and because a vast majority of livestock operations in Illinois do not have to submit their waste management plans the Illinois Department of Agriculture under the LMFA, there is no way for the Illinois EPA to ensure CAFOs actually have plans to appropriately manage their waste, aside from conducting lengthy and expensive individual CAFO investigations and site visits. As Matthew Alschuler said in his comments to the Board,

> Most experts will tell you that every large facility will eventually discharge. So to classify these facilities as zero discharge and not requiring a permit is ignoring the inevitable. The purpose of an NPDES permit is to set up a procedure for the facility to follow so that it will avoid discharges, and limit them should they occur. The permit also alerts the IEPA and neighbors of the facilities size and scope of operation that is likely to take place in their community. At the very least, the Board should require large CAFOs to report information to the IEPA about their operations. This would go a long way to improving CAFO regulations in Illinois…[114]

According to Arnold Leder, "[c]ertain minimum information about the production and land application areas must be included in the inventory for it to be useful…the inventory must contain information such as the number and type of livestock, annual waste production amount, and the available waste storage capacity…[115] In addition "without access to facility nutrient management plans and plans for the off-site transfer of manure for large CAFOs, it is impossible to ensure adequate cropland is available to dispose of livestock waste to avoid discharges and to prevent water quality impairment from runoff."[116] Ownership, waste storage capacity, nutrient management plans, and off-site third party transferees, are all vital categories of information needed to determine persons subject to regulation and those who have failed to comply with

[111] Heacock, 8/21/2012 TR at 149-150.
[112] Leder, 10/30/12 TR at 170.
[113] Leder, 10/30/12 TR at 170.
[114] Alschuler, 11/14/12 TR at 33-34.
[115] Leder, 10/30/12 Prefiled Testimony at 7.
[116] Thu, 10/30/2012 Prefiled Testimony at 3.

permit application or other program requirements pursuant to 40 C.F.R. § 123.26(b)(1),[117] as well as for prioritizing inspections and enforcement.[118]

For these reasons, the Board should adopt the Environmental Groups' Section 501.505 proposal for CAFO information reporting requirements. According to Arnold Leder, who draws on nearly 30 years of enforcement experience at USEPA, CAFOs should submit the required information to the Illinois EPA instead of the agency seeking the information on its own by various means. The Agency's existing pilot inventory is incomplete and the data sources are out of date. [119] An Agency effort to collect the information on its own without surveying the CAFOs will likely result in "time-consuming, piecemeal, inaccurate, and incomplete data collection."[120]

IEPA's proposal to assemble an inventory of CAFOs in Illinois from incomplete sources at other agencies creates a much bigger administrative burden on the agency than Environmental Groups proposal that IEPA require individual CAFOs to provide necessary information directly to IEPA. Responsible CAFO owners and operators should have complete information on all of the items listed in the Environmental Groups' regulatory proposal at their fingertips, which would allow them to fill out a survey form and send the required information to the Illinois EPA in a matter of minutes. By comparison, it could take hours of investigation by multiple EPA staff members to gather the same types of data from multiple sources for an individual CAFO, with no guarantee of obtaining complete information. Given that the Illinois EPA would have to do this for hundreds of CAFOs in order to construct a comprehensive inventory that will allow the Agency to effectively identify polluters and comply with the law, the burden on the Agency far exceeds the burden on individual CAFO owners or operators to provide the same information. As Arnold Leder notes,

> If the Agency requires livestock operators to submit information about their operations, the data-gathering will be far more resource efficient and the inventory will be more complete and accurate. The information needed for a good inventory is quite basic and should already be known to the livestock operators, and thus their time investment in submitting information to the Agency should be relatively minimal.[121]

Furthermore, "unless an adequate registration program requiring this information for all Large CAFOs is enacted, vital information will continue to be shielded from neighboring citizens and the public, such that they will be unable to identify actual or potential pollution problems."[122] By requiring submittal of this information, the public will be provided the information needed to understand "what constitutes appropriate waste management practices and to identify when those practices are not being abided by." [123] Because the agency relies heavily on a complaint-based regulatory program, requiring submittal of this information and providing public access to it will

[117] Eric Sterling, 10/30/12 TR at 42-44; Thu, 10/30/12 TR at 146-147.
[118] Yurdin, 8/21/2012 TR at 101-102; Leder, 10/30/12 Prefiled Testimony at 7-8.
[119] Leder, 10/30/12 Prefiled Testimony at 7-8.
[120] Leder, 10/30/12 Prefiled Testimony at 7-8.
[121] Leder, 10/30/12 Prefiled Testimony at 7-8.
[122] Thu, 10/30/2012 Prefiled Testimony at 3.
[123] Thu, 10/30/2012 Prefiled Testimony at 3.

improve overall agency enforcement and provide an incentive for livestock facilities to comply with the law.

Public access to such information is vital to the proper enforcement of the Clean Water Act. In Illinois, the Illinois EPA, the regulatory authority with the primary responsibility to regulate pollution from CAFOs, has been severely criticized for not adequately implementing and enforcing the Clean Water Act for livestock facilities.[124] Because of the state's failures, citizens have increasingly had to respond to water quality threats on their own. Public involvement in monitoring and reporting CAFO pollution problems has been key to water protection in the state. In order to guarantee the public's continued and rightful involvement in the regulatory process, the Board should enact regulations that require large CAFOs to report complete information about their operations to the Illinois EPA and require this information to be made available to the public.

The Illinois EPA should post all CAFO reporting information on its website, including latitude and longitude coordinates, nutrient management plans, information regarding offsite transferees, etc. Otherwise, the public will be forced to seek the information via the Freedom of Information Act. This process is laborious and time consuming and places its own set of administrative burdens on regulatory agencies. Requiring complete information from CAFOs and posting that information on the Illinois EPA's website will ensure that the public's participation in the regulatory process is "provided for, encouraged, and assisted by the Administrator..." in accordance with the Clean Water Act. [125]

For these reasons, the Board should enact the CAFO reporting requirements proposed by the Environmental Groups.

B. The CAFO Regulations Should Apply to Waters of the State

One important change in scope we propose to the Illinois EPA's proposal is that where either "waters of the United States" or "navigable waters" are used, that language should be changed to "waters of the State."[126]

Waters of the state are defined as "all accumulations of water, surface and underground, natural, and artificial, public and private, or parts thereof, which are wholly or partially within, flow through, or border upon this State."[127] The Illinois definition of "waters of the state" is broader than "navigable waters" and "waters of the United States." "Navigable waters" are defined in the federal Clean Water Act as "the waters of the United States, including the territorial seas."[128] In terms of federal law, those terms are fairly interchangeable.[129] "Waters of the United States"

[124] See Ex. 14.
[125] 33 U.S.C. § 1251(e).
[126] The language can be found in proposed Sections 502.101, 502.102, 502.106, 502.500, 502.510 (b)(6) &(8), 502.520 (d)(4), 502.605 (a), 502.610 (b) &(g), 502.615 (a), 502.620 (a)& (b), 502.645 (d), 502.720, 502.730 (b), and 502.810 of Title 35 of the Illinois Administrative Code.
[127] 415 ILCS 5/3.550.
[128] 33 U.S.C. 1362 (7) (2012).
[129] However, we note our concern that, if used in the CAFO rules at issue in this case, the meaning of "navigable waters" could be interpreted narrowly to exclude many important (and polluted) waters in Illinois.

is defined as waters that could be used for interstate commerce, and those that have a significant nexus to navigable waters.[130] This federal definition has been subject to much litigation over the past decade to determine which waters are subject to federal jurisdiction. A definition subject to uncertain interpretation by courts outside of Illinois, and that on its face relies on interstate commerce or navigability does not make much sense for Illinois, which has clearly stated an intent to protect all waters of the state from pollution.

The "waters of the state" language should be adopted in the CAFO rule because the Board is charged with protecting all waters of the state, not just a subset of those waters. As stated above, the purpose of the Illinois Environmental Protection Act is to "restore, maintain and enhance the purity of the waters of this State in order to protect health, welfare, property, and the quality of life, and to assure that no contaminants are discharged into the waters of the State."[131] The legislative intent of the Illinois Environmental Protection Act was to provide pollution protection for all waters located within the State, not to limit those protections to navigable waters.[132] The Appellate Court of Illinois found that the Illinois Pollution Control Board is required to exercise jurisdiction over even a private, non-navigable lake in order to further the purposes of the Act.[133] Furthermore, the stated purpose of the Board's Agricultural Water Pollution Regulations (the very regulations being amended in this case) is to "prevent the pollution of the air and waters of Illinois" caused by livestock management and livestock waste-handling facilities.[134] Applying the rules at issue in this case to anything less than "waters of the state" would be inconsistent with the purposes of the Act and the specific purpose of Subtitle E of the Board's regulations.

C. Standards for Land Application of Livestock Waste

As discussed above, land application of livestock waste can result in water pollution if done improperly. Accordingly, the Board's CAFO rule must require technical standards (for both permitted CAFOs and unpermitted CAFOs seeking the agricultural stormwater exemption) that keep nutrients on fields and out of the water. Below, Environmental Groups discuss several improvements that should be made to meet the intent of the Act.

1) Waste land-applied above the Illinois Agronomy Handbook's recommended rates represents disposal, not agronomic utilization [35 IAC 502.615(c),(d)]

The soil test phosphorus threshold for switching from nitrogen-based to phosphorus-based land application should be 200 pounds/acre. When a phosphorus-based rate is used, phosphorus will no longer continue to build up in the soil. As Dr. Stacy James noted, an Illinois study advised that soil test phosphorus be kept to no more than 200 pounds/acre to reduce phosphorus losses from agricultural fields.[135] The concentration of phosphorus in runoff tends to increase with soil test phosphorus, and the Agency noted that, "excess nutrients in soil can adversely impact the surface or ground waters when these nutrients are dissolved or eroded by storms."[136]

[130] 40 CFR 230.3 (s) (2013).
[131] 415 ILCS 5/11 (b) (emphasis added).
[132] Tri-County Landfill Co. v. Ill. Pollution Control Bd., 41 Ill. App. 3d 249, 253-254 (Ill. App. Ct. 2d Dist. 1976) (analyzing purpose of Illinois Environmental Protection Act as stated in 415 ILCS 5/11) . See also,
[133] Central Ill. Public Service Co. v. Pollution Control Bd., 36 Ill. App. 3d 397, 402 (5th Dist., 1976).
[134] 35 Ill. Admin. Code 501.102 (e).
[135] James 10/16/2012 Testimony at 10.
[136] TSD at 26.

A 200 pounds/acre threshold is quite generous given that the Illinois Agronomy Handbook states there is no agronomic need to apply phosphorus when it exceeds 70 pounds/acre.[137] Indeed, an argument could be made that 70 pounds/acre should be the threshold, given that the federal rule requires states to insure "appropriate agricultural utilization" in the technical standards that qualify a facility for the agricultural stormwater exemption.[138]

The Agency proposed that the threshold for phosphorus-based application should be 300 pounds/acre. Their support of this number is flimsy and based on an unacceptably high phosphorus discharge concentration (0.9 mg/L) in runoff.[139] Allowing such high concentrations of runoff from agricultural fields will only exacerbate the state's phosphorus pollution problem. By lowering the threshold to 200 pounds/acre, Illinois can make progress toward reducing the number of phosphorus impairments in lakes and streams and incidences of nuisance algal blooms. While a 200 pounds/acre threshold will require some CAFOs to apply waste to more acreage, this waste is touted by the livestock industry as not "waste" but valuable nutrients. Therefore, the need to spread waste on additional acreage should be welcomed by the farming community.

2) Standards for Application of Livestock Waste in Winter (35 IAC 502.630)

Spreading livestock waste on frozen, snow-covered or ice-covered ground is a very risky and specialized form of land application that should be avoided whenever possible. If land application in winter must occur, the application should follow the standards proposed by IEPA, with the improvements Environmental Groups propose below.

a) Agency permission should be obtained to conduct surface application of livestock waste on frozen, ice-covered, or snow-covered ground [35 IAC 502.630(a)(1)]

All large CAFOs should be required to get Agency permission prior to surface applying livestock waste on frozen, ice-covered, or snow-covered ground. Such permission is important because it will ensure that applicators take all the appropriate steps to determine whether they are eligible to apply waste and then follow the proper procedures for applying in winter conditions. If the winter application results in water pollution, then IEPA can quickly identify the source and help implement remedial measures to stop the discharge. Application of waste under winter conditions is one of the most risky and least agronomically beneficial times to apply. It is widely acknowledged that winter application is not a recommended practice because of likely impacts on water quality. As IEPA has acknowledged,

> Winter application of the livestock waste can severely contaminate surface waters if improperly applied. This is especially the case when the soil is frozen, snow or ice covered since these soil conditions increase the potential for contaminated runoff to surface waters. … Because of the high risk posed by winter application

[137] James 10/16/2012 Testimony at 9.
[138] James Prefiled Testimony 10/16/12 p. 13.
[139] TSD at 25.

> to water quality, the Illinois EPA believes winter application should be avoided unless no practical alternative exists.[140]

Applying waste in winter poses unique challenges and risks that need to be managed well and avoided if possible. Winter application can contribute a substantial percentage of the total loads of nutrients and pathogens lost to surface waters and subsurface drainage systems in a given year.[141] Winter application of livestock waste has resulted in discharges to surface waters in Illinois. These discharges pose an unacceptable and avoidable public health risk.

IEPA's proposed rule requires large CAFOs to meet six eligibility criteria before winter application can occur. The IEPA proposal falls short by not requiring applicators to review these criteria with the Agency and get permission from the Agency to apply. The proposal instead relies on applicators doing a self-evaluation to determine if they are eligible to apply waste during one of the most risky land application periods of the year. Unfortunately, not all applicators understand the regulations.[142] Therefore, we doubt that the Agency's proposal will adequately protect water quality as written.

Other states better ensure that winter regulations will be followed by requiring CAFOs to get agency permission before application. Dr. James cited Ohio and Wisconsin as requiring agency permission prior to surface application on frozen or snow-covered ground.[143] Permission is also required in Maine, Vermont, and Kansas:

- Maine: Maine prohibits spreading or spraying manure between December 1 and March 15. If winter application is necessary, an operation can apply to the commissioner for a variance allowing application. Any variance must contain "restrictions to minimize potential environmental degradation and prescribe actions to ensure future compliance."[144]
- Vermont: Under Vermont's Accepted Agricultural Practice Regulations,[145] manure spreading between December 15 and April 1 is prohibited unless the Secretary grants an exemption:

  > 4.03 (c) *Manure shall not be spread between December 15 and April 1 unless the Secretary grants an exemption because of an emergency situation, such as, but not limited to, the structural failure of a manure storage system or for other specific management needs. In granting an exemption, the Secretary shall determine that the manure will be spread on fields with the least likelihood of generating runoff to the adjoining surface waters. Being granted an exemption does not relieve persons from complying with the Vermont Water Quality Standards.*

- Kansas: Unless approved in advance by the secretary, liquid waste, concentrated liquid animal waste, or other liquid process waste shall not be land-applied when the ground is

[140] TSD at 38-39.
[141] James 10/16/2012 Testimony at 11.
[142] Leder 10/16/2012 Testimony at 5.
[143] James 11/7/2012 Testimony at 8
[144] Me. Rev. Stat. Ann. tit. 7 § 4207.
[145] http://www.nerc.org/documents/manure_management/VT/accepted_ag_practices.pdf

> frozen, snow-covered, or saturated, or during a precipitation event. Land application of animal or other process wastes during these periods may be authorized by the secretary for use in filtering animal or other process wastes from retention structures that are properly operated and maintained and that are in imminent danger of overflow to surface waters of the state due to a chronic or catastrophic precipitation event.[146]

Adding a permission requirement to the Illinois regulations would provide the dual benefit of the Agency being able to verify both that the six eligibility criteria have been met, and that the immediate environmental conditions are appropriate for land application.[147] In the case of unpermitted large CAFOs, a permission requirement would also provide the Agency with an important chance to review the Winter Application Plan with the applicator, since these plans need not be submitted to the Agency according to their proposal.

b) There should be a cap on the application rate for surface application of livestock waste on frozen, ice-covered or snow-covered ground [new section 35 IAC 502.630(d)]

Environmental Groups propose that when livestock waste is surface-applied on frozen, ice-covered, or snow-covered ground, the application should be conducted at no more than the phosphorus-based rate. The previous section explains why applying waste under winter conditions is a risky practice and should be greatly restricted. The amount of phosphorus lost as runoff from application fields tends to increase with waste application rate.[148] Phosphorus is a leading cause of impairment in Illinois' streams and lakes.[149] Therefore, limiting the application rate in winter (when large losses are likely) should be more protective of water quality than allowing the higher, nitrogen-based application rate that is more appropriate for less risky times of year.

When land application in winter is necessary, it should be limited to only the amount of waste necessary to free up enough storage to get through the winter without a production area discharge.[150] "By minimizing the amount applied, the livestock operator will also be minimizing the risk of surface water discharges."[151] Judicious and reduced application rates are all the more appropriate in winter because there is usually not a crop present to take up the nutrients until the following spring, allowing months for the nutrients to be lost to nearby surface waters and groundwater via runoff and leaching.

Mr. Leder also indicated that winter application is conducted primarily to achieve emergency disposal, because CAFO operators lack adequate waste storage.[152] The idea is to turn a potentially disastrous situation (e.g., overflowing waste storage structures) into a less dangerous situation by spreading the waste on fields. But if high wintertime application rates are allowed

[146] K.A.R. 28-18-13(h)(1).
[147] Leder 10/16/2012 Testimony at 3.
[148] James 10/16/2012 Testimony at 11.
[149] See, e.g. Ex. 11.
[150] Leder 10/16/2012 Testimony at 3.
[151] Leder 10/16/2012 Testimony at 3.
[152] Leder 10/16/2012 Testimony at 2.

by Illinois' regulations, this risk is merely transferred from the production area to the application field.

The IEPA proposal contains a number of highly protective setbacks and other requirements for land application of waste in winter conditions. These protections are important because CAFOs can generate hundreds of thousands or millions of gallons of waste annually, which need to be applied responsibly. However, the proposal does not set a maximum application rate. The proposal seems to allow for nitrogen-based rates because winter application is supposed to be limited to fields with a relatively low-risk of nutrient loss.[153] Unfortunately, even low-risk fields may shed livestock waste under certain conditions. For example, scientific studies have shown that, "Though there is a perception that it is safe to apply manure on flat areas under winter conditions, according to Midgley and Dunklee (1943), when the soil is frozen, runoff, and hence nutrient transport, may occur on any slope."[154] Further, "McCool (1990) indicated that even the BMPs are often not sufficient to control runoff and soil erosion (and associated nutrient transport) during events of rain and/or melting snow on frozen ground.[155]

Precedent for restricting land application rates in winter exists in other Midwest states. USEPA suggests limiting the application of liquid waste on frozen soil.[156] Indiana, Ohio, and Wisconsin limit winter application based on gallons or pounds or crop phosphorus needs.[157] For example, the Ohio General NPDES Permit for CAFOs states, "Only limited quantities of manure shall be applied to address manure storage limitations until non-frozen or non-snow covered soils are available for manure application."[158]

Establishing a maximum application rate may also motivate CAFOs to increase their waste storage capacity so that winter application is not necessary.

c) "Practical alternatives" to winter application need to be clarified in the rules [35 IAC 502.630(a)(1)(A)]

The Agency's proposed rule at 502.630 (a)(1)(A) states that "practical alternative measures" must be investigated, but does not provide any examples. The regulations should specify examples of acceptable practical alternatives to surface land application of waste on frozen, ice-covered, or snow-covered ground. Such clarity is needed so that CAFOs understand which alternatives the Agency expects them to investigate before resorting to land application. Failure to provide examples may result in more winter applications and more water pollution because CAFOs are given more discretion to decide what they consider to be a "practical alternative."

The Environmental Groups asked the Agency what practices would be considered practical alternative measures. The Agency responded,

[153] James 10/16/2012 Testimony at 12.
[154] Srinivasan et al. 2006, Attachment 42 of James 10/16/2012 Testimony, p. 204.
[155] Srinivasan et al. 2006, Attachment 42 of James 10/16/2012 Testimony, p. 204.
[156] James 10/16/2012 Testimony at 12.
[157] James 10/16/2012 Testimony at 12.
[158] Ohio General Permit for CAFOs, OHA000001 (Attachment 3) at Part VI, B, 5.

> Practical alternative measures to avoid surface land application in winter could include, but are not limited to, removing livestock waste to storage units at another site, reducing other sources of flow (e.g., stormwater runoff) to the existing storage units and reducing the volume of manure that would be produced by reducing the size of the herd.[159]

These examples should be included in the regulations, and are included in the Environmental Groups' Proposal.[160] Indeed, the Agency indicated their willingness to consider the Environmental Groups' suggestions.[161]
The Board may also wish to consider an example of another state providing some clarity on this issue. Ohio's General NPDES Permit for CAFOs states, "Other locations for manure disposal should be investigated prior to the land application (i.e., transfer of manure to another waste treatment or storage facility, wastewater treatment plant, rental or acquisition of a storage tank, etc.)."[162]

d) Examples should be provided of steps to be taken to provide 120 days of available waste storage capacity before winter application [35 IAC 502.630(a)(1)(C)]

The proposed rule in section 502.630 (a)(1)(C) states that owners or operators must "take steps" to provide 120 days of available storage prior to December 1, but does not list specific examples. The regulations should specify some examples of steps to be taken to provide 120 days of available waste storage capacity before winter application is allowed. As with the previous section (c), providing clarity on what the Agency would consider acceptable steps will better ensure the regulations are understood and may ultimately result in less winter application and water pollution. This allows CAFOs too much latitude to decide whether they have taken appropriate steps.

In his testimony, Mr. Arnold Leder provided several examples of suitable steps:

> In order to surface apply waste in winter, livestock operators should have to prove they have taken responsible steps to create adequate waste storage capacity to get through the winter, including land-applying the waste or transferring it to other locations or recipients or depopulating facilities to reduce the amount of waste being generated. Operators should have to cover or otherwise protect their waste storage structures from precipitation and clean stormwater runoff, to reduce the amount of waste that needs to be stored.[163]

[159] 8/14/2012 Attachment 4 (Answers to Prefiled Questions From Environmental Groups directed to Bruce Yurdin) at 8.
[160] Attach.2.
[161] Trans. 8/21/2012 p. 115.
[162] Ohio General Permit for CAFOs, OHA000001 (Attachment 3) at Part VI, B, 5.
[163] Leder 10/16/2012 Testimony at 3.

The Agency agreed that they expect some of these steps to be taken, but were more limited in their examples:

> By stating in Section 502.630(a)(1)(C) that "the owner or operator has taken steps to provide 120 days of available storage capacity" we mean that the producer must have conducted livestock waste removal, by means of land application or transfer to another party, in accordance with their NMP.[164]

However, the Agency did state that "examples would be fine" in the rule.[165] Therefore, several examples are included in the Environmental Groups' Proposal[166], including examples suggested by Mr. Leder, the Agency, and what is found in Wisconsin's winter regulations:

> Allowances for emergency surface applications of liquid manure do not apply to situations where a permittee has failed to properly maintain storage capacity either through improper design or management of the storage facility, including failure to properly account for the number or volume of wastestreams entering the facility, failure to empty a storage or containment facility in accordance with permit conditions prior to the onset of frozen or snow covered ground conditions or due to an increase in animal units.[167]

3) Shallow bedrock and underlying aquifers should be better protected from the land application of liquid livestock waste [35 IAC 502.620(h)]

The application of liquid livestock waste should be prohibited when there is less than 5 feet of soil covering fractured bedrock, sand or gravel. As IEPA has acknowledged, "liquid livestock waste applied directly on bedrock, sand or gravel soils will reach ground water quickly without the natural filtering affect of soil cover."[168] Similarly, "without an adequate soil cover, water will move rapidly move through soil particles, and nutrient present in the livestock waste would not be available for crop uptake."[169] If nutrients are not available for crop uptake, the application hardly serves an agronomic purpose.

Liquid livestock waste is very prone to leaching downward into the soil profile because of the high water content. Carbonate, sandstone, and shale bedrock can contain aquifers. Groundwater and aquifers can become contaminated by land-applied agricultural chemicals and animal waste.

In his testimony, Mr. Samuel Panno suggested that 50 feet of soil over carbonate bedrock is needed to protect karst aquifers from contamination by liquid livestock waste.[170] Clearly such a regulation would pose some significant challenges for farmers in karst areas of the state. In Mr.

[164] 8/14/2012 Attachment 4 (Answers to Prefiled Questions From Environmental Groups directed to Bruce Yurdin) at 8.
[165] Trans. 08/21/2012 pp. 114-115.
[166] Attach. 2.
[167] NR 243.14(7).
[168] TSD at 32.
[169] TSD at 32.
[170] Panno 10/16/2012 Testimony at 5.

Donald Keefer's testimony, he indicated that the first 5-6 feet of the soil profile is where macropores are ubiquitous, serving as conduits to groundwater contamination.[171]

A 2007 report written by the Northeast Wisconsin Task Force states there is an "extreme" relative vulnerability to contamination when there is less than 5 feet of soil over carbonate bedrock.[172] The report suggests there should be no application of manure on land with less than 3 feet of soil over carbonate bedrock.[173] The report also suggests that when there is 3 to 5 feet of soil over bedrock, maximum application rates should be 3,000 gallons/acre/application with a maximum application rate of 6,000 gallons/year.[174] In Illinois, a statewide survey of randomly selected, private rural wells was conducted in 1991 and 1992 and results indicated that nitrate contamination was more likely to occur when aquifers were within 20 feet of the land surface.[175] Approximately 10% of wells were estimated to contain nitrate exceeding the safe drinking water standard.

The Agency proposal allows for liquid livestock waste to be applied when there are only 10 inches of soil covering aquifer materials. In light of the recommendations and findings above, this standard appears woefully inadequate and not protective of groundwater resources. It is imperative for the State to adopt regulations now that protect drinking water for generations to come, before it's too late and even more wells become contaminated and require costly treatment. By prohibiting liquid waste application when there is less than five feet of soil over bedrock and other aquifer material, the Board can accomplish a compromise between environmental protection and farmer constraints.

Other Midwest states have adopted rules to protect shallow groundwater from manure contamination, but even these may be inadequately protective. In Wisconsin, manure cannot be applied to areas where the depth to groundwater or bedrock is less than 2 feet.[176] If the ground is frozen or snow-covered, the minimum depth increases to 5 feet.[177] In Indiana, manure cannot be applied by spray irrigation to land with less than twenty inches of soil over bedrock.[178] In Minnesota, manure management plans must contain protective measures to minimize the risk of groundwater contamination when there is less than three feet of soil over limestone bedrock.[179] The Minnesota Pollution Control Agency publication "Applying Manure in Sensitive Areas" suggests at least 24 inches of soil to protect the seasonal high water table[180] and bedrock.[181]

[171] Keefer 11/07/2012 Testimony at 2.
[172] Final Report of the Northeast Wisconsin Karst Task Force as an (Attachment 4), p. iii.
[173] *Id.*, p. 8
[174] Id., p. 8.
[175] Statewide Survey for Agricultural Chemicals in Rural, Private Water-Supply Wells in Illinois (Attachment 4), p. 1.
[176] Wis. Admin. Code s. NR 243.14(2)(b)(7).
[177] Wis. Admin. Code s. NR 243.14(2)(b)(10).
[178] 327 IAC 19-14-5.
[179] Minn. R. ch. 7020.2225, subp. 4, item D(9).
[180] Minnesota Pollution Control Agency, "Applying Manure in Sensitive Areas,", p.7 (2005), available at http://www.pca.state.mn.us/index.php/view-document.html?gid=3530.
[181] Id., p. 10.

4) Macropores need to be carefully managed to reduce discharges to tiles [35 IAC 502.620(m)]

The application rate of liquid livestock waste containing less than 5% solids on fields with subsurface drainage should be limited to 13,000 gallons/acre/application. A restriction on the application of liquid waste to tile-drained fields is needed because, according to the testimony of Mr. Donald Keefer,[182] macropores are ubiquitous and serve as conduits for land-applied waste to drain into field tiles which ultimately discharge into surface waters. He concluded that, "Significant concern needs to be given to the risk of pathogen, hormone or antibiotic transport to surface waters through subsurface drainage tiles due to land application of livestock waste."[183]

Likewise, Mr. Arnold Leder testified that waste can be applied in moderate amounts but tile discharges can occur because of cracks and wormholes in the soil.[184] While not commenting specifically on loss mechanisms, in their TSD the Agency cited that the majority of discharges from CAFOs occur from manure handling systems and during the land application of manure, and that many of these discharges could have been prevented through better planning, management, and operation.[185] The Agency also reported that field tiles can transport livestock waste more than 200 feet from the land application area.[186] And finally, the Agency stated that buffers and setbacks don't protect streams from polluted tile discharges because the tile runs under and through such areas.[187]

During his oral testimony, Mr. Keefer said that instead of prohibiting waste applications on tile-drained fields, applications could be done at protective rates.[188] Mr. Keefer also noted that the liquid content of manure may influence the likelihood that significant concentrations of pollutants reach tile drains.[189] Manure that contains just a few percent solids is more capable of discharging into tiles than manure containing at least approximately 5% solids.[190]

In Appendix O of "Managing Manure Nutrients at Concentrated Animal Feeding Operations," the U.S. EPA states,

> Fields that are subsurface (tile) drained require additional precautions. When liquid wastes are applied to fields with subsurface (tile) drains, the liquid can follow soil macropores directly to the tile drains, creating a surface water pollution hazard from direct tile discharge.[191]

[182] Keefer 11/07/2012 Testimony at 3.
[183] Keefer 11/07/2012 Testimony at 4.
[184] Leder 10/16/2012 Testimony at 2.
[185] TSD, p. 26.
[186] 8/14/2012 Attachment 5 (Answers to Prefiled Questions From Environmental Groups directed to Dan Heacock) at 4.
[187] TSD at 20.
[188] Trans. 11/14/2012 p. 176.
[189] Keefer 11/07/2012 Testimony at 3-4.
[190] Personal communication with Mr. Leder, January 2013.
[191] Attachment 22 in James 10/16/2012 Testimony, p. O-10.

The U.S. EPA goes on to suggest that the livestock waste application rate on tile-drained fields not exceed the lesser of 13,000 gallons per acre per application or the available water capacity in the upper 8 inches.[192] Under drought conditions, U.S. EPA suggests a decrease in nutrient application rates on non-irrigated fields.[193] This makes sense because large cracks form during droughts and can serve as conduits to tiles. Ohio restricts liquid manure applications on tile fields to a maximum of 13,576 gallons per acre.[194] The Ohio General NPDES Permit for CAFOs states,

> For the land application of liquid manure to sites with subsurface tile drainage, the following criteria must be followed: a. Application rate shall be less than or equal to half an inch or thirteen thousand gallons per acre per application event;[195]

and

> For fields with soil cracks greater than six inches deep, the soil must be tilled before the land application of liquid manure or the application must be delayed until the cracks are sealed. However, liquid manure applications may be made on tiled fields with growing crops if the application rate is less than or equal to a quarter of an inch or six thousand seven hundred gallons per acre and tile plugs are used or tile stops closed prior to application.[196]

The Agency proposal does not specifically address macropores on tile-drained fields. While the proposal does contain some land application technical standards that reduce or prohibit land application under certain conditions (e.g., cases of shallow bedrock), none of these standards are adequate for addressing all tile-drained fields with macropores. Therefore, in order for this rule to ensure that livestock waste is applied in an environmentally protective manner, there must be a provision that specifically addresses the application of liquid livestock waste on tile-drained fields. Such a provision should limit the application rate to 13,000 gallons/acre/application under non-drought conditions, and 6,800 gallons/acre/application under drought conditions. The U.S. Drought Monitor[197] is produced by the U.S. Department of Agriculture and other agencies. In any of the drought stages, you can expect to see surface cracks in agricultural fields. In their proposal, the Environmental Groups are suggesting a reduced application rate when the drought is "moderate" or worse.

The rule would also be more protective of water quality if CAFOs were required to inspect tiles during land application [not just before and after as in 35 IAC 502.510(b)(13)]. As Mr. Keefer noted, land-applied liquids can travel 4-5 feet deep and reach tiles within minutes of application.[198] If the regulations do not require tiles to be inspected until after application, then discharges may occur undetected long before application is completed on large fields. The regulations should also specify that the CAFO must take steps to stop a tile discharge when it is observed. Tile plugs, shut-off valves, and earth-moving equipment to dam up tile discharges could all be used to prevent discharges to surface waters.

[192] Id.
[193] *Id*. p. O-11
[194] OAC 901:10-2-14, Appendix B.
[195] Ohio General Permit for CAFOs, OHA000001 (Attachment 3) at Part VI, B, 4.
[196] Id. at Part VI, B, 2, b
[197] http://droughtmonitor.unl.edu/
[198] Keefer 11/07/2012 Testimony at 2.

5) Technical Standards for Land Application of Livestock Waste Should Apply to All Large CAFOs

Land application of livestock waste poses considerable risks to water quality. As discussed above, poorly managed application of manure can lead to the release of nutrients and pathogens to surface and ground water.[199] Historically, the majority of discharges from CAFOs result from manure handling and land application of livestock waste.[200]

IEPA has proposed some important modifications to its existing CAFO regulations that govern the land application of livestock waste. These new technical standards are contained within Subpart F of Part 502 of the proposed regulations and contain, among other requirements, prescriptions for land application of livestock waste at agronomic rates as well as methods for estimating the volume of waste to be applied and for determining the nutrient values of waste, nitrogen availability, realistic crop yield goals and maximum application rates.

While these modifications are commendable and necessary, under the IEPA proposal they generally only apply to permitted CAFOs. We know the vast majority of CAFOS in Illinois are unpermitted.[201] Under IEPA's proposal, only Section 502.510(b) (in Subpart E), Section 502.630, and the land application setbacks in Part 502 are applicable to unpermitted CAFOs. Environmental Groups propose instead that the following sections in Subpart F apply to all Large CAFOS regardless of permit status: 502.615, 502.620, 502.625, 502.635, 502.640 and 502.645. As shown below, each of these sections provide critical limitations and protocols governing land application designed to ensure that livestock waste is applied in a manner that minimizes the risk of over-application and runoff.

Section 502.615 provides a prescribed method for determining nutrient transport potential, or the potential for nitrogen and phosphorus to move from the field to surface waters. This section requires a field assessment for each field where livestock waste will be applied. The field assessment, which requires identification of factors such as soil type, slope, erodibility, soil test phosphorus, and distance to surface waters, must be utilized to determine the appropriate application rate for each field. Section 502.615 also contains specific limitations on when waste can be applied using either nitrogen-based application or phosphorus-based application. Nitrogen-based application is limited by the mass of available soil P as well as the erosion factor T, which must be calculated using a specified method. Phosphorus-based application is limited by the mass of available soil P and the agronomic nitrogen demand of the next crop grown. Nutrient transport potential is a site-specific determination that requires intimate knowledge and study of each field where waste will be applied and should be done by permitted and unpermitted CAFOs alike. The field assessment spelled out in this section is critical to the determination of appropriate and protective application rates.

Section 502.620 sets protocols for land applying livestock waste, such as prohibitions during precipitation or forecast thereof, a requirement that a determination of soil loss be made for each field, restrictions if land slope or soil loss are too high and prohibitions on applying to porous

[199] Technical Support Document (TSD), p. 26.
[200] TSD, p. 26.
[201] Tr. 8/21/12, p. 149, Yurdin.

soils or rock, or to soils too close to bedrock or water tables. The importance of these protocols cannot be overstated. Excess nutrients in soils can adversely impact surface and ground water when these nutrients are dissolved or eroded by storms.[202] Runoff of nutrients to surface waters is more likely from fields with steep slopes. As slope increases, so does the potential of runoff from fields where waste has been applied.[203] Soil properties such as depth, texture, and permeability are keys in determining the potential for groundwater contamination. In coarse materials like sand, water moves through rapidly, reducing contact between the water and soil particles.[204] Liquid livestock waste applied directly to bedrock, sand or gravel soils will reach ground water quickly without the natural filtering effect of soil cover. Finally, nutrients in liquid waste that moves rapidly through coarse soils will not be available for crop uptake.[205]

Section 502.625 provides in-depth specifications regarding the proper methods for determining livestock waste application rates. 502.625 limits application to the agronomic nitrogen rate, which is the rate required for a realistic crop yield goal. The section provides prescribed methods for determining livestock waste volumes, the nutrient value of livestock waste at new CAFOs, realistic crop yield goals, and nitrogen credits. It also contains requirements to adjust nitrogen availability to account for the method of land application and first-year mineralization of organic nitrogen into a plant available form. In addition to the requirements listed above, the CAFO owner or operator must determine the amount of phosphorus needed by each crop and the phosphorus carryover from previous years of application. Finally, Section 502.625 requires land application to be consistent with the nutrient management plan and that such plan include a determination of the maximum livestock waste application rate for each field. Section 502.625 provides a high degree of specificity and direction regarding how one determines the rate at which livestock waste can be safely land applied.

Given the specificity and detail provided within this Section 502.625, as well as in Sections 502.615 and 502.620, it is apparent that land-applying livestock waste at the correct application rate is of primary importance for the protection of water quality. Despite the vital importance of application rates, there is a glaring lack of specificity and direction provided in 502.510(b). Instead, Section 510(b) calls for an "adequate" land application area and land application protocols that ensure "appropriate" agricultural utilization of nutrients. Adequate and appropriate are not defined in IEPA's proposed rules and thus have no objective meaning and are difficult to enforce.

Section 502.635 requires soil sampling in accordance with specified protocols and sets forth the number and frequency of required sampling. The section also calls for annual analysis of livestock waste, listing the specific parameters that must be tested each year. Although IEPA has stated that "accurate and reliable information [regarding manure and soil nutrient content] is needed to make the necessary calculations," Section 502.510(b) fails to require adherence to any particular soil or manure sampling protocols, but simply calls for "appropriate" testing

[202] TSD, p. 26.
[203] TSD, p. 31.
[204] TDS, p. 31.
[205] TSD, p. 32.

protocols.[206] We propose the Board require compliance with the soil and manure testing protocols in Subpart F.

Finally, Section 502.640 requires periodic inspection of land application equipment as well as routine calibration of such equipment. There is no corresponding requirement in Section 502.510(b), yet according to IEPA, the same land application equipment is used by permitted and unpermitted CAFOs.[207]

All CAFOs produce livestock waste that must be land applied. Large CAFOs, both permitted and unpermitted, commonly use the same land application practices, equipment and technology.[208] All CAFOs generate waste with the same characteristics. As such, the effects of stormwater runoff from land application on surface waters are expected to be the same for all CAFOs.[209] Regardless of permitted status, Large CAFOs produce similar quantities of waste and face the same waste management challenges.[210]

For the sake of clarity and consistency, all large CAFOs should have to follow the same technical standards. In particular, unpermitted large CAFOs should have to follow the same technical standards for land application of waste as is required of the permitted CAFOs.[211] Requiring all Large CAFOs to adhere to the same technical standards regarding land application is fair, economically reasonable, and necessary to protect water quality in Illinois.

D. The CAFO Rules Should Close the Third-Party Waste Transfer Loophole

As noted by Dr. Kendall Thu, "large CAFOs by their very nature do not have adequate land bases to absorb the excess nutrients they produce and dispose of through land application."[212] USEPA estimates show that larger operations produce the greatest amount of excess nutrients and must transport roughly 60 to 70 percent of the nitrogen and phosphorus they generate off-site.[213] Without requiring CAFOs to account for third-party off-site transfer of manure, it is impossible to ensure adequate cropland is available to dispose of livestock waste to avoid discharges and to prevent water quality impairment from runoff.

Arnold Leder testified to the fact that he has seen a number of instances where CAFOs did not have adequate land for their manure.[214] He provided an example of a 5,000-head dairy with only 50 acres of farm ground to apply on, stating "he has to find others to give it to." According to Mr. Leder, this has led to a significant number of discharges and waste being over-applied.[215] "If you don't have some way of tracking it and holding those accountable that receive manure, it is de facto an incentive for the large operator to actually get rid of it because it's, therefore, not their responsibility."[216] Mr. Leder noted that under the Illinois EPA's proposed draft regulations,

[206] TSD, p. 51.
[207] Tr., 8/21/12, p. 168, Yurdin.
[208] TSD, p. 21.
[209] TSD, p. 21.
[210] Tr. 10/30/12, pp. 152-53, James.
[211] Prefiled T., Leder, 10/16/12, p. 6.
[212] Thu, 10/30/12 Prefiled Testimony at 3.
[213] SR Attachment B at 7180.
[214] Leder, 10/30/12 TR at 225.
[215] Leder, 10/30/12 TR at 225.
[216] Leder, 10/10/12 TR at 225.

third party off-site transferees would not be subject to nutrient management planning; land application of CAFO waste at agronomic rates, or setbacks.[217]

Under the Illinois EPA's draft regulatory proposal, permitted CAFOs are required to maintain certain records regarding waste transferred to third parties. One of the items required to be submitted with CAFO NPDES permit applications is the estimated amount of waste to be transferred to other persons per year.[218] Permittees are also required to "retain records for five years of the date, recipient name and address, and the approximate amount of waste transferred other persons,"[219] and provide the agency with estimations of the quantity of livestock waste transferred to other persons in their NPDES annual reports.[220]

While this system of documentation would seem to provide the agency with the ability to account for the waste being generated by CAFOs transferred to third-parties, there are some significant loopholes. First, while permit applicants are required to provide an estimate of the amount to be transferred to other persons, IEPA does not require an operation to identify the persons to whom the waste is transferred or the land where the waste there is to be applied.[221] Under this approach, neither the agency nor the public have the ability to verify that a third-party transferee's land is suitable for application. In addition, while CAFOs are required to retain documentation of information such as names, addresses and amounts of waste transferred to third-parties as part of their record keeping requirements, this information is not required to be submitted to the agency. Once operations commence, the only information to be submitted to the agency regarding the waste to be transferred is an estimation of quantity transferred, which is to be included in their annual NPDES reports.

In essence, this system allows for CAFO waste disposal by third-parties with virtually no regulatory oversight. As noted by the Illinois EPA, off-site land application of livestock waste not under the control of the CAFO owner or operator may not be subject to regulatory technical standards if not included in the facility's nutrient management plan.[222] Daniel Heacock explained that under the Illinois EPA's proposed regulations, third-party off-site recipients of waste have an opportunity to take waste off-site and not be part of a facility's nutrient management plan.[223] Further, third-party manure applicators are not required to register their land application sites with the Illinois EPA.[224]

This information deficit is even worse with regard to unpermitted CAFOs, which are (and are expected to be) the vast majority of CAFOs in Illinois. While permitted CAFOs are required to keep records on who they transfer their waste to and the amount they transfer, such information is effectively shielded from the agency and the public. Under the Illinois EPA's regulatory proposal, unpermitted CAFOs are not subject to the requirements applicable to permitted CAFOs referenced above. There is virtually no oversight offered for the disposal of waste generated at unpermitted CAFOs transferred to third parties.

[217] Leder, 10/31/12 TR at 227.
[218] Illinois EPA proposed amendments to 502.201(a)(10).
[219] Illinois EPA proposed amendments at 502.610(k)(1).
[220] Illinois EPA proposed amendments at 502.325(b)(3).
[221] Heacock, Ex. 8 at 7.
[222] Heacock, Ex. 8 at 8.
[223] Heacock, 8/21/12 TR at 170.
[224] Heacock, Ex. 8 at 7.

Illinois has stronger regulations for third-party transfer of waste for other industries than what the Illinois EPA has proposed for CAFOs. If sludge is transferred off-site to another person other than the generator or is land applied by a person other than the generator, "the user is responsible for full compliance with the generator's permit."[225]

Other states have recognized the need to address the growing problem with the transfer of CAFO waste. Currently Ohio requires

> [E]ach owner, operator, or person responsible for producing, applying, or receiving…in excess of one hundred thousand gallons of manure on an annual basis in distressed watersheds shall develop and operate in conformance with a nutrient management plan that addresses the methods, amount, form, placement, cropping system and timing of all nutrient applications. Nutrient management plans shall be submitted to and approved by the chief or the chief's designee…[226]

Michigan has a manifest program for third-party offsite transferees of CAFO waste. Per the state's permitting program,[227] if CAFO waste is

> [S]old, given away, or otherwise transferred to other persons (recipient) and the land application of that production area waste or CAFO process wastewater is not under the operational control of the CAFO owner or operator that generates the production area waste or CAFO process wastewater (generator), a manifest shall be used to track the transfer and use of the production area waste or CAFO process wastewater…[228]

The Environmental Groups proposed a system similar to Michigan's in their regulatory proposal.[229] The Board should adopt this proposal to ensure proper waste management and disposal of livestock waste to avoid discharges and to prevent water quality impairment from runoff.

E. The CAFO Rule Needs More Protective Setbacks to Protect Water Quality

Although the rule proposed by IEPA contains some setbacks, Environmental Groups propose additional setbacks of both the production area and the land application area that will go a long way toward protecting valuable Illinois water resources. The specific setbacks are discussed in detail below, but this summary table illustrates an overview of what Environmental Groups propose:

[225] 35 Il. Admin. Code. 391.203 (a)
[226] Ohio Admin. Code § 1501:15-5-19.
[227] Mich. Admin. Code R. 323.2196.
[228] Mich. Admin. Code R. 323.2196 (5)(e) (Attachment 5).
[229] Attach. 2.

TYPE	AREA	DISTANCE	IEPA PROPOSAL
manure stacks	production area	1000 feet from community water supply wells; 750 from surface waters; 400 feet from karst features or potable water supply wells; 2 feet above seasonal high water table; 20 inches above bedrock	75 feet from water wells
siting setbacks for new CAFOs from wells	production area	1000 feet from community water supply wells; 400 feet from potable water supply wells	none
setbacks for new CAFOs from surface water	production area	750 feet from surface waters; 1/4 mile from designated surface water drinking supplies	none
setbacks from high-quality waters	land application area	500 feet from biologically significant streams, outstanding resource waters and designated surface drinking water supplies	200 feet from all surface waters

1) Protective manure stack setbacks from water resources should be established [35 IAC 501.404(b)]

Setbacks should be established to protect surface waters and groundwater from manure stack contamination. In particular, manure stacks should be subject to the same siting setbacks from water resources required of other parts of the production area. In the Environmental Groups'

Proposal,[230] it was suggested that in the absence of a cover and enclosed pad or other control, manure stacks be located a minimum of 750 feet from surface waters, 1000 feet from community water supply wells, 400 feet from other potable water supply wells, 400 feet from karst features, 2 feet above the seasonal high water table, and 20 inches above bedrock. Manure stacks have been frequently cited by the Agency as improperly managed sources of water pollution.[231] Manure stacks can exceed 100 feet in length and are often placed directly on the ground without any barrier between the base and the ground surface. Pollutants in manure can leach downward into groundwater if there is not an underlying pad. When unprotected from rainwater, manure stacks can produce polluted runoff capable of reaching and contaminating nearby streams and lakes.

Mr. Samuel Panno recommended that manure stacks without a cover and pad be prohibited in karst areas.[232] The "Final Report of the Northeast Wisconsin Karst Task Force" recommends there be no unconfined manure piles within 1,000 feet of karst features and on soil with less than 15 feet to bedrock.[233] Brown County, Wisconsin (where livestock waste application has resulted in many cases of well contamination) prohibits unconfined manure piles within 1000 feet of the ordinary high water mark of ponds and lakes, 300 feet of the ordinary high water mark of rivers and streams, 250 feet of private wells, 1000 feet of municipal wells, 200 feet upslope or 100 feet downslope of karst features, and in areas where soil depth to groundwater or bedrock is less than 2 feet.[234] In Minnesota, temporary manure stacks cannot be located within 300 feet of waters of the state, sinkholes, rock outcroppings, or open tile intakes, nor within 200 feet of certain private wells, and there must be at least a 2 foot separation between the stockpile base and seasonal high water table.[235] In Iowa there must be a vertical separation of 5 feet between the stockpile and karst terrain, and if manure is not stacked in a manner to prevent runoff there must be an 800 foot setback from high-quality water resources, agricultural drainage wells, and sinkholes.[236] Illinois' LMFA prohibits the construction of non-lagoon livestock waste handling facilities within 400 feet of any natural depression in a karst area.[237]

The Agency acknowledged the importance of depth to bedrock and the water table when they discussed the land application of waste.[238] In their proposal, they suggested that application rates should be reduced when depth to bedrock is less than 20 inches and depth to water table is less than 2 feet. Therefore, it would only make sense that manure should not be stockpiled under such conditions, because in a given area a stack of manure will contain far more volume and pollutants than land-applied waste. Unfortunately, the Agency proposal does not specifically regulate the siting of manure stacks with respect to these features.

[230] Attach. 2.
[231] James 10/16/2012 Testimony at 7.
[232] Trans. 10/30/2012 pp. 129-130.
[233] Final Report of the Northeast Wisconsin Karst Task Force as an (Attachment 6), p. 11 (with "unconfined" being defined as at least 175 cubic feet).
[234] County Ordinance 26.11(7)(c).
[235] Minn R 7020.2125.
[236] 2011 Merged Iowa Code and Supplement/Title XI Natural Resources/Subtitle 1 Control of Environment Chapter 459/Animal Agriculture Compliance Act.
[237] 510 ILCS 77/13.
[238] TSD at 34.

With the exception of well setbacks, the Agency proposal has no siting setbacks relative to surface waters and groundwater. The Agency proposal has a minimum 75 foot setback from water wells. This setback may be insufficient. A study cited by Dr. Stacy James found that a 90 foot vegetated filter strip next to a manure stack was inadequate for reducing fecal coliform to meet the water quality standards.[239] The IEPA proposal requires that manure stacks must have a cover and pad or other control "when needed" to prevent runoff and leachate. This wording provides livestock operators with too much latitude to interpret whether there is a "need." As Dr. James' testimony illustrated, too many livestock operators are not meeting the state's existing regulations that require manure stacks be constructed and maintained to prevent runoff and leachate from entering surface and groundwater.[240] The Agency acknowledged that the existing regulations alone are inadequate in some cases and suggested a cover and pad be used but did not go so far as to routinely require these practices.[241] The Environmental Groups' proposal makes it clear how manure stacks are to be constructed: if stacks do not have a cover and pad, they must be located a minimum distance from water resources.

2) There should be a larger CAFO siting setback from wells [35 IAC 501.402(i)]

New livestock management facilities should be prohibited from locating within 1000 feet of community water supply wells and 400 feet of other potable water supply wells. It is imperative that drinking water supplies be protected from livestock waste contamination. Wells near livestock facilities may become contaminated if waste storage structures leak into the groundwater or if polluted runoff flows overland and reaches unprotected wells. As Arnold Leder stated, "Waste from production areas may also contaminate groundwater; storage structures (including cement pits and ponds) can develop cracks, allowing waste to seep into the surrounding groundwater. Wells located close to production areas are also at risk of contamination from polluted runoff, as are wells near land application sites."[242]

Studies that have assessed the impacts of CAFOs on groundwater have found that groundwater can be contaminated by bacteria, antibiotic resistance genes, nitrate, veterinary pharmaceuticals, and steroid hormones. Several Illinois studies were conducted in the 1990s and early 2000s to determine if CAFOs were contaminating nearby groundwater. These studies indeed found evidence of seepage and one study reported contamination approximately 750 feet downstream from unlined hog lagoons.[243] Although construction standards have changed since these studies were done, subsequent studies do not appear to have been conducted to determine whether the current regulations are adequately protective of water quality. Another study took place in a karst region of southwestern Illinois and found that many of the most contaminated wells were shallow and located in areas with livestock.[244] The wells located in livestock areas were usually contaminated with bacteria and the water chemistry was indicative of animal waste.

[239] James 10/16/2012 Testimony at 8.
[240] James 10/16/2012 Testimony at 7.
[241] TSD at 3.
[242] Leder 10/16/2012 Testimony at 4.
[243] Chee-Sanford et al. 2001 (Attachment 7).
[244] Kelly et al. 2009 (Attachment 8).

The Agency's proposed rule does not suggest any changes to the state's existing regulations governing the siting of newly constructed CAFOs from wells. The proposal also does not require that groundwater be monitored for contamination, but instead relies on the setbacks to be protective.[245] But when asked, the Agency could not provide a scientific basis for the existing setbacks.[246] The Environmental Protection Act requires a minimum 200 foot setback from existing community water supply wells or other potable water supply wells, and that setback increases to 400 feet if the community water supply well derives water from unconfined or highly permeable formations.[247] The Illinois studies call into question whether these distances are adequately protective, as did the pre-filed testimony of Mr. Donald Keefer. Mr. Keefer indicated that an 800 foot setback from private, large-diameter water wells would be adequate to protect wells from land-applied livestock waste contamination via macropores.[248] Although he was discussing land application fields and not waste storage areas, the transport mechanisms via macropores could be similar. Mr. Ken Turner, one of the public commentators at the Elizabeth hearing, expressed great concern about the likelihood of well contamination had the proposed Traditions Dairy been built near his home. According to Mr. Turner, the dairy's engineer predicted that the waste holding ponds would leak a little less than 1000 gallons/acre/day.[249] With CAFOs getting larger and storing increasingly more livestock waste, it is imperative that setbacks be large enough to prevent well contamination.

Protective setbacks are particularly important given that CAFOs are not routinely required to monitor groundwater. The only CAFOs required to conduct groundwater monitoring are those with lagoons located near aquifer material.[250] Consequently, only approximately 13 CAFOs in Illinois must sample monitoring wells on a quarterly basis. A baseline sample is collected before lagoons are placed in service, and subsequent samples are compared to the baseline to determine whether seepage may be occurring. The Environmental Groups examined the well monitoring data of 3 CAFOs and found evidence that at least one of those CAFOs with a lagoon built according to current construction standards may be contaminating the groundwater. Baseline sampling at Inwood Dairy found no detections of Fecal streptococcus, but several subsequent sampling events detected the pathogen.[251]

Several Midwest states have required facility siting setbacks from wells that are larger than the Illinois setbacks.

- In Wisconsin, barnyards and feedlots must be 250 feet from private wells and 1000 feet from community wells.[252]
- In Minnesota, new feedlots must be 1000 feet from community water supply wells serving children.[253]
- In Ohio, manure ponds or lagoons must be at least 300 feet from wells.[254]

[245] Trans. 8/21/2012 p. 132.
[246] Trans. 8/21/2012 pp. 130-131.
[247] 415 ILCS 5/14.2.
[248] Keefer 11/07/2012 Testimony at 3.
[249] 11/14/2012 PC #14 at 1.
[250] 35 IAC 506.204(d).
[251] Attachment 9.
[252] WI ADC s NR 243.15.
[253] Minn. R. pt. 7020.2005, Subp. 1.
[254] Ohio Admin. Code Ann. § 901:10-2-02(B)(1)(a).

- In Indiana, waste management systems must be 1000 feet from public water supply wells.[255]
- In Iowa, earthen manure structures or lagoons must be 1000 feet from shallow public wells and 400 feet from deep public wells or any type of private wells.[256]

The Environmental Groups' proposal would increase Illinois' existing well setbacks to 1000 feet from community water supply wells and 400 feet from other potable water supply wells. Such an increase would better ensure the protection of public health and bring Illinois' regulations into better alignment with other Midwest states.

3) There should be a CAFO siting setback from surface waters [35 IAC 501.402(h)]

New livestock facilities should be located no closer than 750 feet from surface waters and a quarter mile from designated surface water drinking supplies. A siting setback is needed to protect surface waters from becoming polluted by contaminated runoff and spills from livestock facilities. Numerous instances of production area discharges into nearby streams were established in the testimonies of Mr. Arnold Leder and Dr. Stacy James, and supported by the Agency in their pre-filed answers to the Environmental Groups pre-filed questions for the Springfield hearing. Mr. Leder stated that production areas should be isolated from surface waters and that the further back they are sited, the better.[257] He also said that having a buffer between production areas and surface waters allows space for livestock waste to be captured or soaked up before reaching the water. Dr. James cited one instance where a manure stream flowed 600 feet overland into a nearby stream, and found that some scientific studies conclude that over 1000 feet of setback may be needed to prevent production area discharges.[258]

The Agency proposal does not include a CAFO siting setback from surface waters, nor does one exist in Illinois' current regulations. Such an omission is serious given the numerous instances of production area discharges documented in Illinois. Daniel Heacock was incorrect in indicating that CAFOs must be constructed outside of the 10-year floodplain.[259] Instead, CAFOs located within a 10-year floodplain must only be protected against such flood.[260] The Livestock Management Facilities Act prohibits the siting of waste storage structures within the floodway of a 100-year floodplain.[261] However, many Illinois streams do not have the 100-year floodplain mapped. Even if there is a mapped floodway, discharges from production areas can still occur when a CAFO is outside of the floodway by virtue of gravity. Requiring CAFOs to locate outside of floodways just reduces the chance of them being flooded, but does not eliminate the potential for discharge.

Other Midwest states have seen the danger of allowing CAFOs to locate right next to surface waters.

[255] 327 Ind. Admin. Code 16-8-2.
[256] Iowa Admin. Code 65.
[257] Leder 10/16/2012 Testimony at 5.
[258] James 10/16/2012 Testimony at 4.
[259] Trans. 8/21/2012 p. 123.
[260] 35 IAC 501.402(b).
[261] 510 ILCS 77/13.

- Minnesota feedlots must be 300 feet from streams and rivers and 1000 feet from lakes and ponds.[262]
- In Iowa, CAFOs must be 500 feet from a water source and 2500 feet from designated wetlands.[263]
- In Ohio, manure ponds and lagoons must be 1500 feet from surface water intakes,[264] 300 feet from streams, and 600 feet from streams if a major CAFO, unless additional design criteria are used and approved.[265]
- In Indiana, waste management systems must be 1000 feet from public water supply surface intake structures and 300 feet from waters of the state.[266]

Creating a CAFO siting setback from surface waters would bring Illinois into alignment with other Midwest states while better ensuring that drinking water supplies and recreational waters are safe for the public to use. The establishment of a 750 foot setback from surface waters and increasing that setback to a quarter mile for drinking water supplies will reduce the instances of production area discharges reaching and polluting water.

4) Surface drinking water supplies and high quality surface waters need extra protection from land-applied livestock waste [35 IAC 502.645(f)]

Biologically significant streams, outstanding resource waters, and designated surface drinking water supplies should be protected by a 500-foot land application setback. Biologically significant streams (classified by Illinois Department of Natural Resources) and outstanding resource waters (designated by Illinois Pollution Control Board) represent the highest quality, least disturbed surface waters in the state. If they are not protected from polluted agricultural runoff, they will degrade over time and Illinois will lose its best aquatic resources. Likewise, designated drinking water supplies need to be kept free of bacteria and nitrates from livestock waste so that the water is safe to drink and does not require expensive treatment.

The Agency proposal includes a 200-foot land application setback from all surface waters. However, the Agency acknowledges that, "Overland flow of livestock waste has been observed entering surface waters several hundred feet from the edge of a field where land application occurred."[267] In her testimony, Dr. Stacy James cited a complaint filed by the State of Illinois against a swine facility where there was evidence of a discharge travelling at least a quarter mile from the land application site.[268] She also pointed out that applying waste close to streams can be dangerous due to equipment failures that can result in high volumes of waste far in excess of normal application rates pooling and potentially running off the field.[269] Unfortunately, it is a reality that pumping equipment is often left unattended for hours at a time, during which much damage can occur if there is a leak. Dr. James went on to discuss several studies that found

[262] Minn. R. pt. 7020.0300, Subp. 21.
[263] Iowa Code Ann. § 459.310.
[264] Ohio Admin. Code Ann. § 901:10-2-02(B)(2)(b).
[265] Ohio Admin. Code Ann. § 901:10-2-02(B)(1), 910:10-2-02(B)(2).
[266] 327 Ind. Admin. Code 16-8-2.
[267] 8/14/2012 Attachment 5 (Answers to Prefiled Questions From Environmental Groups directed to Dan Heacock) at 4.
[268] James 10/16/2012 Testimony at 5.
[269] James 10/16/2012 Testimony at 5.

evidence CAFOs had polluted streams near application areas.[270] She also reported that several states have larger setbacks than 200 feet to protect certain aquatic resources.[271] Given there have been documented cases of land-applied livestock waste contaminating streams located more than 200 feet from the land application site, the setback distance should be increased to 500 feet in the case of high quality waters and drinking water supplies.

IV. States that require permits for "unpermitted" Large CAFOs

At the November 14, 2012 hearing Board Member Carrie Zalewski inquired into whether there is an exhaustive list of states that require permits of all CAFOs.[272] The Environmental Groups conducted a review of state NPDES programs in response to this inquiry. It was found difficult to compile an exhaustive and accurate list of all of the states requiring NPDES permits of all large CAFOs because a number of states are in the process of revising their regulations. Further, many states use their NPDES regulations as just one part of their CAFO program and supplement these requirements with additional provisions.

Many states administer a state NPDES CAFO program with some other state permit, license, or authorization program. Typically, this additional state authorization consists of a construction or operating permit program. Many have non-NPDES operating permits and some have non-NPDES construction permits or a combination of both. Hence, we found a number of states that required NPDES permits of CAFOs that discharge, but also had similar permitting program requirements for non-discharging CAFOs under different state permits (i.e., submittal of nutrient management plans for agency review prior to commencing operations, regular monitoring and reporting requirements, etc.).

In focusing on the states that use NPDES permits as a primary means of regulating CAFOs under their delegated Clean Water Act programs, we found a number of states requiring NPDES permits of all Large CAFOs regardless of their discharge status. To our knowledge, a majority of these states do not have plans to revise or change their regulations despite less stringent permit duty to apply requirements now in place on the federal level. These states include Delaware,[273] Pennsylvania,[274] Wisconsin,[275] Michigan,[276] Kansas,[277] Arizona,[278] Texas,[279] and South Dakota.[280] Many of these states adopted the 2003 federal CAFO Rule "duty to apply" standards for Large CAFOs and have elected to keep them in place despite subsequent changes to federal permitting requirements since 2003 or have otherwise established regulatory presumptions that large CAFOs by virtue of their size require NPDES permits to control their pollution.

[270] James 10/16/2012 Testimony at 6.
[271] James 10/16/2012 Testimony at 6.
[272] Zalewski, 11/14/12 TR at 110: 7-10.
[273] 7 Del. Admin. Code 7201- 9.5.3
[274] 25 Pa. Code §92a.29
[275] Wis. Admn. Code § NR 243.12
[276] MI ADC R 323.2196
[277] Kan. Admin. Regs. § 28.18 (2008)
[278] Ariz. Admin. Code § 18-9-D902 (2004)
[279] 30 Tex. Admin. Code § 321.36 (2006)
[280] S.D. Admin. R. 74:52:01:05 (2003) and 74:52:02:22 (2003)

It should be noted that there are a number of other states that have adopted the 2008 federal CAFO Rule "duty to apply" requirements, which require CAFOs that discharge or "propose to discharge," to have NPDES permits. We did not include these states in the above list even though the 2008 "duty to apply" requirement is more stringent than current federal requirements. And again, many states have additional state regulatory permitting requirements for large CAFOs despite their discharge status that go beyond federal permitting requirements; however, we focused our review on those programs that primarily regulate all large CAFOs with NPDES permits strictly based on their size and not their discharge status.

A. Is there a distinction between states issuing permits to only discharging large CAFOs or those issuing permits to all non-discharging large CAFOs?

At the November 14, 2012 hearing, Board Member Jennifer Burke inquired as to whether there is a distinction between states issuing permits only to large "discharging CAFOs" verses those issuing permits to all Large "non-discharging CAFOs."[281] As noted above, there are numerous states that regulate all CAFOs under their state NPDES permitting programs, regardless of their discharge status. The only notable distinction we found among these states in comparison to states that have elected to adopt current federal CAFO permitting requirements verbatim (i.e., CAFOs that discharge) is that many of these states established regulatory presumptions that all Large CAFOs discharge by virtue of their size or their state statutes had stated policies to prevent pollution from CAFOs or otherwise granted their state agencies the authority to regulate risks of water pollution through their Clean Water Act permitting programs.

For example, Michigan has regulations that require CAFOs to apply for permits regardless of whether the CAFO actually discharges. In Michigan, "[a]ll CAFO owners or operators shall apply either for an individual NPDES permit, or a certificate of coverage under an NPDES general permit[.]"[282] The only exception to the Michigan rule is "for CAFO owners and operators who have 'received a determination from the department, made after providing notice and opportunity for public comment, that the CAFO has 'no potential to discharge[.]'"[283]

The delegated state agency in Michigan (DEQ) has this authority under the state's Environmental Protection Act as follows:

> DEQ has the duty to 'protect and conserve the water resources of the state,' MCL § 324.3103(1), and to 'take all appropriate steps to prevent any pollution the [DEQ] considers to be unreasonable and against public interest in view of the existing conditions in any ... waters of the state,' MCL § 324. 3106." [284]

A Michigan Appellate Court has made it clear that the discharge status of a CAFO is irrelevant in terms of the duty to apply for a permit, explaining "[u]nlike the provisions of the Clean Water Act examined in Waterkeeper, these statutory duties do not speak of 'discharges' at all; nor do

[281] Burke, 11/14/12 TR at 140.
[282] MI ADC R. 323.2196(1)(b).
[283] Michigan Farm Bureau v. Dep't of Envtl. Quality, 292 Mich. App. 106, 113, 807 N.W.2d 866, 874 (2011), citing MI ADC R. 323.2196(1)(b).
[284] Michigan Farm Bureau v. Dep't of Envtl. Quality, 292 Mich. App. 106, 134-35, 807 N.W.2d 866, 886 (2011).

they implicate only present or actual pollution." [285] Also, "the duty to 'take all appropriate steps to prevent any pollution the [DEQ] considers to be unreasonable and against public interest,' (emphasis added), clearly grants the DEQ authority to forestall potential pollution even before any discharge of pollutants ever occurs." [286]

DEQ considered the number of CAFOs discharging pollutants and "concluded that it was reasonable and necessary to require all CAFOs to seek and obtain an NPDES permit or to satisfactorily demonstrate that they have no potential to discharge."[287] Based on the legislative intent and purpose of Michigan's Environmental Protection Act, DEQ properly promulgated regulations requiring CAFOs to apply for permits in order to "prevent any pollution" to the waters of the state.[288]

B. Is Wisconsin's WPDES permit issued under an NPDES-delegated program?

At the November 14, 2012 hearing, Board Member Jennifer Burke specifically asked David Trainor whether "Wisconsin's permit is issued under an NPDES delegated program under the Clean Water Act or if it's some other type of state permit."[289] The Environmental Groups researched this issue and found the permit is in fact issued under the state's delegated NPDES program.

The Wisconsin legislature set forth the policy and purpose of the state's Wisconsin Pollution Discharge Elimination System (WPDES) program under Wisconsin Stat. § 283.001 (1) recognizing that,

> [u]nabated pollution of the waters of this state continues to...endanger public health; to threaten fish and aquatic life, scenic and ecological values; and to limit the domestic, municipal, recreational, industrial, agricultural and other uses of water. It is the policy of this state to restore and maintain the chemical, physical, and biological integrity of its waters to protect public health, safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, agricultural, and other uses of water.[290]

The legislature granted the Wisconsin Department of Natural Resources (WDNR) "all authority necessary to establish, administer and maintain a state pollutant discharge elimination system to effectuate the policy set forth under sub. (1) and consistent with all the requirements of the federal water pollution control act."[291] It has been held that these sections of Wisconsin's enabling statute authorize the WDNR to implement a permit program that protects both ground

[285] Michigan Farm Bureau v. Dep't of Envtl. Quality, 292 Mich. App. 106, 134-35, 807 N.W.2d 866, 886 (2011).
[286] Michigan Farm Bureau v. Dep't of Envtl. Quality, 292 Mich. App. 106, 134-35, 807 N.W.2d 866, 886 (2011), citing MCL §324.3106.
[287] Id. at 143.
[288] MCL § 324.3106.
[289] Burke, 11/14/12 TR at 140:7-13.
[290] Wisconsin Stat. § 283.001(1).
[291] Wis. Stat. § 283.001(2).

water and surface water and that the state's regulatory program is broader and more stringent than the federal regulatory program.[292]

In Wisconsin, all CAFOs with 1000 or more animal units are required to have WPDES permits.[293] Such permits must be applied for 12 months prior to becoming a CAFO.[294]

In a case challenging the authority of the WDNR to require more stringent NPDES permitting requirements for CAFOs than federal regulations, it was found that the state statute and regulation were consistent with the overall legislative goal to "restore and maintain the .... integrity of [the state's] waters."[295] While the CAFO challenging the requirements argued that the state's rules had a uniformity provision relating to point source discharges making it so the state was to "comply with and not exceed the requirements of the federal water pollution control act,"[296] the Court concluded that in the context of regulating CAFOs, the broad grant of authority contained in the enabling statute was not limited by the uniformity provision cited by the CAFO.

In summary, to respond to Board Member Burke's question, Wisconsin's permit is issued under an NPDES delegated program under the Clean Water Act and, while it is more stringent and regulates a greater universe of CAFOs than current federal regulations, it has withstood legal challenge. It should be noted that the enabling statute for Wisconsin's permitting program is not dissimilar to Illinois.'[297] Nor is Michigan's.[298]

V. The Board Needs to Adopt Technical Standards, Not Rely on Existing Programs

Throughout this proceeding, agricultural interests have declared that existing regulations are adequate to protect water quality. No evidence has been provided to support the contention that the IEPA proposed regulations would "have no verifiable impact on water quality."[299] Illinois' widespread water quality impairments and other documented water pollution problems show that the status quo is not working for Illinois.[300]

Existing regulations, such as the LMFA and voluntary programs like Comprehensive Nutrient Management Plans (CNMPs) for the United States Department of Agriculture, Natural Resources Conservation Service (NRCS) were created for different purposes and do not accomplish the purposes required by the federal rule, the NPDES program or the Illinois Environmental Protection Act.

[292] Maple Leaf Farms, Inc. v. State, Dept. of Natural Resources (App. 2001) 633 N.W.2d 720, 247 Wis.2d 96, review denied 635 N.W.2d 782, 247 Wis.2d 1034.
[293] Wis. Adm. Code s NR 243.12.
[294] Wis. Adm. Code s NR 243.12(1)(a)
[295] Maple Leaf Farms, Inc. v. State, Dept. of Natural Resources (App. 2001) 633 N.W.2d 720, 247 Wis.2d 96, review denied 635 N.W.2d 782, 247 Wis.2d 1034.
[296] Wis. Stat. § 283.11(2).
[297] See 415 ILCS § 5/11(b), (c).
[298] MCLA § 324.3106.
[299] Funk, Tr. 10/23/12, p. 42-45.
[300] See discussion above in Section II.

A. LMFA

Under the LMFA, facilities with 1000 animal units or more must prepare and maintain a Waste Management Plan (WMP).[301] The Agricultural Coalition has asked the Board to consider the WMPs as the technical standards necessary for unpermitted Large CAFOs to qualify for the agricultural stormwater exemption under the Clean Water Act. However, the LMFA was not written with the intent to ensure Clean Water Act compliance. To the contrary, the LMFA specifically states that facilities have an independent obligation to comply with the Illinois Environmental Protection Act.[302]

In order for Illinois' technical standards to meet the federal requirements, the technical standards that qualify a facility for the agricultural stormwater exemption must ensure appropriate agricultural utilization of the nutrients in livestock waste.[303] The proposed technical standards were developed with an awareness of LMFA requirements, but include a number of important improvements in order to meet the specific charge of protecting water quality and complying with federal law.[304]

Table 1 of Dr. James' November 7, 2012 prefiled testimony details the many shortcomings of the LMFA as compared to the technical standards proposed by IEPA in this rulemaking.[305] Some of the most critical provisions include restrictions on waste application when soil phosphorus reaches the very high threshold of 400 lbs/acre, when precipitation is forecast, or when ground is frozen or snow-covered.[306] Similarly, the proposed technical standards contain at least seven important provisions pertaining to production area management practices, while, by contrast, the LMFA only contains standards for land application in its WMP.[307] Even the definition of a "large CAFO" that might be subject to the plan differs between the LMFA and the federal NPDES rules, meaning that not all facilities that would need to comply with the NPDES regulations are required to create a WMP.[308] In short, the LMFA WMP is not equivalent to the proposed IEPA technical standards, and for good reason.

Another important difference between the implementation of the LMFA, the IEPA Proposal and the requirements of the Clean Water Act is that there is not adequate oversight regarding WMPs in the LMFA program. The Department of Agriculture does not conduct compliance checks to determine whether facilities have and are following WMP unless a complaint has been filed.[309] Only facilities with over 5000 animal units are required to submit WMPs to the Department of Agriculture, and consequently no one has been able to submit into the record an estimate of how many facilities have WMPs.[310] Per IEPA's proposal, at least permitted CAFOs must submit their NMPs to the Agency for review. The LMFA is simply not an example of a regulatory program that is working for clean water in Illinois.

[301] James Prefiled Testimony 10/16/12, p. 12.
[302] See, e.g., 510 ILCS 77/20 (a).
[303] James Prefiled Testimony 10/16/12 p. 13.
[304] James Prefiled Testimony 10/16/12 p. 13.
[305] James Testimony 11/7/12. p. 3-6.
[306] James Prefiled Testimony 10/16/12 p. 13. See also, Funk, Tr. 10/23/12, p. 27-28.
[307] James Testimony 11/7/12. p. 2.
[308] Funk, Tr. 10/23/12, p. 115-117.
[309] James Testimony 11/7/12. p. 3.
[310] Funk, Tr. 10/23/12, p. 25. See also James Prefiled Testimony 10/16/12 p. 13.

B. CNMP

NRCS has a program that requires some facilities to develop CNMPs in order to qualify for federal farm subsidies.[311] The Illinois NRCS CNMP Criteria address nutrient transport potential from land application areas[312] and consider many factors of an operation's existing facilities and desired goals.[313] The CNMP process is not meant to stand independent of the technical standards established by a state; in fact, the CNMP specifically requires a facility to abide by state rules.[314]

Environmental Groups opine that the CNMP process is indeed comprehensive, and we could live with a rule that allowed unpermitted facilities that have developed a CNMP to qualify for the agricultural stormwater exemption. However, that does not mean that existence of the CNMP program can stand in the place of proper technical standards for production and land application areas (developed by IEPA, with our proposed amendments) for large unpermitted CAFOs. The CNMP is a voluntary program that is rather complex and expensive,[315] so adoption of CNMPs is not widespread across the industry. The Board cannot, as the Agricultural Coalition suggests, decline to adopt the necessary technical standards on the basis that facilities might choose to pursue a CNMP to qualify for federal subsidies or other benefits.

VI. The Rules Proposed By IEPA and Environmental Groups are Economically Reasonable

The Environmental Proposal and IEPA's proposed CAFO rules are both economically reasonable and should have no significant financial effect on Illinois CAFO operators or on the livestock industry in Illinois.

Dr. John Ikerd, an agricultural economist and specialist in livestock marketing, examined the economic impacts of IEPA's proposed CAFO rules and the Environmental Proposal on the livestock industry in Illinois using a US EPA assessment entitled, Economic Analysis of the Final Revisions to the National Pollutant Discharge Elimination System Regulation and the Effluent Guidelines for Concentrated Animal Feeding Operations (USEPA Report) in which USEPA assessed the economic impacts of its 2003 CAFO Rule.[316] The economic assessment conducted by USEPA of its 2003 CAFO Rule was used by IEPA as the basis for its own assessment of the economic impacts of IEPA's proposed CAFO rule on Illinois livestock producers and the Illinois economy in general.[317]

In its report, USEPA assessed a CAFO rule that required all CAFOs to obtain a NPDES permit. In this assessment, US EPA also assumed that all CAFOs would be subject to the same land application technical standards. As such, the USEPA Report is an ideal tool for assessing the economic impact of the Environmental Proposal as well as IEPA's proposal, though any impacts found by US EPA would necessarily be overstated when applied to IEPA's proposal given that

[311] Funk, Tr. 10/23/12, p. 37.
[312] Funk, Tr. 10/23/12 p. 17.
[313] Funk, Tr. 10/23/12, p. 37-38.
[314] Funk, Tr. 10/23/12, p. 98.
[315] Funk, Tr. 10/23/12, p. 40-42.
[316] PC #16, Attach. 3.
[317] PC #16, p.1; SOR, pp. 86-89.

IEPA's proposed regulations would subject very few CAFOs to permitting requirements or to land application technical standards.[318]

According to USEPA, the 2003 CAFO Rule could be implemented by 83% of all CAFOs without any significant financial effects.[319] Applying the US EPA findings to Illinois, Dr. Ikerd concludes that at most, 25 CAFOs in Illinois would experience financial stress from complying with the Environmental Proposal, and even fewer would experience financial stress from complying with the IEPA CAFO Rules due to the more lax standards in that proposal.[320]

According to Dr. Ikerd, given US EPA's finding that its regulations would have an even smaller economic impact on new CAFOs, "there is no reason to believe the IEPA CAFO Rules will be an obstacle to the establishment of new CAFOs or a threat to existing producers or to the future of animal agriculture in Illinois."[321]

Dr. Ikerd also used the USEPA report to assess impacts on production levels and retail prices of livestock products in Illinois and found that the impact on the overall production and prices of meat, milk, and eggs would be so small as to be negligible. For instance, USEPA estimated 0.1% of beef and 0.2% of dairy production quantity changes post-compliance, with no estimated changes in production of hogs, broilers, layers or turkeys, and found increases in production-level prices of less than "one-half of one percent" for beef, dairy, hogs, broilers, eggs, and turkeys. Production level price changes for beef and pork were estimated at less than one-twentieth of one percent. [322]

Both the Environmental Proposal and IEPA's proposal are economically reasonable and protective of the Illinois livestock industry. Despite protests to the contrary,

> there is nothing to indicate that the IEPA CAFO Rules or the Environmental Proposal would have a significant financial impact on Illinois CAFO operators or on the livestock industry of Illinois. The important point is that under neither regulatory scheme, would implementation of new CAFO regulations have a significant impact on the overall livestock industry of Illinois. [323]

Notably, Dr. Ikerd concludes that while USEPA's economic projections rightly found that the proposed 2003 CAFO regulations would have had a minimal cost impact on livestock producers and consumers, the economic benefits were not fully accounted for. USEPA did not include the non-monetized benefits into their economic calculations, such as reduced pathogen contamination in private and public drinking water supplies and associated treatment costs and lessened health risks from fewer pollution discharge events, etc. Dr. Ikerd surmises that in considering these non-monetized benefits, the costs are far outweighed by the economic benefits of implementing effective regulations.

[318] PC#16, p. 2.
[319] PC #16, p. 2.
[320] PC#16, p. 2.
[321] PC#16, p. 3.
[322] PC#16, p. 3.
[323] PC #16, p. 4.

VII. CONCLUSION

Environmental Groups respectfully request the Board to adopt the IEPA proposal, as modified by the Environmental Groups' Proposal in Attachment 2.[324] As the record shows, these regulations are economically reasonable, technically achievable, and are necessary to protect Illinois water quality and comply with state and federal law.

Dated: January 16, 2013

Respectfully Submitted,

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[324] Environmental Groups also ask the Board to reject the amendments proposed by the Agricultural Coalition, as explained in the Response to Agricultural Coalition's Motion Proposing Changes to the IEPA Proposed Rules, also filed today.

Attachment 1:

Detailed summaries of significant enforcement cases

DISCHARGE FROM POINT SOURCE WITHOUT NPDES PERMIT[1]

Bradshaw Enterprises, LLC (1 of 2) - January 26, 2007
ORDER: 2006 WL 3485163 (Ill.Pol.Control.Bd.)
http://www.epa.state.il.us/cgi-bin/en/orders/orders.pl
Docket #: PCB 07-35

Attorney General filed a three (3) count complaint on November 14, 2006. Bradshaw Enterprises is a 1,000 head sow farrow-to-wean hog production facility in Clark County. The complaint alleged a 2003 waste release and fish kill to an unnamed tributary of Mount Branch, which leads to Embarrass River.

The order stipulated that Bradshaw violated Illinois law in the following ways:
(1) caused or allowed water pollution; (2) created a water pollution hazard; (3) violated water quality standards for total ammonia nitrogen and caused offensive conditions via a release of waste from point source without an NPDES permit.

Bradshaw agreed to pay a civil penalty of $3,500. Bradshaw was also ordered to replace the irrigation system used to land apply waste at the facility. The cost of compliance was $93,000.

Violated Sections:

- 415 ILCS 5/12(a); (d); (f)
- 35 Ill. Adm. Code 302.203; 302.212(a); 501.405

***Bradshaw Enterprises, LLC (2 of 2) -** June 1, 2012
ORDER: http://www.epa.state.il.us/cgi-bin/en/orders/orders.pl
Docket #: PCB 07-35

Attorney General filed a four (4) count complaint on August 19, 2011 against Bradshaw Enterprises, LLC concerning a different facility. At the time of filing, Bradshaw also operated a 2,300 head swine facility in Douglas County. Bradshaw allegedly polluted Brushy Fork Creek, which leads to Embarrass River from their seeping, lagoon that was inadequately kept and lacking freeboard.

The order stipulated that Bradshaw violated IL law in the following ways:
(1) caused or allowed discharge to a waterway so as to cause injury to public health or life; (2) caused or allowed contaminants to be deposited on land so as to create water pollution hazard; (3) caused or allowed discharge of livestock waste from a livestock waste handling, storage, and containment system without NPDES permit; (4) failed to keep facility's lagoon berms impermeable or sealed to prevent groundwater and surface water pollution, failed to provide appropriate and adequate waste storage and maintain waste levels to prevent discharge, and failed to report release of livestock waste within 24 hours.

Bradshaw was ordered to pay a civil penalty of $8,500. Bradshaw was also ordered to repair and seal the lagoon berm responsible for the seepage, retain an engineer to review and inspect livestock waste system, to raise the elevation of the lagoon's perimeter, and establish and maintain vegetation surrounding the lagoon structure. Bradshaw was also ordered to continue to maintain at least two (2) feet of freeboard in the wastewater lagoon, upgrade the design of the facility's compost structure, and to monitor and record said levels of freeboard. Bradshaw was also made subject to NPDES permit requirements upon coverage date for the facility.

Violated sections:

- 45 ILCS 5/12(a); (d); (f)
- 35 Ill. Adm. Code 309.102(a), 501.404(c)(2)/(3), 580.105, 580.300

* *See also "Improper Lagoon System"*

[1] Asterisk (*) indicates the case shows up in more than one violation category

Dare Farms (1 of 2) – July 22, 2010
ORDER : [http://www.epa.state.il.us/cgi-bin/en/orders/orders.pl]
Docket #: 09-CH-30

Attorney General filed a two (2) count complaint on May 3, 2010. Phil Dare operates an 1800 meat cattle feedlot in Fulton County. Dare farms has since modified waste handling practice and lagoon system pursuant to a 2002 settlement. The order stipulated that Dare Farms violated IL law in the following ways:
(1) caused discharge/emission of contaminants in the air so as to cause air pollution for failing to employ adequate odor control methods on uncovered lagoon systems with no available freeboard or control of overflow due to rain; (2) failed to apply for NPDES permit and continued discharge of pollutant from a point source to a waterway (West Branch Copperas Creek) without a permit and failed to report overflow of waste onto the land within 24 hours.

Dare was ordered to install appropriate cover on the facility's lagoon to prevent odor dissemination, mow and maintain vegetation to a height of 6 inches maximum, and maintain at least 24 inches of freeboard in the lagoon at all times. Dare was also ordered to limit number of cattle to a 1000 head maximum and properly dispose. Dare was also ordered to divert all clean surface water away from livestock waste management system and to generate precipitation and freeboard records. The court also ordered Dare to scrape the concrete feedlot three (3) days per week and to apply manure by injection under the surface and submit manure application records quarterly. Dare was ordered to submit for an NPDES permit by September 2010.

*** Dare Farms (2 of 2)** – April 7, 2011
ORDER : [http://www.epa.state.il.us/cgi-bin/en/orders/orders.pl]
Docket #: 09-CH-30

Attorney General filed a two (2) count complaint on May 3, 2010 concerning the same facility in Fulton County. The order stipulated that Dare violated IL law in the following ways: (1) caused or allowed strong, persistent, and unreasonably offensive livestock odors to emanate from their site and failed to consider and incorporate adequate odor control methods and technology at their livestock management facility; and (2) caused or allowed the discharge of contaminants to waterways without an NPDES permit by: depositing contaminants on land in such a place and manner so as to create water pollution, failing to maintain adequate storage and maintain waste levels, and failing to report release of livestock waste overflow from a lagoon.

Dare was ordered to pay a civil penalty of $9,000. Dare was also ordered to maintain appropriate cover to prevent offensive odor, maintain 24 inches of freeboard, limit the number of cattle to a maximum of 1000, record and submit numbers of cattle weekly, generate and record precipitation and freeboard levels, scrape open concrete a minimum of three (3) days a week, inject all land applied manure into the soil, submit manure application records semi-annually, and install a Vegetative Environmental Buffer (VEB).

Violated Sections:

- 415 ILCS 5/9(a), 5/12(a), (d), (f)
- 35 Ill. Adm. Code 501.402(c)(3)

**See also 'Improper Lagoon System'*

*** Durkee Swine Farm**
ORDER: 2011 WL 2475170 (Ill.Pol.Control.Bd.)
[http://www.epa.state.il.us/cgi-bin/en/orders/orders.pl]
Docket #: PCB 09-35

Four (4) count complaint was filed on November 25, 2008 by the Attorney General. Alan Durkee operates a 2,200 head swine farm in Henderson County. The case was settled without a hearing. The order stipulated that Durkee Swine Farm violated IL law in the following ways:

(1) caused or threatened discharge of contaminants to State waters [Middle Creek] so as to cause water pollution in Illinois; (2) deposited pollutants on the land so as to create a water pollution hazard; (3) discharged livestock waste into waters without an NPDES permit; (4) land applied livestock waste over practical limits leading to water pollution; (5) improperly applied livestock waste to land so as to cause turbidity, discoloration, and odorous waters of an unnamed tributary of Middle Creek that led to fish kill.

After publication in the *Hancock-Henderson Quill*, the public did not request a hearing. Durkee agreed to pay a civil penalty of $5,500 by July 18, 2011 and to cease all violations.
Violated sections:

- 415 ILC 5/12(a); (d); (f)
- 35 Ill. Adm. Code 302.203, 309.102(a), 501.405

* *See also 'Improper Land Application Practices'*

*** Fehr Brothers Swine Farms**
COMPLAINT ONLY

Five(5) count complaint was filed on December 22, 2011 by the Attorney General. Kenneth Fehr owns multiple swine facilities that are operated by his four sons in Woodford County. There are 6000 pigs between the 4 facilities. The complaint alleged that Fehr Brothers violated IL law in the following ways:
(1) caused discharge to Panther Creek from both a point source and non-point source by: applying 400,000 gallons of manure to frozen land which thawed and led run off at 200 gallons per minute; [Neisler Facility] – pits exposed to elements, lagoon erosion, discharged from lagoons and caused runoff from decomposing livestock bodies; [Toby's Place] – pump failure led 6000 gallons of manure to be released on land and pooled; (2) deposited contaminants on land so as to threaten water pollution; (3) failed to apply for NPDES permit where it was eligible and discharging from point source; (4) caused offensive conditions in form of dark, odorous, turbid, foam in creek; (5) applied manure to frozen land, failed to maintain adequate freeboard in lagoon, failed to report manure release within 24 hours.
Violated Sections:
** See also: "Improper Land Application" and "Insufficient Lagoon System"*

*** Fragrant 40, LLC**
COMPLAINT ONLY

Attorney General filed six (6) count complaint on August 31, 2011. Fragrant 40 is a 4500 head swine finishing operation in Macoupin County, IL. Ronald and Jeff Seabaugh are the agent and operator of the facility respectively. They came under control of the facility when they purchased it in 2008. The complaint alleged that Fragrant 40 violated IL law in the following ways:

(1) willfully caused pollution to Taylor Creek for failure to properly maintain lagoon system [no freeboard markers, discharging seepage through culvert pipe directly to creek]; (2) willfully deposited pollution and livestock waste onto land so as to create a water pollution hazard through its proximity to Taylor Creek; (3) discharged pollutants from a point source (waste storage structures, lagoon system, land application fields) without NPDES permit after being instructed to obtain one; (4) caused discharge of contaminants that resulted in turbid, discolored, and offensive odor conditions in Taylor Creek; (5) failed to maintain adequately sealed storage pits, failed to provide adequate storage space for waste levels, failed to divert clean water from entering livestock waste storage structures; (6) caused or allowed strong, persistent and unreasonably offensive livestock odors to emanate from the site.
Violated Sections:

- 415 ILCS 5/12(a), (d), (f)

- 35 Ill. Adm. Code 309.102(a), 502.101, 502.104, 502.106
- 415 ILCS 5/9(a)

** See Also: "Improper Land Application" and "Insufficient Lagoon System"*

Fuhler

ORDER [http://www.epa.state.il.us/cgi-bin/en/orders/orders.pl] – October 15, 2006
Docket #: 05-CH-89

Attorney General filed a one (1) count complaint on December 28, 2005. James Fuhler operates a 200 cow dairy farm in Clinton County, IL. The order stipulated that Fuhler violated IL law in the following way:
(1) caused or allowed discharge of livestock waste to Lake Branch for failure to install proper runoff collection, vegetative buffers and stormwater diversion structures.

Fuhler constructed two additional waste pits for the facility feedlots and a buffer strip between the feedlot and the waterway. The cost of compliance was $170,030.89. 60% ($101,074) was covered by a federal grant. Fuhler was ordered to pay a $1,000 civil penalty.
Violated Sections:

- 415 ILCS 5/12(a), (d)
- 35 Ill. Adm. Code 501.403(a), 501.404(c)(4)(A)

*** Giertz Swine Farm**

ORDER: 2007 WL 4305449 (Ill.Pol.Control.Bd.)
Docket # - PCB 07-23

According to the complaint, respondent was in violation, in separate incidents on various specified dates occurring in March-April and in November 2004:
(1) By causing or allowing the discharge of livestock waste so as to cause or threaten water pollution and create a water pollution hazard and by failure to have in place appropriate diversion dikes and manure storage capacity, (2) By causing, allowing, or threatening the discharge of a contaminant without a permit under the National Pollutant Discharge Elimination System (NPDES), and; (3) By failing to timely report releases of livestock waste from a facility.

On October 26, 2007, the People and Giertz filed a stipulation and proposed settlement, accompanied by a request for relief from the hearing requirement of Section 3 1(c)(1) of the Act (415 ILCS 5/3 1(c)(1) (2006)). The Board provided notice of the stipulation, proposed settlement, and request for relief. The newspaper notice was published in the *Times Record* on October 31, 2007. The Board did not receive any requests for hearing. The Board grants the parties' request for relief from the hearing requirement. *See* 415 ILCS 5/31(c)(2) (2006); 35 Ill. Adm. Code 103.300(b). Giertz neither admits nor denies the alleged violations, but agrees to pay a civil penalty of $3,500. The Board accepts the stipulation and proposed settlement.
Violated sections:

- 415 ILCS 5/12(a), (d), (f); 5/4(h)
- 35 Ill. Adm. Code 501.403(a), 501.404(c)(4)(A), 309.102(a), 580.105

** See also "Insufficient Lagoon System"*

*** Randy Edumund Farms**
ORDER: 2007 WL 872187 (Ill.Pol.Control.Bd.)
Docket # - PCB 07-73

According to the complaint filed on March 15, 2007, the Illinois EPA conducted a field investigation of a report of a discharge of swine manure and fish kill in an unnamed tributary to Spring Creek in rural Henry County on November 10, 2003. At the time of the inspection, the stream was dark colored, turbid and odorous, smelling of swine manure, with numerous dead minnows.

The Illinois EPA inspectors tracked the discharge of swine manure to the Edmund facility. The complaint alleged that discharge resulted from run-off from the Edmund facility. The complaint also alleged that the Edmund facility had recently land applied liquid swine manure on a *small, steeply sloped cornfield* on the Edmund facility site. The alleged that the land applied waste had run-off from the land to surface waters. The complaint also alleged that feedlot runoff also occurred from various swine feedlots and a cattle lot at the facility.

Attorney General alleged that Respondent Edumund was also in violation by failing to have adequate diversion dikes, walls or curbs that would prevent surface waters from flowing through the animal feeding operations, and by failing to have structures in place that direct runoff to an appropriate disposal, holding or storage area.

The complaint also alleged that the facility failed to have adequate storage capacity in a liquid manure-holding tank, lagoon, holding pond, or any combination thereof so as not to cause water pollution as defined in the Act or applicable regulations.

The order stipulated that Respondent Edmund violated Section 12(a) of the Act, 415 ILCS 5/12(a)(2004), and 35 III. Adm. Code 501.404(c)(4)(A). The order also stipulated that Edumund did not have an NPDES permit for his waste dumping.

Edmund does not admit to the alleged violations, but upon the court's entry of the consent order, agreed to pay a civil penalty of $7,500.00. The consent order also required that Edmund continue rotating the location of his cattle feeding operations, conduct weekly inspections of his swine feeding areas to avoid contaminated run-off and excessive waste accumulation and shall record the results of such inspections, land apply by injection any liquid waste removed from the confinement hog facility, and adhere to the manure management plan and comprehensive nutrient management plan. The penalty of $7,500.00 was paid on February 9, 2007.

Violated sections:

- 415 ILCS 5/9(a); 5/12(a), (d), (f)
- 35 Ill. Adm. Code 306.102(a), 309.102(a), 501.403(a), 501.404(c), 501.405

** See also "Improper Land Application" and "Insufficient Lagoon System"*

*** Speckhart Swine Farm**
ORDER: 2009 WL 1103858 (Ill.Pol.Control.Bd.)
Docket # - PCB 09-56

On February 3, 2009, the Office of the Attorney General filed a three-count complaint against Brent Speckhart d/b/a Speckhart Swine Farm. The order stipulated that Speckhart violated IL law in the following ways:
(1) discharged livestock waste upon the land so as to allow contaminants to drain into waters of the state; (2) deposited livestock waste upon the land so as to create water pollution; (3) discharged contaminants into the waters of the state from a point source without a NPDES permit; (4) failed to maintain lagoon levels such that there was adequate storage capacity to prevent an overflow; and, by failing to take proper measures to handle the volume of waste in the facility's two-cell lagoon.

On February 3, 2009, the People and respondent filed a stipulation and proposed settlement, accompanied by a request for relief from the hearing requirement of Section 31(c)(1) of the Act (415 ILCS 5/31(c)(1) (2006)). The Board provided notice of the stipulation, proposed settlement, and request for relief. The newspaper notice was published in the *Quincy Herald-Whig* on February 7, 2009. The Board did not receive any requests for hearing. Brent Speckhart Swine Farm was ordered to pay a civil penalty of $7,000 for the alleged violations. Speckhard was also ordered to cease and desist from the alleged violations.

Violated sections:

- 415 ILCS 5/12(a), (d), (f)
- 35 Ill. Adm. Code 501.404(c)

** See also – "Improper Land Application" and "Insufficient Lagoon System"*

*** Strout Crossing**

ORDER: 2011 WL 4350923 (Ill.Pol.Control.Bd.) – September 8, 2011.

Docket #: PCB 12-28

Attorney General filed a six (6) count complaint on August 17, 2011. Jerry and Mark Webster operate Strout Crossing, a head sow operation in Pike County. The order stipulated that Strout Crossing violated IL law in the following ways:

(1) caused or allowed the discharge of swine waste so as to cause water pollution to Silkwood Creek; (2) deposited swine waste upon the land in proximity to Silkwood Creek when rain was imminent to create a water pollution hazard; (3) caused, threatened, or allowed the discharge of swine waste from a land application into Silkwood Creek without an NPDES permit; (4) applied swine waste to land so as to allow discharge resulting in unnatural color, odor, and turbidity of Silkwood Creek; (5) caused or allowed a point source discharge from swine waste that resulted in Silkwood Creek exhibiting the same odor, turbidity, and scum as the swine waste; and (6) applied swine waste on a steep slope and in in close proximity to surface waters during a time when rain was imminent.

A newspaper notice was published in *Pike Press* on October 5, 2011. No one requested a public hearing. Strout Crossing agreed to pay a civil penalty of $6,500, report all release of waste, request NPDES permit information from the EPA, properly apply livestock waste in the future, and cease from future violations.

Violated Sections:

- 415 ILCS 5/12(a), (d), (f)
- 35 Ill. Adm. Code 303.203, 304.106, 501.405, 502.103

*** Timmerman Farms**

ORDER: 2009 WL 6512084 (Ill.Pol.Control.Bd.)

Docket # - PCB 07-70

On September 1, 2004, the Illinois EPA conducted an inspection at the Timmerman Farms facility. The complaint alleged that the intersection of Highline Road and Drive-In Road contained water that was very dark in color discharging through the roadway culvert. The livestock waste was allegedly traced back to the Timmerman Farms site. The complaint alleged that on or before September 1, 2004, a lagoon on site had overflowed due to rainfall. On September 1, 2004, livestock building roofs on site did not have guttering or curbing to divert storm water away from the feedlot. On September 1, 2004, the single-stage lagoon on site had no freeboard, and livestock wastes were still discharging from the northwest corner of the lagoon. The complaint alleged that the adjacent farm field was saturated with livestock waste, and the waste was flowing into a ditch along the access road. The complaint also alleged that the ditch was discharging into the earthen swale that discharged into a roadside ditch on Drive-In Road. Also, on September 1, 2004 a lagoon on site had no freeboard, and as a result, livestock waste discharged from the northwest corner of the lagoon.

The complaint alleged that Timmerman Farms violated IL law in the following ways: (1) caused or allowed the discharge of contaminants so as to cause water pollution and so as to violate the Board's water quality standards for offensive conditions and dissolved oxygen; (2) caused or allowed the discharge of contaminants into waters of the State without a National Pollutant Discharge Elimination System (NPDES) permit; and (3) deposited contaminants upon the land in such a way as to create a water pollution hazard.

On October 30, 2009, the People and respondent filed an order and proposed settlement, accompanied by a request for relief from the hearing requirement of Section 31(c)(1) of the Act (415 ILCS 5/31(c)(1) (2008)). The Board provided notice of the stipulation, proposed settlement, and request for relief. Notice was published in *Breese Journal* on November 12, 2009. The Board did not receive any requests for hearing. Timmerman agreed to pay a civil penalty of $15,000.

Violated sections:

- 415 ILCS 5/12(a), (d), (f)
- 35 Ill. Adm. Code 302.203, 302.206, 309.102(a), 501.404(c)(3), 501.403

** See also: "Insufficient Lagoon System" and "Improper land application"*

IMPROPER LAND APPLICATION

Alton Irrigation, Inc.
ORDER: 2012 WL 753136 (Ill.Pol.Control.Bd.) – March 1, 2012
[http://www.epa.state.il.us/cgi-bin/en/orders/orders.pl]
Docket # - PCB 12-99

Attorney General filed a four (4) count complaint on January 3, 2012. Alton Irrigation, Inc. improperly applied livestock waste for the William DuBois Swine Farm located in Peoria County. The order stipulated that Alton violated IL law in the following ways: (1) caused or allowed discharge of swine waste from a land application field into water of the State so as to cause water pollution; (2) depositing contaminants upon land in such a place and manner so as to create a water pollution hazard; (3) conducting land application activity in such a way as to allow discharge of liquid sqine waste resulting in unnatural color, odor, and turbidity in the waterway [unnamed tributary of Spoon River; (4) caused or allowed discharge of liquid swine waste from the site into waters of the State so as to cause death of fish and aquatic life.

Notice of stipulation and proposed settlement was published in *The Peoria Journal* Star. No requests for a hearing were made. Alton agreed to pay a civil penalty of $10,000 and a donation of $1,062.22 to the Wildlife and Fish Fund for the reasonable value of fish destroyed. Alton was also ordered to cease and desist all application of waste to saturated soil and when precipitation is imminent and apparent.

Violated sections:

- 415 ILCS 5/12(a); (d)
- 415 ILCS 5/42(c)
- 35 Ill. Adm. Code 302.203

Todd Chandler AG, Inc.
ORDER: [http://www.epa.state.il.us/cgi-bin/en/orders/orders.pl]
Docket # - 09-CH-9

Attorney General filed a two (2) count complaint on August 19, 2009. Todd Chandler is president of Todd Chandler Ag, Inc. The facility in question is a 500 head cattle feedlot and a 1000 head swine feedlot in Henderson County. The order stipulated that Todd Chandler violated IL law in the following ways: (1) caused or allowed discharge of pollutants without an NPDES permit from uncontained manure and land application of contaminants near Henderson Creek; (2) caused or allowed unreasonably offensive livestock odors to emanate from their site so as to interfere with the enjoyment of their neighbors' properties.

Issued order requiring Chandler to remove all accumulated wastewater and manure, cease open burning of bales, collect and test samples from private wells and provide them to the EPA, and to document all prevented water conditions.

Violated sections:

- 415 ILCS 5/12(a); (d); (f); 5/42(d), (e); 5/43(a); 5/9(a)
- 35 Ill. Adm. Code 309.102, 501.404, 510.402

*** Durkee Swine Farm**
ORDER: 2011 WL 2475170 (Ill.Pol.Control.Bd.)
[http://www.epa.state.il.us/cgi-bin/en/orders/orders.pl]
Docket # - PCB 09-35

Four (4) count complaint was filed on November 25, 2008 by the Attorney General for improper handling of waste that occurred in 2007. Alan Durkee operates a 2,200 head swine farm in Henderson County. The case was settled without a hearing. Durkee swine farm violated IL law in the following ways: (1) caused or threatened discharge of contaminants to State waters [Middle Creek] so as to cause water pollution in Illinois; (2) deposited pollutants on the land so as to create a water pollution hazard; (3) discharged livestock waste into waters without an NPDES permit; (4) land applied livestock waste over practical limits leading to water pollution; (5) improperly applying livestock waste to land so as to cause turbidity, discoloration, and odorous waters of an unnamed tributary of Middle Creek that led to fish kill.

After publication in the *Hancock-Henderson Quill*, the public did not request a hearing. Durkee agreed to pay a civil penalty of $5,500 by July 18, 2011 and to cease all violations.

Violated sections:

- 415 ILC 5/12(a); (d); (f)
- 35 Ill. Adm. Code 302.203, 309.102(a), 501.405

** See also: "Discharge From a Point Source Without a Permit"*

*** Fehr Brothers Swine Farms**

COMPLAINT ONLY

Five(5) count complaint was filed on December 22, 2011 by the Attorney General. Kenneth Fehr owns multiple swine facilities that are operated by his four sons in Woodford County. There are 6000 pigs between the 4 facilities. The complaint alleged that Fehr Brothers violated IL law in the following ways:

(1) caused discharge to Panther Creek from both a point source and non-point source by: applying 400,000 gallons of manure to frozen land which thawed and led run off at 200 gallons per minute; [Neisler Facility] – pits exposed to elements, lagoon erosion, discharged from lagoons and caused runoff from decomposing livestock bodies; [Toby's Place] – pump failure led 6000 gallons of manure to be released on land and pooled; (2) deposited contaminants on land so as to threaten water pollution; (3) failed to apply for NPDES permit where it was eligible and discharging from point source; (4) caused offensive conditions in form of dark, odorous, turbid, foam in creek; (5) applied manure to frozen land, failed to maintain adequate freeboard in lagoon, failed to report manure release within 24 hours.

Violated Sections:

** See also: "Improper Land Application" and "Insufficient Lagoon System"*

*** Randy Edumund Farms**

ORDER: 2007 WL 872187 (Ill.Pol.Control.Bd.)

Docket # - PCB 07-73

According to the complaint filed on March 15, 2007, the Illinois EPA conducted a field investigation of a report of a discharge of swine manure and fish kill in an unnamed tributary to Spring Creek in rural Henry County on November 10, 2003. At the time of the inspection, the stream was dark colored, turbid and odorous, smelling of swine manure, with numerous dead minnows.

The Illinois EPA inspectors tracked the discharge of swine manure to the Edmund facility. The complaint alleged that discharge resulted from run-off from the Edmund facility. The complaint also alleged that the Edmund facility had recently land applied liquid swine manure on a *small, steeply sloped cornfield* on the Edmund facility site. The alleged that the land applied waste had run-off from the land to surface waters. The complaint also alleged that feedlot runoff also occurred from various swine feedlots and a cattle lot at the facility.

Attorney General alleged that Respondent Edumund was also in violation by failing to have adequate diversion dikes, walls or curbs that would prevent surface waters from flowing through the animal feeding operations, and by failing to have structures in place that direct runoff to an appropriate disposal, holding or storage area.

The complaint also alleged that the facility failed to have adequate storage capacity in a liquid manure-holding tank, lagoon, holding pond, or any combination thereof so as not to cause water pollution as defined in the Act or applicable regulations.

The order stipulated that Respondent Edmund violated Section 12(a) of the Act, 415 ILCS 5/12(a)(2004), and 35 III. Adm. Code 501.404(c)(4)(A). The order also stipulated that Edumund did not have an NPDES permit for his waste dumping.

Edmund does not admit to the alleged violations, but upon the court's entry of the consent order, agreed to pay a civil penalty of $7,500.00. The consent order also required that Edmund continue rotating the location of his cattle feeding operations, conduct weekly inspections of his swine feeding areas to avoid contaminated run-off and excessive waste accumulation and shall record the results of such inspections, land apply by injection any liquid waste removed from the confinement hog facility, and adhere to the manure management plan and comprehensive nutrient management plan. The penalty of $7,500.00 was paid on February 9, 2007.

Violated sections:

- 415 ILCS 5/9(a); 5/12(a), (d), (f)
- 35 Ill. Adm. Code 306.102(a), 309.102(a), 501.403(a), 501.404(c), 501.405

** See also "Discharge from a Point Source without a Permit" and "Insufficient Lagoon System"*

*** Northwest Illini Feedlots Corporation**

ORDER: 2012 WL 3732021 (Ill.Pol.Control.Bd.)

Docket # - PCB 12-133

According to the complaint, the respondent violated these provisions by allowing its livestock waste lagoon berm to fail and discharge waste water into waters of the State, by allowing livestock waste to be deposited on the ground through its lagoon dewatering process in such a manner to allow the pumped waste water to ultimately run off into Straddle Creek, by failing to comply with the Field Application of Livestock Waste provisions and discharge limitations of its National Pollutant Discharge Elimination System (NPDES) permit, by failing to employ adequate measures to prevent the discharge of livestock waste into waters of the State during adverse weather conditions and flooding, by failing to provide adequate curbing or other structures to divert clean storm water from entering its livestock lagoon, by failing to ensure that its livestock lagoon was impermeable or sealed to prevent surface water pollution, by failing to leave adequate capacity in its liquid livestock waste storage lagoon to prevent water pollution, by pumping the contents of its waste lagoon onto a nearby field in such a manner to allow some of the pumped water to ultimately drain into a ditch that discharges into Straddle Creek, and by failing to conduct the land application of livestock waste in such a manner as to minimize air pollution to neighboring farms or residences.

Northwest Illini Feedlots Corporation (Northwest) must pay a civil penalty of $6,500.00. Northwest also must cease and desist from future violations of the Environmental Protection Act and Board regulations that were the subject of the complaint.

Violated sections:

- 415 ILCS 5/9(a); 5/12(a), (d), (f)
- 35 Ill. Adm. Code 306.102(a), 309.102(a), 501.403(a), 501.404(c)(2), 501.405

** See also "Insufficient Livestock System"*

Murphy Farms PCB

ORDER: 2008 WL 2568511 (Ill.Pol.Control.Bd.)
Docket # - PCB 00-104

On June 18, 2002 a release of livestock waste was reported coming from the facility. The complaint alleged that the waste contaminated an unnamed tributary of French Creek. The waste allegedly came from over land application of the manure. The release of waste was reported by the Illinois Emergency Management Agency.

The People further alleged that respondents violated these provisions by causing or allowing the emission of offensive odors, and causing or allowing the discharge of livestock waste to a tributary of French Creek without a National Pollutant Discharge Elimination System (NPDES) permit so as to create water pollution.

The proposed stipulation does not contain a civil penalty but, Murphy Farms agrees to pay a "monetary payment" in the sum of $35,000 to the University of Illinois, College of Agriculture, Consumer and Environmental Sciences, for the school's Discovery Farms research project. Murphy Farms agrees not to and shall not violate the Environmental Protection Act and Board regulations that were the subject of the complaint.

Violated sections:

- 415 ILCS 5/9(a); 5/12(a), (d), (f)
- 35 Ill. Adm. Code 501.405(a)

*** Robert Miller, D/B/A Mil-R-Mor Farm**

Order: 2010 WL 2500708 (Ill.Pol.Control.Bd.)
Docket # - PCB 10-43

On December 15, 2009, the Office of the Attorney General filed a six (6) count complaint against Robert Miller, d/b/a Mil-R-Mor Farm. Mil-R-Mor is a 1,300 acre dairy farm, consisting of two separate parcels: 765 East Rock Grove Road, Orangeville, Stephenson County; and 1984 Hickory Grove Road, Dakota, Stephenson County. The order stipulated that the Farm violated IL law in the following ways:
(1) caused the discharge of manure and manure-containing runoff into a small tributary, so as to cause water pollution; (2) caused and allowed offensive conditions; (3) failed to provide adequate runoff structures at the Farm; (4) failed to construct a temporary manure stack; and (5) improperly placed livestock waste on soil.

The Farm neither admits nor denies the violations alleged in Counts II and V in the Complaint filed in this matter, and denies the violations alleged in Counts I, III, IV, and VI. Mil-R-Mor agreed to pay a civil penalty of $2,000. The stipulation also contained a detailed compliance plan, and provision for stipulated damages of $25.00 per day for failure to timely complete required actions.

Violated sections:

- 415 ILCS 5/12(a), (d)
- 35 Ill. Adm. Code 302.203, 501.403(a), 501.404(b)(1), 501.405(a)

**See also "Insufficient Lagoon System*"

*** Speckhart Swine Farm**

ORDER: 2009 WL 1103858 (Ill.Pol.Control.Bd.)
Docket # - PCB 09-56

On February 3, 2009, the Office of the Attorney General filed a three-count complaint against Brent Speckhart d/b/a Speckhart Swine Farm. The order stipulated that Speckhart violated IL law in the following ways:

(1) discharged livestock waste upon the land so as to allow contaminants to drain into waters of the state; (2) deposited livestock waste upon the land so as to create water pollution; (3) discharged contaminants into the waters of the state from a point source without a NPDES permit; (4) failed to maintain lagoon levels such that there was adequate storage capacity to prevent an overflow; and, by failing to take proper measures to handle the volume of waste in the facility's two-cell lagoon.

On February 3, 2009, the People and respondent filed a stipulation and proposed settlement, accompanied by a request for relief from the hearing requirement of Section 31(c)(1) of the Act (415 ILCS 5/31(c)(1) (2006)). The Board provided notice of the stipulation, proposed settlement, and request for relief. The newspaper notice was published in the *Quincy Herald-Whig* on February 7, 2009. The Board did not receive any requests for hearing. Brent Speckhart Swine Farm was ordered to pay a civil penalty of $7,000 for the alleged violations. Speckhard was also ordered to cease and desist from the alleged violations.

Violated sections:

- 415 ILCS 5/12(a), (d), (f)
- 35 Ill. Adm. Code 501.404(c)

** See also – "Improper Land Application" and "Insufficient Lagoon System"*

*** Strout Crossing**

ORDER: 2011 WL 4350923 (Ill.Pol.Control.Bd.) – September 8, 2011.
Docket #: PCB 12-28

Attorney General filed a six (6) count complaint on August 17, 2011. Jerry and Mark Webster operate Strout Crossing, a head sow operation in Pike County. The order stipulated that Strout Crossing violated IL law in the following ways:
(1) caused or allowed the discharge of swine waste so as to cause water pollution to Silkwood Creek; (2) deposited swine waste upon the land in proximity to Silkwood Creek when rain was imminent to create a water pollution hazard; (3) caused, threatened, or allowed the discharge of swine waste from a land application into Silkwood Creek without an NPDES permit; (4) applied swine waste to land so as to allow discharge resulting in unnatural color, odor, and turbidity of Silkwood Creek; (5) caused or allowed a point source discharge from swine waste that resulted in Silkwood Creek exhibiting the same odor, turbidity, and scum as the swine waste; and (6) applied swine waste on a steep slope and in in close proximity to surface waters during a time when rain was imminent.

A newspaper notice was published in *Pike Press* on October 5, 2011. No one requested a public hearing. Strout Crossing agreed to pay a civil penalty of $6,500, report all release of waste, request NPDES permit information from the EPA, properly apply livestock waste in the future, and cease from future violations.

Violated Sections:

- 415 ILCS 5/12(a), (d), (f)
- 35 Ill. Adm. Code 303.203, 304.106, 501.405, 502.103

*** Timmerman Farms**

ORDER: 2009 WL 6512084 (Ill.Pol.Control.Bd.)
Docket # - PCB 07-70

On September 1, 2004, the Illinois EPA conducted an inspection at the Timmerman Farms facility. The complaint alleged that the intersection of Highline Road and Drive-In Road contained water that was very dark in color discharging through the roadway culvert. The livestock waste was allegedly traced back to the Timmerman Farms site. The complaint alleged that on or before September 1, 2004, a lagoon on site had overflowed due to rainfall. On September 1, 2004, livestock building roofs on site did not have guttering or curbing to divert storm water away from the feedlot. On September 1, 2004, the single-stage lagoon on site had no freeboard, and livestock wastes were still discharging from the northwest corner of the lagoon. The complaint alleged that the adjacent farm field was saturated with livestock waste, and the waste was flowing into a ditch along the access road. The complaint also alleged that the ditch was discharging into the earthen swale that discharged into a roadside ditch on Drive-In Road. Also, on September 1, 2004 a lagoon on site had no freeboard, and as a result, livestock waste discharged from the northwest corner of the lagoon.

The complaint alleged that Timmerman Farms violated IL law in the following ways: (1) caused or allowed the discharge of contaminants so as to cause water pollution and so as to violate the Board's water quality standards for offensive conditions and dissolved oxygen; (2) caused or allowed the discharge of contaminants into waters of the State without a National Pollutant Discharge Elimination System (NPDES) permit; and (3) deposited contaminants upon the land in such a way as to create a water pollution hazard.

On October 30, 2009, the People and respondent filed an order and proposed settlement, accompanied by a request for relief from the hearing requirement of Section 31(c)(1) of the Act (415 ILCS 5/31(c)(1) (2008)). The Board provided notice of the stipulation, proposed settlement, and request for relief. Notice was published in *Breese Journal* on November 12, 2009. The Board did not receive any requests for hearing. Timmerman agreed to pay a civil penalty of $15,000.

<u>Violated sections:</u>

- 415 ILCS 5/12(a), (d), (f)
- 35 Ill. Adm. Code 302.203, 302.206, 309.102(a), 501.404(c)(3), 501.403

** See also: "Insufficient Lagoon System" and "Discharge from a Point Source without a Permit"*

INSUFFIENT LAGOON SYSTEM

***Bradshaw Enterprises, LLC (2 of 2) -** June 1, 2012
ORDER: http://www.epa.state.il.us/cgi-bin/en/orders/orders.pl
Docket #: PCB 07-35

Attorney General filed a four (4) count complaint on August 19, 2011 against Bradshaw Enterprises, LLC concerning a different facility. At the time of filing, Bradshaw also operated a 2,300 head swine facility in Douglas County. Bradshaw allegedly polluted Brushy Fork Creek, which leads to Embarrass River from their seeping, lagoon that was inadequately kept and lacking freeboard.

The order stipulated that Bradshaw violated IL law in the following ways:
(1) caused or allowed discharge to a waterway so as to cause injury to public health or life; (2) caused or allowed contaminants to be deposited on land so as to create water pollution hazard; (3) caused or allowed discharge of livestock waste from a livestock waste handling, storage, and containment system without NPDES permit; (4) failed to keep facility's lagoon berms impermeable or sealed to prevent groundwater and surface water pollution, failed to provide appropriate and adequate waste storage and maintain waste levels to prevent discharge, and failed to report release of livestock waste within 24 hours.

Bradshaw was ordered to pay a civil penalty of $8,500. Bradshaw was also ordered to repair and seal the lagoon berm responsible for the seepage, retain an engineer to review and inspect livestock waste system, to raise the elevation of the lagoon's perimeter, and establish and maintain vegetation surrounding the lagoon structure. Bradshaw was also ordered to continue to maintain at least two (2) feet of freeboard in the wastewater lagoon, upgrade the design of the facility's compost structure, and to monitor and record said levels of freeboard. Bradshaw was also made subject to NPDES permit requirements upon coverage date for the facility.

Violated sections:

- 45 ILCS 5/12(a); (d); (f)
- 35 Ill. Adm. Code 309.102(a), 501.404(c)(2)/(3), 580.105, 580.300

* *See also "Discharge From a Point Source without a Permit"*

*** Fehr Brothers Swine Farms**
COMPLAINT ONLY

Five(5) count complaint was filed on December 22, 2011 by the Attorney General. Kenneth Fehr owns multiple swine facilities that are operated by his four sons in Woodford County. There are 6000 pigs between the 4 facilities. The complaint alleged that Fehr Brothers violated IL law in the following ways:
(1) caused discharge to Panther Creek from both a point source and non-point source by: applying 400,000 gallons of manure to frozen land which thawed and led run off at 200 gallons per minute; [Neisler Facility] – pits exposed to elements, lagoon erosion, discharged from lagoons and caused runoff from decomposing livestock bodies; [Toby's Place] – pump failure led 6000 gallons of manure to be released on land and pooled; (2) deposited contaminants on land so as to threaten water pollution; (3) failed to apply for NPDES permit where it was eligible and discharging from point source; (4) caused offensive conditions in form of dark, odorous, turbid, foam in creek; (5) applied manure to frozen land, failed to maintain adequate freeboard in lagoon, failed to report manure release within 24 hours.

Violated Sections:

** See also: "Improper Land Application" and "Discharge from a Point Source without a Permit"*

*** Giertz Swine Farm**
ORDER: 2007 WL 4305449 (Ill.Pol.Control.Bd.)

Docket # - PCB 07-23

According to the complaint, respondent was in violation, in separate incidents on various specified dates occurring in March-April and in November 2004:
(1) By causing or allowing the discharge of livestock waste so as to cause or threaten water pollution and create a water pollution hazard and by failure to have in place appropriate diversion dikes and manure storage capacity, (2) By causing, allowing, or threatening the discharge of a contaminant without a permit under the National Pollutant Discharge Elimination System (NPDES), and; (3) By failing to timely report releases of livestock waste from a facility.

On October 26, 2007, the People and Giertz filed a stipulation and proposed settlement, accompanied by a request for relief from the hearing requirement of Section 3 1(c)(1) of the Act (415 ILCS 5/3 1(c)(1) (2006)). The Board provided notice of the stipulation, proposed settlement, and request for relief. The newspaper notice was published in the *Times Record* on October 31, 2007. The Board did not receive any requests for hearing. The Board grants the parties' request for relief from the hearing requirement. *See* 415 ILCS 5/31(c)(2) (2006); 35 Ill. Adm. Code 103.300(b). Giertz neither admits nor denies the alleged violations, but agrees to pay a civil penalty of $3,500. The Board accepts the stipulation and proposed settlement.

Violated sections:

- 415 ILCS 5/12(a), (d), (f); 5/4(h)
- 35 Ill. Adm. Code 501.403(a), 501.404(c)(4)(A), 309.102(a), 580.105

** See also "Discharge from a Point Source without a Permit"*

Pinnacle Genetics, LLC and Professional Swine Management LLC

ORDER: 2009 WL 926746 (Ill.Pol.Control.Bd.)

Docket # - PCB 07-29

On March 1, 2007, the Board adopted a stipulated settlement in Board Case number 07-29, concerning Pinnacle Genetics, LLC ("Genetics") and Professional Swine Management ("Professional"). Genetics and Professional jointly operate an 1800-head sow swine production facility. The State alleged that Pinnacle Genetics and Professional violated Sections 4(h), 9(a),(b), and (c), and 12(a),(d), and (f) of the Act and Sections 201.141., 237.102, 304.106, 309.102(a), 309.202, 501.402(c)(3), 501.404(b)(1) and 580.105 of the Board's rules, by causing or threatening water pollution and a water pollution hazard by improperly storing manure solids, conducting an unpermitted truck wash at the facility, improperly operating a hog carcass incinerator, open burning potentially infectious medical waste, and allowing wastewater and manure solids to enter waters of the State.

Pinnacle Genetics and Professional Swine Management (PSM) does not admit to the alleged violations, but upon the court's entry of the consent order, agrees to pay a civil penalty of $27,000.00 and to cease and desist from future violations of the Act and its regulations. The consent order also required Pinnacle Genetics and PSM to perform three supplemental environmental projects at the cost of $11,000 plus annual maintenance costs of approximately $1,500 to $2,000. The consent order further required Pinnacle Genetics and PSM to operate the facility in a manner so as not to cause a contaminated discharge or other leachate runoff from the site. Both Genetics and PSM must provide Illinois EPA with pre-hearing and burn temperature monitoring records for the incinerator, actual incinerator loading rates and completed incinerator operation log sheets, as well as general composting data for the 12-month period following the installation of the monitoring device. In the event of failure to timely comply as directed, Genetics and Professional agree to pay stipulated penalties of $100.00 per day per violation. The penalty was paid on March 14, 2007.

Violated sections:

- 415 ILCS 5/4(h); 9(a), (b), (c); 5/12(a), (d), (f)
- 35 Ill. Adm. Code 201.141, 237.102, 304.106, 309.102(a), 309.202, 237.102,

501.402(c)(3), 501.404(b)(1), 580.105

*** Northwest Illini Feedlots Corporation**
ORDER: 2012 WL 3732021 (Ill.Pol.Control.Bd.)
Docket # - PCB 12-133

According to the complaint, the respondent violated these provisions by allowing its livestock waste lagoon berm to fail and discharge waste water into waters of the State, by allowing livestock waste to be deposited on the ground through its lagoon dewatering process in such a manner to allow the pumped waste water to ultimately run off into Straddle Creek, by failing to comply with the Field Application of Livestock Waste provisions and discharge limitations of its National Pollutant Discharge Elimination System (NPDES) permit, by failing to employ adequate measures to prevent the discharge of livestock waste into waters of the State during adverse weather conditions and flooding, by failing to provide adequate curbing or other structures to divert clean storm water from entering its livestock lagoon, by failing to ensure that its livestock lagoon was impermeable or sealed to prevent surface water pollution, by failing to leave adequate capacity in its liquid livestock waste storage lagoon to prevent water pollution, by pumping the contents of its waste lagoon onto a nearby field in such a manner to allow some of the pumped water to ultimately drain into a ditch that discharges into Straddle Creek, and by failing to conduct the land application of livestock waste in such a manner as to minimize air pollution to neighboring farms or residences.

Northwest Illini Feedlots Corporation (Northwest) must pay a civil penalty of $6,500.00. Northwest also must cease and desist from future violations of the Environmental Protection Act and Board regulations that were the subject of the complaint.
Violated sections:

- 415 ILCS 5/9(a); 5/12(a), (d), (f)
- 35 Ill. Adm. Code 306.102(a), 309.102(a), 501.403(a), 501.404(c)(2), 501.405

** See also "Improper Land Application"*

*** Speckhart Swine Farm**
ORDER: 2009 WL 1103858 (Ill.Pol.Control.Bd.)
Docket # - PCB 09-56

On February 3, 2009, the Office of the Attorney General filed a three-count complaint against Brent Speckhart d/b/a Speckhart Swine Farm. The order stipulated that Speckhart violated IL law in the following ways:
(1) discharged livestock waste upon the land so as to allow contaminants to drain into waters of the state; (2) deposited livestock waste upon the land so as to create water pollution; (3) discharged contaminants into the waters of the state from a point source without a NPDES permit; (4) failed to maintain lagoon levels such that there was adequate storage capacity to prevent an overflow; and, by failing to take proper measures to handle the volume of waste in the facility's two-cell lagoon.

On February 3, 2009, the People and respondent filed a stipulation and proposed settlement, accompanied by a request for relief from the hearing requirement of Section 31(c)(1) of the Act (415 ILCS 5/31(c)(1) (2006)). The Board provided notice of the stipulation, proposed settlement, and request for relief. The newspaper notice was published in the *Quincy Herald-Whig* on February 7, 2009. The Board did not receive any requests for hearing. Brent Speckhart Swine Farm was ordered to pay a civil penalty of $7,000 for the alleged violations. Speckhard was also ordered to cease and desist from the alleged violations.
Violated sections:

- 415 ILCS 5/12(a), (d), (f)
- 35 Ill. Adm. Code 501.404(c)

** See also – "Improper Land Application" and "Insufficient Lagoon System"*

*** Randy Edumund Farms**

ORDER: 2007 WL 872187 (Ill.Pol.Control.Bd.)

Docket # - PCB 07-73

According to the complaint filed on March 15, 2007, the Illinois EPA conducted a field investigation of a report of a discharge of swine manure and fish kill in an unnamed tributary to Spring Creek in rural Henry County on November 10, 2003. At the time of the inspection, the stream was dark colored, turbid and odorous, smelling of swine manure, with numerous dead minnows.

The Illinois EPA inspectors tracked the discharge of swine manure to the Edmund facility. The complaint alleged that discharge resulted from run-off from the Edmund facility. The complaint also alleged that the Edmund facility had recently land applied liquid swine manure on a *small, steeply sloped cornfield* on the Edmund facility site. The alleged that the land applied waste had run-off from the land to surface waters. The complaint also alleged that feedlot runoff also occurred from various swine feedlots and a cattle lot at the facility.

Attorney General alleged that Respondent Edumund was also in violation by failing to have adequate diversion dikes, walls or curbs that would prevent surface waters from flowing through the animal feeding operations, and by failing to have structures in place that direct runoff to an appropriate disposal, holding or storage area.

The complaint also alleged that the facility failed to have adequate storage capacity in a liquid manure-holding tank, lagoon, holding pond, or any combination thereof so as not to cause water pollution as defined in the Act or applicable regulations.

The order stipulated that Respondent Edmund violated Section 12(a) of the Act, 415 ILCS 5/12(a)(2004), and 35 III. Adm. Code 501.404(c)(4)(A). The order also stipulated that Edumund did not have an NPDES permit for his waste dumping.

Edmund does not admit to the alleged violations, but upon the court's entry of the consent order, agreed to pay a civil penalty of $7,500.00. The consent order also required that Edmund continue rotating the location of his cattle feeding operations, conduct weekly inspections of his swine feeding areas to avoid contaminated run-off and excessive waste accumulation and shall record the results of such inspections, land apply by injection any liquid waste removed from the confinement hog facility, and adhere to the manure management plan and comprehensive nutrient management plan. The penalty of $7,500.00 was paid on February 9, 2007.

Violated sections:

- 415 ILCS 5/9(a); 5/12(a), (d), (f)
- 35 Ill. Adm. Code 306.102(a), 309.102(a), 501.403(a), 501.404(c), 501.405

** See also "Improper Land Application" and "Discharge from Point Source without a Permit"*

Attachment 2:

Environmental Groups' updated version of proposed rules

TITLE 35: ENVIRONMENTAL PROTECTION
SUBTITLE E: AGRICULTURE RELATED POLLUTION
CHAPTER I: POLLUTION CONTROL BOARD

PART 501
GENERAL PROVISIONS

SUBPART A: AUTHORITY AND POLICY

Section

SUBPART B: DEFINITIONS AND INCORPORATIONS

Section

501.263	Injection
501.265	Lagoon
501.267	Land Application Area
501.270	Leachate
501.274	Liquid Livestock Waste
501.275	Liquid Manure-Holding Tank
501.280	Livestock
501.285	Livestock Management Facility
501.290	Livestock Shelter
501.295	Livestock Waste
501.300	Livestock Waste-Handling Facility
~~501.301~~	~~Macropore~~
501.305	Man-made
501.310	Man-made Ditch
501.312	Manure
501.313	Manure Storage Area
501.315	Manure Storage Structure
501.317	Maximum Feasible Location
501.320	Modification
501.325	Navigable Waters (Repealed)
501.330	New Livestock Management Facility and New Livestock Waste-Handling Facility
501.333	New Source
501.335	NPDES
501.340	NPDES Permit
501.342	Non-farm Residence
501.343	Overflow
501.345	Owner /~~or~~ Operator
501.350	Person
501.355	Pollutant
501.356	Populated Area
501.357	Process Wastewater
501.358	Production Area
501.359	Raw Materials Storage Area
501.360	Saturated~~Settling Basin~~
501.363	Setbacks
501.365	Silvicultural Point Source
501.370	Standard of Performance
501.372	Supernatant
501.373	Surface Land Application
501.375	Temporary Manure Stack
501.377	Vegetative Buffer
501.378	Vegetative Fence Row
501.379	Waste Containment Area
501.380	Water Pollution
501.385	Wet Lot

SUBPART C: OPERATIONAL RULES FOR ALL LIVESTOCK MANAGEMENT FACILITIES AND LIVESTOCK WASTE-HANDLING FACILITIES

SUBPART D: SUBMITTAL OF INFORMATION

AUTHORITY: Implementing and authorized by Sections 9, 12, 13, 21, 22 and 27 of the Environmental Protection Act [415 ILCS 5/9, 5/12, 5/13, 5/21, 5/22 and 5/27]~~(Ill. Rev. Stat. 1989, ch. 111 1/2, pars. 1009, 1012, 1013, 1021, 1022 and 1027)~~.

SOURCE: Filed and effective January 1, 1978; amended at 2 Ill. Reg. 44, p. 137, effective October 30, 1978; codified at 7 Ill. Reg. 10592; amended in R90-7 at 15 Ill. Reg. 10075, effective July 1, 1991; amended at 36 Ill. Reg. _____, effective _____.

SUBPART A: AUTHORITY AND POLICY

Section 501.103 Organization of this Chapter

The Board regulations adopted in 35 Illinois Administrative Code Subtitle E: Agriculture Related Pollution, Chapter I: Pollution Control Board are organized as provided in this Section.

Part 501 of this Chapter contains definitions and incorporations by reference applicable to Parts 501, 502 and 503 which are the Parts of this Chapter administered by the Environmental Protection Agency. Subpart C of Part 501 also contains the requirements applicable to all Livestock Waste Handling Facilities and Livestock Management Facilities whether or not those

facilities are defined as Animal Feeding Operations (AFOs) or Concentrated Animal Feeding Operations (CAFOs) and without regard to whether the facility is subject to National Pollutant Discharge Elimination System (NPDES) permitting requirements.

Part 502 of this Chapter identifies which AFOs are subject to NPDES permit requirements and specifies those requirements. Part 502 also provides the state technical standards applicable to permitted CAFOs. This Part also contains requirements applicable to land application activities from AFOs which are defined as Large CAFOs and are not permitted under an NPDES permit.

Part 503 of this Chapter contains the requirements applicable to fish and aquatic animal production facilities, irrigation activities, and silvicultural activities and sources.

The Part 506 rules implement the Livestock Management Facilities Act [510 ILCS 77]. These rules and the Livestock Management Facilities Act are administered by the Illinois Department of Agriculture.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.104 Severability

If any provision of these rules or regulations is adjudged invalid, or if the application thereof to any person or in any circumstance is adjudged invalid, such invalidity shall not affect the validity of this chapter as a whole, or of any part, subpart, sentence or clause thereof not adjudged invalid.

(Source: Added at 36 Ill. Reg. _____, effective _____)

SUBPART B: DEFINITIONS AND INCORPORATIONS

Section 501.200 Incorporations by Reference

a) The Board incorporates the following material by reference:

ASABE ~~ASAE~~. Available from American Society of Agricultural and Biological Engineers, 2950 Niles Road, St. Joseph, MI 49085~~-9659 (616-429-6300)~~ (269-429-0300), fax 269-429-3852, hq@asabe.org.

"Management~~Control~~ of Manure Odors," ASAE EP379.4~~EP379.1~~ (January 2007)~~(December 1986)~~.
"Design of Anaerobic Lagoons for Animal Waste Management," ASABE~~ASAE~~ EP403.4 ~~EP403.1~~ (R2011)~~(March 1990)~~.

"Illinois Agronomy Handbook, 24th Edition," University of Illinois, College of Agriculture, Consumer and Environmental Sciences. Urbana, IL, July 2009.

"Livestock Waste Facilities Handbook, Third Edition," MWPS-18. MidWest Plan Service. April 1993.

"Manure Characteristics," Section 1. Second Edition MWPS-18. MidWest Plan Service. 2004.

"Recommended Chemical Soil Test Procedures for the North Central Region," North Central Regional Publication No.221, Missouri Agricultural Experiment Station Bulletin SB 1001 (January 1998). North Central Region-University of Missouri Soil Testing Lab, 23 Mumford Hall, University of Missouri Columbia, MO 65211.

"Average Crop, Pasture, and Forestry Productivity Ratings for Illinois Soils; Bulletin No. 810," University of Illinois, College of Agricultural, Consumer and Environmental Sciences Office of Research (2000), revised January 15, 2011 to amend Table 2 for B810.

"Optimum Crop Productivity Ratings for Illinois Soils; Bulletin 811," University of Illinois, College of Agricultural, Consumer and Environmental Sciences Office of Research (2000), revised January 15, to amend Table S2 for B811.

b) This Section incorporates no later editions or amendments.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

~~**SUBPART B: DEFINITIONS**~~

Section 501.201 Definitions

a) Except as hereinafter stated and unless a different meaning of the term is clear from its context, the definitions of terms used in this Chapter shall be the same as those used in the Act and 35 Ill. Adm. Code: Subtitle C, Chapter I.

b) The definitions contained in this Subpart are applicable to 35 Ill. Adm. Code Parts 501, 502 and 503.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 501.223 Animal Confinement Area

Animal confinement area includes but is not limited to open lots, housed lots, feedlots, confinement houses, stall barns, free stall barns, milkrooms, milking centers, cowyards, barnyards, medication pens, walkers, animal walkways and stables.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.236 Chemicals and Other Contaminants

Antibiotics, hormones, feed additives, pesticides, hazardous and toxic chemicals, petroleum products and by-products, other chemical products and by-products, and the residues and containers thereof.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.238 Concentrated Animal Feeding Operation (CAFO)

An AFO that is defined as a Large CAFO pursuant to Section 502.103 or as a Medium CAFO pursuant to Section 502.104, or that is designated as a CAFO pursuant to Section 502.106.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.241 CWA

The Clean Water Act, as amended, 33 U.S.C. 1251 *et seq.*~~Federal Water Pollution Control Act (also known as the Clean Water Act), as amended, 33 U.S.C 1251 et seq., Public Law 92-500, enacted by the Congress October 18, 1972, as amended by Public Law 95-217, enacted December 27, 1977, as amended.~~

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 501.242 Dry lot

A facility for growing ducks in confinement with a dry litter floor cover and no access to swimming areas.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.244 Erosion Factor T

An estimate of the maximum average annual rate of soil erosion by water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year. The erosion factor T is provided in United States Department of Agriculture Natural Resources Conservation Service soil surveys.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.252 Frozen Ground

Soil that is frozen anywhere ~~between~~ **in** the first ~~½ inch to~~ 8 inches of soil as measured from the ground surface.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.253 Grassed Waterway

A natural or constructed waterway or outlet shaped or graded and established in suitable vegetation as needed for the conveyance of runoff from a field, diversion or other structure.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.254 Groundwater

Underground water which occurs within the saturated zone and geologic materials where the fluid pressure in the pore space is equal or greater than atmospheric pressure.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.261 Incorporation

A method of land application of livestock waste in which the livestock waste is thoroughly mixed or completely covered with the soil within 24 hours. Any ponded liquid livestock waste remaining on the site after application is not considered to be thoroughly mixed or completely covered with the soil.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.263 Injection

Means the placement of livestock waste 4 to 12 inches below the soil surface in the crop root zone using equipment specifically designed for that purpose and where the applied material is retained by the soil.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.267 Land Application Area

Land under the control of an Animal Feeding Operation owner or operator, whether it is owned, rented, or leased, to which livestock waste from the production area is or may be applied.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.295 Livestock Waste

~~Livestock excreta and associated feed losses, bedding,~~ Manure, litter, process wastewater, overflow from watering systems, wash waters, sprinkling waters from livestock cooling, precipitation polluted by falling on or flowing onto an animal feeding operation and other materials polluted by livestock, including but not limited to sludge and contaminated soils from storage structures. Livestock waste does not include agricultural stormwater discharge.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

~~**Section 501.301 Macropore**~~

~~Any pore that allows free drainage to the depth of the subsurface drain.~~

Section 501.305 Man-made

Constructed by man~~ and used for the purpose of transporting waste~~.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 501.310 Man-made Ditch

A discrete fissure or channel excavated in the earth~~ for the purpose of transporting livestock waste directly to navigable waters. This is not to be confused with a vegetative filter or acceptable disposal area which is a treatment device and may take the form of a man-made terrace or grass waterway system~~.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 501.312 Manure

Manure includes animal excreta, bedding, compost and raw materials or other materials commingled with manure or set aside for disposal.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.313 Manure Storage Area

Manure storage area includes but is not limited to lagoons, runoff ponds, storage sheds, stockpiles, under the house or pit storages, liquid impoundments, static piles, and composting piles.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.325 Navigable Waters (Repealed)

~~All waters of the United States as defined in Criteria and Standards for the National Pollutant Discharge Elimination System (40 CFR 125.1(p)):~~

~~a) All navigable waters of the United States;~~

~~b) Tributaries of navigable water of the United States;~~

~~c) Interstate waters;~~

~~d) Intrastate lakes, rivers and streams which are utilized by interstate travelers for recreational or other purposes;~~

~~e) Intrastate lakes, rivers and streams from which fish or shellfish are taken and sold in interstate commerce; and~~

~~f) Intrastate lakes, rivers and streams which are utilized for industrial purposes by industries in interstate commerce.~~

(Source: Repealed at 36 Ill. Reg. _____, effective _____)

Section 501.333 New Source

Any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commenced after either of the following dates:

a) after promulgation of standards of performance under section 306 of the Clean Water Act which are applicable to such source, or

b) after proposal of standards of performance in accordance with section 306 of Clean Water Act which are applicable to such source, but only if the standards are promulgated in accordance with section 306 within 120 days of their proposal.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.343 Overflow

The discharge of livestock waste resulting from the filling of livestock waste storage structures beyond the point at which livestock waste or stormwater can no longer be contained by the structure.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.345 Owner /~~or~~ Operator

Any person who owns, leases, operates, controls or supervises a livestock management facility or livestock waste-handling facility.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 501.355 Pollutant

Dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or

discarded equipment, rock, sand, cellar dirt and industrial, municipal and agricultural waste discharged into water, as defined in CWA.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 501.357 Process Wastewater

Water directly or indirectly used in the operation of the AFO for any of the following activities: spillage or overflow from animal or poultry watering systems; washing, cleaning, or flushing pens, barns, manure pits, or other AFO facilities; direct contact swimming, washing, or spray cooling of animals; or dust control. It also includes any water which comes into contact with any raw materials, products, or byproducts, including manure, litter, feed, milk, eggs or bedding.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.358 Production Area

The part of an AFO that includes the animal confinement area, the manure storage area, the raw materials storage area, and the waste containment areas. Also included in the definition of production area is any egg washing or egg processing facility, and any area used in the storage, handling, treatment, or disposal of mortalities.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.359 Raw Materials Storage Area

Raw materials storage area includes, but is not limited to, feed silos, silage bunkers, and bedding materials stacks.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.360 Saturated~~Settling Basin~~

Means soils where pore spaces are occupied by liquid such that additional inputs of water or liquid wastes cannot infiltrate into the soil.~~Any excavated, diked or walled structure or combination of structures designed as part of a livestock waste-handling facility to detain feedlot runoff for a sufficient time to permit solids to settle for later removal.~~

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 501.363 Setbacks

A specified distance from surface waters or potential conduits to surface waters where livestock waste may not be land applied. Examples of conduits to surface waters include, but are not limited to, open tile intake structures, sinkholes, and agriculture well heads.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.373 Surface Land Application

Application of livestock waste to the ground surface that is not incorporated or injected.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.377 Vegetative Buffer

Narrow, permanent strip of dense perennial vegetation established parallel to the contours of the land and perpendicular to the dominant slope of the field for the purposes of slowing water runoff, enhancing water infiltration, and minimizing the risk of any potential nutrients or pollutants from leaving the field and reaching surface waters.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.378 Vegetative Fence Row

Narrow, permanent strip of perennial vegetation established at the edge of a field that is a minimum of 15 feet wide. The vegetative fence row slows water runoff and enhances water infiltration thereby reducing the risk of pollutants leaving the field.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.379 Waste Containment Area

Waste containment area includes, but is not limited to, settling basins, and areas within berms and diversions which separate uncontaminated stormwater from livestock waste.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.385 Wet lot

A confinement facility for raising ducks which is open to the environment, has a small number of sheltered areas, and with open water runs and swimming areas to which ducks have free access.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.390 25-Year, 24-Hour Precipitation Event

The maximum 24-hour precipitation event with a probable recurrence interval of once in 25 years, as defined by the National Weather Service in NOAA Atlas 14-Precipitation Frequency Atlas of the United States, Volume 2, Version 3.0 (2004), found at http://hdsc.nws.noaa.gov/hdsc/pfds/orb/il_pfds.html.

(Source: Added at 36 Ill. Reg. _____, effective _____)

Section 501.395 100-Year, 24-Hour Precipitation Event

The maximum 24-hour precipitation event with a probable recurrence interval of once in 100 years, as defined by the National Weather Service in NOAA Atlas 14-Precipitation Frequency Atlas of the United States, Volume 2, Version 3.0 (2004), found at http://hdsc.nws.noaa.gov/hdsc/pfds/orb/il_pfds.html.

(Source: Added at 36 Ill. Reg. _____, effective _____)

SUBPART C: OPERATIONAL RULES FOR ALL LIVESTOCK MANAGEMENT FACILITIES AND LIVESTOCK WASTE-HANDLING FACILITIES

Section 501.401 Purpose and Scope of Operational Rules for Livestock Management Facilities and Livestock Waste-Handling Facilities ~~General Criteria~~

a) Besides the regulations contained within this Chapter, every person shall also comply with provisions of the Act and Board regulations.

b) The owner or operator of any livestock management facility or livestock waste-handling facility shall comply with the CWA, NPDES filing requirements and the feedlot category of point source effluent guidelines. All livestock management facilities and livestock waste handling facilities have the obligation to make a site specific determination of whether the facility is subject to NPDES permit requirements and to follow those requirements when and where they are applicable. CAFOs are subject to additional requirements applicable under Part 502.

c) The ~~These~~ regulations in this subpart shall apply to stockyards and similar operations where animals are held briefly, as well as to conventional livestock operations.

d) The transportation of livestock wastes shall be planned and conducted so as not to cause, threaten, or allow any violation of the Act and applicable regulations.

e) Any runoff or overflow from a livestock management facility or a livestock waste handling facility shall not cause a water quality violation pursuant to the Act or 35 Ill. Adm. Code Subtitle C: Water Pollution.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 501.402 Location of New Livestock Management Facilities and New Livestock Waste-Handling Facilities

a) No new livestock management facility or new livestock waste-handling facility shall contain within its boundaries any stream or other surface waters except small temporary accumulations of water occurring as a direct result of precipitation.

b) New livestock management facilities and new livestock waste-handling facilities located within a 10-year flood height as recorded by the United States Geological Survey or as officially estimated by the Illinois State Water Survey shall be protected against such flood.

c) 1) Upon July 15, 1991, new or expanded livestock management facilities and new or expanded livestock waste-handling facilities shall not be located within 1/2 mile of a populated area or within 1/4 mile of a non-farm residence.

2) For purposes of this subsection (c), the following shall not be considered location of a new or expanded livestock management or waste handling facility:

A) Commencement of operations at an idle facility which has livestock shelters left intact, and which has been operated as a livestock management facility or livestock waste-handling facility for four consecutive months at any time within the ten (10) previous years;

B) Commencement of operations at a facility reconstructed after partial or total destruction due to natural causes, i.e., tornado, fire, or earthquake.

3) Adequate odor control methods and technology shall be practiced by operators of new and existing livestock management facilities and livestock waste-handling facilities so as not to cause air pollution.

d) The setback requirements of subsection (c) shall not apply to any livestock management facility or livestock waste-handling facility which meets any of the following conditions:

1) The facility is located in an Agricultural Area, designated as such pursuant to the Agricultural Areas Conservation and Protection Act, 505 ILCS 5/1 ~~Il. Rev. Stat. 1989, ch. 5, para. 1001 et seq.~~;

2) The facility undergoes expansion, and the owner of the facility certifies and notifies the Agency in writing as such that the facility was operating as a livestock management facility or livestock waste-handling facility for at least one year prior to the existence of any non-farm residence within 1/4 mile of the facility or of a populated area within 1/2 mile of the facility; or

3) The use of the facility as a livestock management or livestock waste handling facility is allowed by local zoning or municipal ordinance. If no local zoning or municipal ordinance exists that covers such use, the facility shall be exempt if the livestock are not raised or kept at the facility primarily for hire or the raising or keeping of livestock at the facility does not have financial profit as a primary aim.

e) A new livestock management facility or new livestock waste-handling facility which locates within 1/4 mile of a neighboring farm residence shall locate at the maximum feasible location from such residence.

f) A new livestock management facility or new livestock waste-handling facility which locates within 1/4 mile of a non-farm residence or within 1/2 mile of a populated area, pursuant to subsection (d), shall locate at the maximum feasible location from such residence or populated area.

g) New livestock management facilities or new livestock waste-handling facilities located on soil types or geological formations where the deposition of livestock waste is likely to cause groundwater pollution shall be constructed in such a way that pollution will be prevented, or supplementary measures shall be adopted which will prevent pollution.

h) No livestock management facility or livestock waste handling facility that commences construction of such facility after the effective date of this Section shall locate within 750 feet of surface waters or within a quarter mile of designated surface water drinking supplies.

i) No livestock management facility or livestock waste handling facility that commences construction of such facility after the effective date of this Section shall locate within 1000 feet of community water supply wells or within 400 feet of other potable water supply wells.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 501.404 Handling and Storage of Livestock Waste

a) Any livestock waste stored in excess of six months shall be contained in a manure storage structure.

b) Temporary Manure Stacks

1) A temporary manure stack is a potential secondary source, as defined by the Act. As a potential secondary source, a temporary manure stack is subject to the minimum setback zones established in Title IV of the Act. ~~Temporary manure stacks shall be constructed or established and maintained in a manner to prevent runoff and leachate from entering surface or groundwaters.~~

2) A temporary manure stack shall not be located within 75 feet from any water well, except monitoring wells. ~~No temporary manure stack shall be constructed within 100 feet of a water well.~~

3) A temporary manure stack shall be constructed or established and maintained in a manner to prevent runoff and leachate from entering surface waters or groundwater~~s~~. ~~A~~**Either a** cover and **enclosed** pad or other control must be provided ~~when needed~~ to prevent runoff and leachate from entering surface waters and groundwater **or the temporary manure stack must be located in accordance with the following setbacks: 750 feet from surface waters; 1000 feet from community water supply wells; 400 feet from other potable water supply wells, and 400 feet from karst features.**

4) A temporary manure stack without a cover and enclosed pad or other control is prohibited where the minimum soil depth to the seasonal high water table is less than or equal to 2 feet or where there is less than 20 inches of unconsolidated material over bedrock.

c) Livestock Waste-Holding Facilities

1) Liquid manure-holding tanks shall be impermeable and capable of withstanding pressures and loadings to which such a tank may be subjected.

2) Holding ponds and lagoons shall be impermeable or so sealed as to prevent groundwater or surface water pollution.

3) For livestock management facilities and livestock waste handling facilities that are not required to obtain an NPDES permit, the~~The~~ contents of livestock waste-handling facilities shall be kept at levels such that there is adequate storage capacity so that an

overflow does not occur except in the case of precipitation in excess of a 25-year 24-hour storm.

4) Liquid Livestock Waste

A) Existing livestock management facilities which handle the waste in a liquid form shall have adequate storage capacity in a liquid manure-holding tank, lagoon, holding pond, or any combination thereof so as not to cause air or water pollution as defined in the Act or applicable regulations. If inadequate storage time causes or threatens to cause a violation of the Act or applicable regulations, the Agency may require that additional storage time be provided. In such cases, interim pollution prevention measures may be required by the Agency.

B) New livestock waste-handling facilities which handle the waste in a liquid form shall provide a minimum of 120-day storage with a liquid manure-holding tank, lagoon, holding pond, or any combination thereof unless the operator has justifiable reasons substantiating that a lesser storage volume is adequate. If inadequate storage volumes cause or threaten to cause a violation of the Act or applicable regulations, the Agency may require corrective measures.

d) Runoff Field Application Systems

Any livestock management facility <u>not meeting the definition of a CAFO in Section 501.238,</u> may construct and operate a runoff field application system for the treatment of livestock waste from fewer than 300 animal units, meeting the requirements of 35 Ill. Adm. Code 570, in lieu of utilizing liquid manure-holding tanks, holding ponds, or lagoons in compliance with subsection (c), or other livestock waste-handling systems which would assure compliance with the Act and 35 Ill. Adm. Code.Subtitle E.

e) Subsections (a) through (d) shall not apply to livestock management facilities with fifty (50) or fewer animal units, provided that the following conditions exist:

1) The location of the facility relative to waters of the State is such that there is no discharge of livestock waste into waters of the State, in violation of Section 12 of the Act <u>[415 ILCS 5/12 (2010)]</u>~~(Ill. Rev. Stat. 1989, ch. 111 1/2, par. 1012)~~;

2) There is no discharge of livestock waste into waters of the State by means of a man-made ditch, flushing system or other similar man-made device, in violation of Section 12 of the Act [415 ILCS 5/12 (2010)]~~(Ill. Rev. Stat. 1989, ch. 111 1/2, par. 1012)~~; and

3) The facility is managed so that livestock waste is not allowed to accumulate to an extent which threatens to cause a discharge to waters of the State, in violation of Section 12 of the Act [415 ILCS 5/12 (2010)]~~(Ill. Rev. Stat. 1989, ch. 111 1/2, par. 1012)~~.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

Section 501.405 Field Application of Livestock Waste

a) For livestock management facilities and livestock waste handling facilities that are not required to obtain an NPDES permit, the ~~The~~ quantity of livestock waste applied on soils shall not exceed a practical limit as determined by soil type, especially its permeability, the condition (frozen or unfrozen) of the soil, the percent slope of the land, cover mulch, proximity to surface waters and likelihood of reaching groundwater, and other relevant considerations. These livestock waste application guidelines will be adopted pursuant to Section 502.305, unless otherwise provided for by Board regulations. Facilities required to obtain an NPDES permit are subject to the requirements in Subpart F of Part 502. Large unpermitted CAFOs must comply with **Sections 502.610(k); and 502.615 through 502.645 of Subpart F.**

b) Operators of livestock waste handling facilities shall practice odor control methods during the course of manure removal and field application so as not to affect a neighboring farm or non-farm residence or populated area by causing air pollution as described in Section 501.102(d). Odor control methods include, but are not limited to,

1) Soil injection or other methods of incorporation of waste into the soil including disking or plowing;

2) Consideration of climatic conditions including wind direction and inversions;

3) For liquid livestock waste: whether supernatant which is used for irrigation purposes has been stored in a livestock waste lagoon system which is designed and operated in accordance with "Design of Anaerobic Lagoons for Animal Waste Management", as incorporated by reference at Section 501.200.

4) Other methods as described in "Management~~Control~~ of Manure Odors", as incorporated by reference at Section 501.200.

(Source: Amended at 36 Ill. Reg. _____, effective _____)

SUBPART D: SUBMITTAL OF INFORMATION

Section 501.505 Requirements for Certain CAFOs to Submit Information

~~a) The requirements of this Section must be met if the United States Environmental Protection Agency adopts a regulation pursuant Section 308 of the Clean Water Act [33 U.S.C. 1318] that requires submittal of information from one or more categories of CAFOs.~~

~~b) Any CAFO required to submit information under a final rulemaking pursuant to Section 308 of the Clean Water Act described in subsection (a) of this Section, must comply with the requirements of that regulation unless such requirements are overturned or stayed by a court.~~

~~c) Any CAFO required to submit information to the United States Environmental Protection Agency pursuant to a final action under Section 308 of the Clean Water Act must submit the same information to Illinois EPA. The submission must occur simultaneously with the submittal to the United States Environmental Protection Agency or within 90 days following the effective date of this Section, whichever is later.~~

(a) Existing Large CAFOs that are not covered under an individual or general NPDES permit, must submit the information in subsection (d) of this Section to the Agency in a form provided by the Agency within 90 days of the effective date of this Section.

b) Existing CAFOs that expand or otherwise increase the number of animals to meet the size threshold of Large CAFOs after the effective date of this Section, which are not covered under an individual or general NPDES permit, must submit the information in subsection (d) of this Section to the Agency in a form provided by the Agency no later than 90 days in advance of the date the expanded CAFOs are to commence operations.

c) **New unpermitted Large CAFOs that commence construction after the effective date of this Section and that do not apply for NPDES permits, must submit the information in subsection (d) of this Section to the Agency in a form provided by the Agency no later than 180 days in advance of the date the new CAFO is to commence operations.**

d) **Pursuant to subsections (a), (b) and (c) of this Section, the following information must be submitted to the Agency:**

1) **Name and address of the owner and operator;**

2) **If contract operation, name and address of the integrator;**

3) **The facility location and mailing addresses;**

4) **The latitude and longitude at the entrance to the production area;**

5) **Specific information about the average and maximum number and type of animals, whether in open confinement or housed under roof (e.g., beef cattle, broilers, layers, swine weighing 55 pounds or more);**

6) **The type of waste containment and storage (e.g. anaerobic lagoon, roofed storage shed, storage ponds, underfloor pits, above ground storage tanks, below ground storage tanks, concrete pad, impervious soil pad, and total capacity for manure, litter, and process wastewater storage [tons/gallons]);**

7) **Estimated amounts of livestock waste generated per year (tons/gallons);**

8) **Whether the CAFO land applies;**

9) **The total number of acres of land application area and the amount of waste applied on those acres annually;**

10) **Estimated amount of livestock waste transferred to other persons or third-parties per year (tons/gallons);**

A) **Copies of signed contractual agreements with transferees accepting waste from the facility consistent with Section 502.610 (k).**

11) **Whether the CAFO implements a nutrient management plan;**

12) A copy of the CAFO's nutrient management plan;

13) Whether the CAFO employs nutrient management practices and keeps records on site consistent with applicable regulations;

14) If the CAFO does not land apply, alternative uses of manure, litter and/or wastewater; and

15) Whether the facility has ever been issued an NPDES permit and, if so, the dates of coverage under the permit.

e) The information in subsection d) shall be submitted every five years.

f) The submittal**s** required under this Section should be sent **in electronic format** to **the** Illinois Environmental Protection Agency **at a web address provided by the Agency or to:**

Division of Water Pollution Control
Attn. Permit Section
P.O. Box 19276
Springfield, Illinois 62794-9276.

g) The Agency shall make the information collected under this Section available to the public.

(Source: Added at 36 Ill. Reg. _____, effective _____)

TITLE 35: ENVIRONMENTAL PROTECTION
SUBTITLE E: AGRICULTURE RELATED POLLUTION
CHAPTER I: POLLUTION CONTROL BOARD

PART 502
PERMITS

SUBPART A: PERMITS REQUIRED

Section

SUBPART B: PERMIT APPLICATIONS

Section

SUBPART C: PERMIT ISSUANCE AND CONDITIONS

Section

SUBPART D: APPEAL AND ENFORCEMENT

SUBPART E: REQUIREMENTS FOR DEVELOPING AND IMPLEMENTING NUTRIENT MANAGEMENT PLANS

SUBPART F: LIVESTOCK WASTE DISCHARGE LIMITATIONS AND TECHNICAL STANDARDS

SUBPART G: ADDITIONAL LIVESTOCK WASTE DISCHARGE LIMITATIONS

SUBPART H: NEW SOURCE PERFORMANCE STANDARDS FOR NEW, LARGE SWINE, POULTRY AND VEAL CAFOS

Section
502.800 Applicability
502.810 Production Area Requirements
502.820 Land Application Area Requirements
502.830 Alternative Best Management Practice Livestock Waste Discharge Limitations
502.840 Technical Evaluation

APPENDIX A References to Previous Rules

AUTHORITY: Implementing Sections 9, 12, 13, 21, and 22 of the Environmental Protection Act [415 ILCS 5/9, 5/12, 5/13, 5/21 and 5/22] ~~(Ill. Rev. Stat. 1981, ch. 111 1/2, pars. 1009, 1012, 1013, 1021 and 1022)~~ and authorized by Section 27 of the Environmental Protection Act [415 ILCS 5/27] ~~(Ill. Rev. Stat. 1981, ch. 111 ½ par. 1027)~~.

SOURCE: Filed and effective January 1, 1978; amended 2 Ill. Reg. 44, p. 137, effective October 30, 1978; codified at 7 Ill. Reg. 10592; amended at Ill. Reg. , effective _____.

SUBPART A: PERMITS REQUIRED

Section 502.101 NPDES Permit Requirement and Duty to Maintain Permit Coverage

a) A CAFO is a point source. Any discharge of pollutants into waters of the ~~United~~ State~~s~~ from a CAFO is prohibited unless authorized by an NPDES permit or unless the discharge is an agricultural stormwater discharge as described in Section 502.102(b. No person shall cause or allow a discharge from a CAFO in violation of federal and state law, including but not limited to the CWA~~-~~, the Act or Board regulations

b) The owner or operator of a CAFO must seek coverage under an NPDES permit if the CAFO discharges.~~, provided that:~~

~~1) A past discharge from a CAFO does not trigger a duty to apply for a permit if the conditions that gave rise to the discharge have been corrected and the CAFO modified its design, construction, operation or maintenance in such a way as to prevent discharges from occurring in the future.~~

~~2) *No permit shall be required under this* Part *for any discharge for which a permit is not required under the* CWA, *and regulations pursuant thereto.* (Section 12(f) of the Act).~~

c) The owner or operator of a CAFO that discharges must either apply for an individual NPDES permit or submit a notice of intent for coverage under an NPDES general permit. If the Agency has not made a general permit available to the CAFO, the CAFO owner or operator must submit an application for an individual permit to the Agency. All permit applications and applications for permit modifications must contain the information set forth in Subpart B of this Part.

d) Any permitted CAFO shall apply for reissuance of the NPDES permit not less than 180 days prior to the expiration date of the permit unless the CAFO will not discharge after the expiration date of the NPDES permit.

e) The owner or operator of a new CAFO that will discharge must apply for NPDES permit coverage at least 180 days prior to the time that the CAFO commences operation.

f) Once an animal feeding operation is defined as a CAFO for at least one type of animal, the NPDES permit requirements for CAFOs apply with respect to all animals in confinement at the animal feeding operation and all livestock waste generated by those animals or the production of those animals.

~~No person specified in Sections 502.102, 502.103 or 502.104 or required to have a permit under the conditions of Section 502.106 shall cause or allow the operation of any new livestock management facility or livestock waste-handling facility, or cause or allow the modification of any livestock management facility or livestock waste-handling facility, or cause or allow the operation of any existing livestock management facility or livestock waste-handling facility without a National Pollutant Discharge Elimination System (NPDES) permit. Facility expansions, production increases, and process modifications which significantly increase the amount of livestock waste over the level authorized by the NPDES permit must be reported by submission of a new NPDES application.~~

(Source: Amended at ____ Ill. Reg. _____, effective _____)

Section 502.102 Land Application Discharges and Agricultural Stormwater~~Twenty-five Year Storm Event~~

a) The discharge of livestock waste to waters of the ~~United~~ State~~s~~ from a CAFO as a result of the livestock waste application by the CAFO to land application areas is a discharge from that CAFO subject to NPDES permit requirements, except where it is an agricultural stormwater discharge and

therefore exempt from the definition of a point source under Section 502 of the Clean Water Act.

b) Where livestock waste has been land applied in accordance with ~~site-specific nutrient management practices~~ **Sections 502.615 through 502.645 to** ~~that~~ ensure appropriate agricultural utilization of the nutrients in the livestock waste and in compliance with Section 502.510 for permitted CAFOs and Section**s** 502.510(b) **and 502.500(b)** for unpermitted Large CAFOs, a precipitation-related discharge of livestock waste from land application areas ~~of an unpermitted large CAFO or a permitted CAFO,~~ is an agricultural stormwater discharge.

~~c) Unpermitted Large CAFOs must **develop a nutrient management plan consistent with 502.505 and** maintain the documentation specified in 35 Ill. Adm. Code 502.510(b)(15) either on site or at a nearby office, or otherwise make such documentation readily available to the Agency upon request.~~

c~~d~~) The nutrient management practices to be implemented shall be reviewed annually by the CAFO and the nutrient management plan updated when there is a change in the nutrient management practices.

~~An NPDES permit shall be required for an animal feeding operation which falls within the criteria set forth in Section 502.103 or Section 502.104 below; provided, however, that no animal feeding operation shall require a permit if it discharges only in the event of a 25-year 24-hour storm event.~~

(Source: Amended at ____ Ill. Reg. _____, effective _____)

Section 502.103 ~~Very~~ Large CAFOs ~~Operators~~

An AFO is defined as a Large CAFO if as many as or ~~NPDES permit is required if~~ more than the numbers of animals specified in any of the following categories are stabled or confined:

Number of Animals	Kind of Animals
700	Mature dairy cows, whether milked or dry
1,000	Veal calves
1,000	Cattle other than mature dairy cows or veal calves. Cattle includes but is not limited to heifers, steers, bulls and cow/calf pairs
2,500	Swine each weighing 55 pounds or more
10,000	Swine each weighing less than 55 pounds
500	Horses
10,000	Sheep or lambs
55,000	Turkeys

30,000	Laying hens or broilers, if the AFO uses a liquid manure handling system
125,000	Chickens (other than laying hens), if the AFO uses other than a liquid manure handling system
82,000	Laying hens, if the AFO uses other than a liquid manure handling system
30,000	Ducks (if the AFO uses other than a liquid manure handling system)
5,000	Ducks (if the AFO uses a liquid manure handling system)

~~Number of Animals~~	~~Kind of Animals~~
~~1000~~	~~Brood cows and slaughter and feeder cattle~~
~~700~~	~~Milking dairy cows~~
~~500~~	~~Horses~~
~~2500~~	~~Swine weighing over 55 pounds~~
~~10,000~~	~~Sheep, lambs or goats~~
~~55,000~~	~~Turkeys~~
~~100,000~~	~~Laying hens or broilers (if the facility has continuous overflow watering)~~
~~30,000~~	~~Laying hens or broilers (if the facility has a liquid manure handling system)~~
~~5000~~	~~Ducks~~
~~1000~~	~~Animal units~~

(Source: Amended at ____ Ill. Reg. _____, effective _____)

Section 502.104 Medium CAFOs ~~Large Operators~~

a) An AFO is defined as a Medium CAFO ~~NPDES permit is required~~ if ~~more than~~ the following numbers ~~and types~~ of animals specified in any of the following categories are stabled or confined and the provisions of either subsection ~~condition~~ (b), ~~or~~(c) or (d) below of this Section is met:

Number of Animals	Kind of Animals
200 to 699	Mature dairy cows, whether milked or dry
300 to 999	Veal calves
300 to 999	Cattle other than mature dairy cows or veal calves. Cattle includes but is not limited to heifers, steers, bulls and cow/calf pairs
750 to 2,499	Swine each weighing 55 pounds or more
3,000 to 9,999	Swine each weighing less than 55 pounds
150 to 499	Horses
3,000 to 9,999	Sheep or lambs
16,500 to 54,999	Turkeys
9,000 to 29,999	Laying hens or broilers, if the AFO uses a

	liquid manure handling system
37,500 to 124,999	Chickens (other than laying hens), if the AFO uses other than a liquid manure handling system
25,000 to 81,999	Laying hens, if the AFO uses other than a liquid manure handling system
10,000 to 29,999	Ducks (if the AFO uses other than a liquid manure handling system)
1,500 to 4,999	Ducks (if the AFO uses a liquid manure handling system)

~~Number of Animals~~	~~Kind of Animals~~
~~300~~	~~Brood cows and slaughter or feeder cattle~~
~~200~~	~~Milking dairy cows~~
~~750~~	~~Swine weighing over 55 pounds~~
~~150~~	~~Horses~~
~~3000~~	~~Sheep, lambs or goats~~
~~16,000~~	~~Turkeys~~
~~30,000~~	~~Laying hens or broilers (if the facility has continuous overflow watering)~~
~~9000~~	~~Laying hens or broilers (if the facility has a liquid manure handling system)~~
~~1000~~	~~Ducks~~
~~300~~	~~Animal units~~

b) Pollutants are discharged into ~~navigable~~ waters of the ~~United~~ State~~s~~ through a man-made ditch, flushing system or other similar man-made device; or

c) Pollutants are discharged directly into ~~navigable~~ waters of the ~~United~~ State~~s~~ which originate outside of and pass over, across, through or otherwise come into direct contact with the animals confined in the operation; or~~.~~

d) The AFO is designated as a CAFO by the Agency pursuant to Section 502.106.

(Source: Amended at ____ Ill. Reg. _____, effective _____)

Section 502.105 Small CAFOs~~Voluntary Applications~~

An AFO is a Small CAFO if it is designated as a CAFO by the Agency pursuant to Section 502.106 of this Part, and it is not a Medium CAFO.~~None of the requirements listed in this subpart precludes the voluntary filing of an NPDES application by the owner or operator of an animal feeding operation.~~

(Source: Amended at ____ Ill. Reg. _____, effective _____)

Section 502.106 **Case-By-Case ~~Case-by-case~~ Designation Requiring NPDES Permits**

a) Notwithstanding any other provision of this Part, the Agency may require any animal feeding operation not falling within Sections ~~502.102,~~ 502.103 or 502.104 to obtain an~~a~~ NPDES permit by designating the AFO as a CAFO upon determining that it is a significant contributor of pollutants to waters of the of the ~~United~~ State~~s~~. In making ~~such designation~~ the determination of whether the AFO is a significant contributor of pollutants, the Agency shall consider the following factors:

1) The size of the animal feeding operation and the amount of livestock wastes reaching ~~navigable~~ waters of the ~~United~~ State~~s~~;

2) The location of the animal feeding operation relative to ~~navigable~~ waters of the **State**;

3) The means of conveyance of livestock ~~animal~~ wastes ~~and process wastewaters~~ into ~~navigable~~ waters of the ~~United~~ State~~s~~;

4) The slope, vegetation, rainfall and other factors relative to the likelihood or frequency of discharge of livestock waste ~~animal wastes and process wastewaters~~ into ~~navigable~~ waters of the ~~United~~ State~~s~~; and

5) Other such factors bearing on the significance of the pollution problem sought to be regulated.

b) The Agency, however, may not require a permit under subsection (a)~~paragraph a)~~ of this Section for any animal feeding operation with less than the number of animals ~~units (300)~~ set forth in Section 502.104 above, unless it meets either of the following conditions:

1) Pollutants are discharged into ~~navigable~~ waters of the ~~United~~ State~~s~~ through a man-made ditch, flushing system or other similar man-made device; or

2) Pollutants are discharged directly into ~~navigable~~ waters of the ~~United~~ State~~s~~ which originate outside of and pass over, across, through or otherwise come into direct contact with the animals confined in the operation.

c) In no case may a permit application be required from an animal feeding operation designated pursuant to this section until there has been an onsite

inspection of the operation and a determination that the operation should and could be regulated under the permit program. ~~In addition, no application may be required from an owner or operator of an animal feeding operation designated pursuant to this section unless the owner or operator is notified in writing of the requirement to apply for a permit~~.

d) Upon receipt of the Agency's notification that an NPDES permit is required pursuant to this Section, ~~paragraph b)~~ the operator shall make application to the Agency within 90~~60~~ days. The Agency may issue an NPDES permit with a compliance schedule detailing interim steps to be taken along with a final date, not to exceed 14 months from the date the permit is issued, by which compliance with the Act and all applicable regulations shall be achieved.

~~e) No animal feeding operation may be required to have a permit if it discharges only in the event of a 25-year 24-hour storm event.~~

(Source: Amended at ____ Ill. Reg. _____, effective _____)

SUBPART B: PERMIT APPLICATIONS

Section 502.201 Permit Applications~~Contents~~

a) All applications from a new or existing CAFO for any permit, including an individual permit or a general permit, required under this Chapter shall contain, where appropriate, the following information and documents:

1) The name of the owner or operator;

2) If a contract operation, the name and address of the integrator;

3~~2~~) The facility location and mailing addresses;

4~~3~~) The latitude and longitude at the entrance to the production area;

5~~4~~) Specific information about the average and maximum number and type of animals, whether in open confinement or housed under roof (beef cattle, broilers, layers, swine weighing 55 pounds or more, swine weighing less than 55 pounds, mature dairy cows, dairy heifers, veal calves, sheep and lambs, horses, ducks, turkeys, other);~~Kinds and numbers of livestock~~;

6~~5~~) A statement as to any projected changes in the size of the livestock operation and when they may occur during the term of the permit;

7~~6~~) The type of containment and storage (anaerobic lagoon, roofed storage shed, storage ponds, underfloor pits, above ground storage tanks, below ground storage tanks, concrete pad, impervious soil pad, other) and total capacity for manure, litter, and process wastewater storage (tons/gallons); ~~Description of land areas used for the livestock management facilities and livestock waste-handling facilities and land areas used for livestock waste disposal;~~

~~8~~7) A topographic map of the geographic area in which the CAFO is located showing the specific location of the production area and land application areas, and indicating the following:~~A sketch of the existing and/or proposed facility indicating the following:~~

~~A) Approximate overall dimensions of the facility;~~

A~~B)~~ Direction and location of surface and subsurface drainage and other discharges from the facility; and

B~~C~~) ~~General~~ Location~~location~~ of waterways in the area.~~;~~

~~D) Location of area for manure disposal; and~~

~~E) A marked-up aerial photograph or U.S. Geological Survey map of the area involved is desirable in lieu of a sketch.~~

9~~8~~) Estimated amounts of livestock waste generated per year (tons/gallons);

10~~9~~) The total number of acres of land application area **and the amount of waste applied to those acres annually**;

11~~10~~) Estimated amount of livestock waste transferred to other persons per year (tons/gallons);

12) Copies of contracts for the transfer of waste to other persons consistent with Section 502.610(k) and the location on a topographic map and acreage of each site used by the other person for land application of the transferred waste.

13~~11~~) A nutrient management plan that is consistent with the requirements of Subpart E;

14~~12~~) A stormwater pollution prevention plan;

15~~13~~) A spill control and prevention plan; and

16~~14~~) A statement identifying and justifying any departure from current design criteria promulgated by the Agency.

b) The Agency may adopt procedures requiring such additional information as is necessary to determine whether the CAFO ~~livestock management facility or livestock waste handling facility~~ will meet the requirements of the Act and applicable Board regulations~~requlations~~.

c) Applicable requirements of 35 Ill. Adm. Code 309: Subpart A shall apply to applications for NPDES permits required by this chapter. The Agency may prescribe the form in which information required under this section shall be submitted.

(Source: Amended at ____ Ill. Reg. _____, effective _____)

Section 502.202 Permit Application Submissions~~Registered or Certified Mail~~

All permit applications shall be mailed, ~~or~~ delivered or electronically submitted to the appropriate address designated by the Agency. ~~Any application or revised application sent by mail shall be sent by registered or certified mail, return receipt requested. Applications which are hand-delivered shall be delivered to and receipted for by any authorized person employed in the Permit Section of the Agency's Division of Water Pollution Control.~~

(Source: Amended at ____ Ill. Reg. _____, effective _____)

Section 502.203 New Applications (Repealed)

~~Any person now discharging whose discharge was not covered by the Refuse Act permit program (33 U.S.C. 407), but which is subject to the NPDES program, must apply for an NPDES permit on the effective date of this chapter. However, for purposes of this chapter, any person who has applied for an NPDES permit from the U.S. Environmental Protection Agency and whose application has not been denied, shall be considered to have applied for an NPDES permit unless the discharge described in the Application for an NPDES Permit has substantially changed in nature, volume, or frequency; in which case another NPDES permit application shall be submitted.~~

(Source: Repealed at ____ Ill. Reg. _____, effective _____)

Section 502.204 Renewal

Permittees seeking reissuance of their NPDES permit pursuant to 502.101(d) ~~who wish to continue to discharge subsequent to the expiration date of their permit~~ must apply for reissuance of the permit, using proper forms, not less than 180 days prior to the permit expiration date. The Agency will notify such persons of the need for renewal at least 60

days prior to the date on which the renewal application must be submitted; however, failure to do so does not excuse non-compliance with this chapter.

(Source: Amended at ____ Ill. Reg. _____, effective _____)

Section 502.205 New Operations (Repealed)

~~Any person whose livestock waste-handling facility or livestock management facility is required by Sections 502.101, 502.102, 502.103 or 502.104 to obtain a permit and will begin operation on or after the effective date of these Regulations must apply for an NPDES permit no later than 180 days in advance of the date on which the facility is to commence operation minus the number of days available storage time for installed manure storage structures.~~

(Source: Repealed at ____ Ill. Reg. _____, effective _____)

Section 502.207 Disclosure Required for Land Trusts

An applicant filing for an NPDES permit shall satisfy the requirements of the "Land Trust Beneficial Interest Disclosure Act" [735 ILCS 405 et. seq.).~~"An Act to Require disclosure, under certification of perjury, of all beneficial interests in real property held in a land trust, in certain cases" (Ill. Rev. Stat. 1981, ch. 148, par. 72)~~ before the Agency grants the applicant its permit.

(Source: Amended at ___ Ill. Reg. _____, effective _____)

SUBPART C: PERMIT ISSUANCE AND CONDITIONS

Section 502.304 Issuance and Conditions

a) The provisions of 35 Ill. Adm. Code 309: Subpart A shall apply to the issuance, conditions and modification of NPDES permits under this chapter in the same manner as such provisions apply to NPDES permits issued pursuant to 35 Ill. Adm. Code 309. Specific provisions applicable to CAFOs seeking coverage under NPDES general permits are found in Section 502.310 of this Subpart.

b) In addition to specific conditions authorized under this Part, the Agency may impose such conditions in any permit issued pursuant to this Part as may be necessary to accomplish the purposes of the Act or Board regulations.

(Source: Amended at ____ Ill. Reg. _____, effective _____)

Section 502.310 CAFOs Seeking Coverage Under NPDES General Permits

a) CAFO owners or operators must submit a notice of intent that meets the requirements of Section 502.201 and Subpart E of this Part when seeking authorization to discharge under a general permit.

b) When additional information is necessary to complete the notice of intent or to clarify, modify, or supplement previously submitted material, the Agency may request such information from the owner or operator as provided in 35 Ill. Adm. Code 309.106.

c) The Agency must notify the public of its proposal to grant coverage under the general permit to the CAFO. This public notice must include the CAFO's nutrient management plan.

d) The process for submitting public comments and hearing requests, and the hearing process if a request for a hearing is granted, will follow the procedures applicable to draft individual permits found in 35 Ill. Adm. Code 309.109(b) and 309.115 through 309.118.

e) The time period for the public to comment and request a hearing is 30 days following the date of the notice issued pursuant to subsection (c).

f) When a public hearing is held, the Agency must respond to significant comments received during the comment period as provided in 35 Ill. Adm. Code 309.119 and 309.120, except that notice and transmission to the U.S. EPA Regional Administrator is not required. If no hearing is held, the Agency shall follow the procedures in 35 Ill. Adm. Code 309.112 and 309.120 for Agency action after the comment period. If necessary, the Agency will require the CAFO owner or operator to revise the nutrient management plan in order to be granted permit coverage.

g) When the Agency authorizes coverage for the CAFO owner or operator under the general permit, the terms of the nutrient management plan shall become incorporated as terms and conditions of the permit for the CAFO. This incorporation of terms and conditions does not require a modification of the general permit.

h) The Agency shall notify the CAFO owner or operator and inform the public that coverage has been authorized and of the terms of the nutrient management plan incorporated as terms and conditions of the permit applicable to the CAFO.

i) Nothing in this Section shall limit the Agency's authority to require an individual NPDES permit pursuant to Section 39(b) of the Act.

(Source: Added at ___ Ill. Reg. _____, effective _____)

Section 502.315 CAFO Permit Requirements

NPDES permits issued to CAFOs under this Part must include:

a) Requirements to implement a nutrient management plan that meets the provisions of Subpart E of this Part.

b) Requirements for the permittee to create, maintain for five years from creation on site, and make available to the Agency, upon request, a complete copy of the records required in Section 502.320 of this Part.

c) Annual reporting requirements for permitted CAFOs. The permittee must submit an annual report to the Agency. The annual report must include the information specified in Section 502.325 of this Part.

d) Requirements to comply with the livestock waste discharge limitations in Subparts F, G and H of this Part, if applicable.

(Source: Added at ___ Ill. Reg. _____, effective _____)

Section 502.320 Recordkeeping Requirements

The permittee must create, maintain for five years, and make available to the Agency, upon request, the following records:

a) A copy of all applicable records identified pursuant to Section 502.510(b)(15);

b) A copy of the information required under Section 502.201;

c) Records documenting the visual inspections required under Section 502.610(c);

d) Weekly records of the depth of the manure and process wastewater in the liquid livestock waste storage as indicated by the depth marker under Section 502.610(d);

e) Records documenting any actions taken to correct deficiencies required under Sections 502.610(e) and (f). Deficiencies not corrected within 30 days must be accompanied by an explanation of the factors preventing immediate correction;

f) Records of mortalities management and practices used by the facility to meet the requirements of Section 502.610(g);

g) Records documenting the current design of any livestock waste storage structures, including volume for solids accumulation, design treatment volume, total design volume, and approximate number of days of storage capacity;

h) Records of the date, time, and estimated volume of any overflow;

i) A copy of the facility's site-specific nutrient management plan;

j) Expected crop yields for land application areas;

k) The date(s) livestock waste is applied to each land application area;

l) Copies of contracts for the transfer of waste to other persons consistent with Section 502.610 (k);

m~~l~~) Records documenting subsurface drainage inspections conducted according to the plan developed pursuant to Section 502.510(b)(13);

n~~m~~) Results from livestock waste and soil sampling;

o~~n~~) Explanation of the basis for determining livestock waste application rates;

p~~o~~) Calculations showing the total nitrogen and phosphorus to be applied to each field, including sources other than livestock waste;

q~~p~~) Total amount of nitrogen and phosphorus actually applied to each field, including documentation of calculations for the total amount applied;

r~~q~~) The method used to apply the livestock waste;

s~~r~~) Date of livestock waste application equipment inspection;

t~~s~~) Maximum number and type of animals, whether in open confinement or housed under roof by the following types: beef cattle, broilers, layers, swine weighing 55 pounds or more, swine weighing less than 55 pounds, mature dairy cows, dairy heifers, veal calves, sheep and lambs, horses, turkeys, ducks, other;

u~~t~~) All records necessary to prepare the annual report required by Section 502.325;

v~~u~~) Total number of acres of land application area covered by the nutrient management plan;

w~~v~~) The quantity of livestock waste removed when a manure storage area or waste containment area is dewatered;

x~~w~~) The permittee will record the following information for each day during which livestock wastes are applied to land:

1) the amount applied to each field in either gallons, wet tons or dry tons per acre,

2) soil water conditions at the time of application (such as dry, saturated, flooded, frozen, snow-covered),

3) an estimate of the amount of precipitation 24 hours prior to, and for 24 hours after the application,

4) the type of application method used (surface, surface with incorporation, or injection),

5) the location of the field where livestock waste was applied,

6) the results of leak inspection of livestock waste application equipment,

7) the name and address of off-site recipients of livestock waste, the amount of waste transferred to each off-site recipient in gallons or dry tons, off-site location on a topographic map and acreage of each site used by the off-site recipient,

8) Weather conditions, including precipitation, air temperature, wind speed, wind direction and dew point, at time of land application and for 24 hours prior to and for 24 hours following application, and

9) Records of the weather forecasts required to be maintained pursuant to Sections 502.620(d) and 502.630(b)(3), (4), and (5);

y~~x~~) The laboratory analysis sheets reporting the analysis of the livestock waste samples shall be kept on file at the facility for the term of this permit and for 5 years after expiration of the permit; and

z~~y~~) Records documenting the test methods and sampling protocols for manure, litter and process wastewater and soil analyses.

(Source: Added at ___ Ill. Reg. _____, effective _____)

Section 502.325 Annual Report

a) The NPDES permit must specify annual reporting requirements for the CAFO. The annual report must be submitted to the Agency.

b) The annual report must contain the following minimum elements:

1) Maximum number and type of animals, whether in open confinement or housed under roof by the following types: beef cattle, broilers, layers, swine weighing 55 pounds or more, swine weighing less than 55 pounds, mature dairy cows, dairy heifers, veal calves, sheep and lambs, horses, turkeys, ducks, other;

2) Quantity of livestock waste generated by the facility in the previous 12 months (tons/gallons);

3) Quantity of livestock waste transferred to **(**an**)**other person**(s)** by the facility in the previous 12 months (tons/gallons)**, including the name of the transferee(s) and the date(s) of transfer**;

4) Total number of acres of land application area covered by the nutrient management plan;

5) Total number of acres under the control of the CAFO that were used for land application of livestock waste in the previous 12 months;

6) A statement indicating whether the current version of the CAFO's nutrient management plan for land application of livestock waste was developed or approved by a certified nutrient management planner and by whom the certification was issued;

7) Summary of all livestock waste discharges from the production area that have occurred in the previous 12 months, including date, time, and approximate volume;

8) A report of instances of non-compliance with the NPDES permit in the previous 12 months;

9) The actual crops planted and actual yields for each field;

10) The actual nitrogen and phosphorus content of the livestock waste;

11) The results of calculations conducted in accordance with Sections 502.515(d)(3) and (e)(3);

12) The amount of livestock waste land applied to each field during the

previous 12 months; and

13) For any CAFO that implements a nutrient management plan that addresses rates of application in accordance with Section 502.515(e):

a) the results of any soil testing for nitrogen and phosphorus taken during the preceding 12 months,

b) data used in calculations conducted in accordance with Section 502.515(e)(3), and

c) the amount of any supplemental fertilizer applied during the previous 12 months.

(Source: Added at __ Ill. Reg. _____, effective _____)

SUBPART E: REQUIREMENTS FOR DEVELOPING AND IMPLEMENTING NUTRIENT MANAGEMENT PLANS

Section 502.500 Purpose, Scope and Applicability

The requirements in this Subpart are intended to minimize the transport of nitrogen and phosphorus to waters of the ~~United~~ State~~s~~ in compliance with the nutrient management plan.

a) The requirements in this Subpart apply to CAFOs required to obtain an NPDES permit. Unpermitted Large CAFOs, ~~claiming an agricultural stormwater exemption consistent with Section 502.102~~, are subject to the requirements in Section **502.500(b), 502.505,** 502.510(b)**, 502.515, and 502.520(a).**

b) The CAFO owner or operator shall develop, submit and implement a site specific nutrient management plan. Th~~eis~~ **nutrient management** plan **for a NPDES permitted facility** shall ~~specifically~~ identify and describe practices that will be implemented to assure compliance with this Subpart and the livestock waste discharge limitations and technical standards of Subparts F, G, and H. **The nutrient management plan for an unpermitted Large CAFO shall identify and describe practices that will be implemented to assure compliance with Sections 502.505, 502.510(b), 502.515 and 502.520(a) of Subpart E and Sections 502.610(k) and 502.615 through 502.645 of Subpart F.**

(Source: Added at __ Ill. Reg. _____, effective _____)

Section 502.505 Nutrient Management Plan Information

The nutrient management plan shall contain, at a minimum, the following items:

a) Name, address, and phone number of the owners of the CAFO;

b) Name, address, and phone number of the managers or operators if different than the owners;

c) Address, phone number, and plat location of the CAFO production area;

d) Name of the person who developed the nutrient management plan and a statement indicating whether it was developed or approved by a certified nutrient management planner and by whom the certification was issued;

e) Type of waste storage for the CAFO;

f) Species, size and maximum number of animals at the CAFO;

g) Scaled aerial photos or maps depicting each field available and intended for livestock waste applications with available acreage listed and indicating residences, non-farm businesses, common places of assembly, streams, wells, waterways, lakes, ponds, rivers, drainage ditches, subsurface drainage systems, other water sources, 10-year flood plain, buffers, slope, locations of structural BMPs, setbacks and areas restricted from application by this Subpart E;

h) For land application areas not owned or rented **or otherwise under the control of the owner or operator**, copies of **contracts** ~~statement of consent~~ between the owner or operator of the livestock facilities and the owner of the land where livestock waste will be applied **consistent with Section 502.610(k)**;

i) Cropping schedule for each field for the past year, anticipated crops for the current year, and anticipated crops for the five year term of the permit;

j) Realistic crop yield goal for each crop in each field;

k) An estimate of the nutrient value of the livestock waste or results of livestock waste analysis determined pursuant to Section 502.625(c);

l) Livestock waste application methods;

m) Results of the Bray P1 or Mehlich 3 test for soil phosphorus reported in pounds of elemental phosphorus per acre. If the livestock waste is to be land applied based on a single year or multi-year phosphorus application on the land application area, the following items must be provided;

1) An estimate of the volume of livestock waste to be disposed of annually,

2) The phosphorus content of the livestock waste,

3) The phosphorus amount needed for each crop in the planned crop rotation, expressed as pounds of P_2O_5 per acre, obtained from the Illinois Agronomy Handbook, 24th Edition, incorporated by reference at Section 501.200, and

4) The maximum livestock waste application rate based on phosphorus for each field, determined pursuant to Section 502.625(g).

n) Calculations showing the following;

1) An estimate of the volume of livestock waste to be disposed of annually,

2) Nitrogen loss due to the method of storage, if applicable,

3) Amount of nitrogen available for application,

4) Nitrogen loss due to the method of application,

5) Amount of plant-available nitrogen including first-year mineralization of organic nitrogen,

6) Amount of nitrogen required by each crop in each field based on realistic crop yield goal,

7) Nitrogen credits from previous crops, from other sources of fertilizer applied for the growing season, and from any livestock waste applications during the previous three years for each field,

8) Livestock waste application rate based on nitrogen for each field, and

9) Land area required for application.

o) A listing of fields and the planned livestock waste application amounts for each field.

(Source: Added at __ Ill. Reg. _____, effective _____)

Section 502.510 Nutrient Management Plan Requirements

a) Any permit issued to a CAFO must include a requirement to implement a nutrient management plan by the date of permit coverage that, at a minimum, contains best management practices necessary to meet the requirements of this Section and the applicable livestock discharge limitations and technical standards in 35 Ill. Adm. Code Parts 501 and 502.

b) The nutrient management plan must specify and demonstrate:

1) The livestock waste application rate of nitrogen in a single year and phosphorus in a single year or multiple years, not to exceed the single year crop nitrogen and single year or multi-year phosphorus requirements for realistic crop yield goals in the rotation;

2) Adequate land application area for livestock waste application**, including land owned or controlled by a person other than the CAFO owner or operator**;

3) Adequate storage of livestock waste, including procedures to ensure proper operation and maintenance of the storage facilities;

4) Proper management of mortalities to ensure that they are not disposed of in a liquid livestock waste or stormwater storage or treatment system that is not specifically designed to treat animal mortalities;

5) That clean water is diverted, as appropriate, from the production area;

6) Prevention of direct contact of confined animals with waters of the ~~United~~ State~~s~~;

7) That chemicals and other contaminants handled on-site are not disposed of in any livestock waste or stormwater storage or treatment system unless specifically designed to treat such chemicals and other contaminants;

8) Appropriate site specific conservation practices to be implemented, including as appropriate buffers or equivalent practices, to control runoff of pollutants to waters of the ~~United~~ State~~s~~;

9) Protocols for appropriate testing of livestock waste and soil. Livestock waste must be analyzed a minimum of once annually for nitrogen and phosphorus content, and soil analyzed a minimum of

twice every five years for phosphorus content. The results of these analyses are to be used in determining application rates for livestock wastes;

10) Protocols to land apply livestock waste in accordance with site-specific nutrient management practices that ensure appropriate agricultural utilization of the nutrients in the livestock waste;

11) Livestock waste shall not be applied within the distance from residences provided in Section 502.645(a) and within the areas prohibited from land application by this Part;

12) A winter time land application plan that meets the requirements of Section 502.630 of this Part;

13) The plan for the inspection, monitoring, management and repair of subsurface drainage systems at the livestock waste application site. Inspection of subsurface drainage systems shall include visual inspection prior to land application to determine failures that may cause discharges and visual inspection after land application to identify discharges;

14) A spill prevention and control plan;

15) Specific records that will be maintained to document the implementation and management of the minimum elements described in subsections (**1**~~2~~) through (14) of this Section; and

16) A description of the storage provisions and schedules provided for livestock waste when cropping practices, soil conditions, weather conditions or other conditions prevent the application of livestock waste to land or prevent other methods of livestock waste disposal.

(Source: Added at __ Ill. Reg. _____, effective _____)

Section 502.515 Terms of Nutrient Management Plan

Any permit issued to a CAFO must require compliance with the terms of the CAFO's site-specific nutrient management plan. These terms include:

a) The terms of the nutrient management plan are the information, protocols, best management practices, and other conditions in the nutrient management plan determined by the Agency to be necessary to meet the requirements of Sections 502.505 and 502.510.

b) The terms of the nutrient management plan, with respect to protocols for land application of livestock waste as required by Subpart F, must include:

1) the fields available for land application;

2) field-specific rates of application properly developed pursuant to subsections (d) or (e) of this Section, to ensure appropriate agricultural utilization of the nutrients in the livestock waste; and

3) any timing limitations identified in the nutrient management plan concerning land application on the fields available for land application.

c) The terms of the nutrient management plan must address rates of application using either the Linear Approach as described in subsection (d) of this Section or the narrative rate approach as described in subsection (e) of this Section, unless the Agency specifies that only one of these approaches may be used.

d) The Linear Approach is an approach that expresses rates of application as pounds of nitrogen and phosphorus, according to the following specifications:

1) The terms include maximum application rates from livestock waste for each year of permit coverage, for each crop identified in the nutrient management plan, in chemical forms determined to be acceptable to the Agency, in pounds per acre, per year, for each field to be used for land application, and certain factors necessary to determine such rates.

2) At a minimum, the factors that are terms must include:

A) the outcome of the field-specific assessment of the potential for nitrogen and phosphorus transport from each field;

B) the crops to be planted in each field or any other uses of a field such as pasture or fallow fields;

C) the realistic yield goal for each crop or use identified for each field;

D) the nitrogen and phosphorus recommendations according to Section 502.625 for each crop or use identified for each field;

E) credits for all nitrogen in the field that will be plant available;

F) consideration of multi-year phosphorus application;

G) accounting for all other additions of plant available nitrogen and phosphorus to the field;

H) the form and source of livestock waste to be land-applied;

I) the timing and method of land application; and

J) the methodology by which the nutrient management plan accounts for the amount of nitrogen and phosphorus in the livestock waste to be applied.

3) CAFOs that use this linear approach must calculate the maximum amount of livestock waste to be land applied at least once each year using the results of the most recent representative livestock waste tests for nitrogen and phosphorus taken within 12 months of the date of land application required by Section 502.635.

e) The narrative rate approach is an approach that expresses rates of application as a narrative rate of application that results in the amount, in tons or gallons, of livestock waste to be land applied, according to the provisions of this subsection (e).

1) The terms include:

A) maximum amounts of nitrogen and phosphorus derived from all sources of nutrients, for each crop identified in the nutrient management plan, in chemical forms determined to be acceptable to the Agency, in pounds per acre, for each field, and certain factors necessary to determine such amounts;

B) the outcome of the field-specific assessment of the potential for nitrogen and phosphorus transport from each field;

C) the crops to be planted in each field or any other uses such as pasture or fallow fields including alternative crops identified in accordance with subsection (e)(1)(G) of this Section;

D) the realistic yield goal for each crop or use identified for each field;

E) the nitrogen and phosphorus recommendations according to Section 502.625 for each crop or use identified for each field;

F) the methodology by which the nutrient management plan accounts for the following factors when calculating the amounts of livestock waste to be land applied:

i) results of soil tests conducted in accordance with protocols identified in the nutrient management plan, as required by Section 502.510(b)(9);

ii) credits for all nitrogen in the field that will be plant available;

iii) the amount of nitrogen and phosphorus in the livestock waste to be applied;

iv) consideration of multi-year phosphorus application;

v) accounting for all other additions of plant nitrogen and phosphorus to the field;

vi) the form and source of livestock waste;

vii) the timing and method of land application; and

viii) volatilization of nitrogen and mineralization of organic nitrogen.

G) alternative crops identified in the CAFO's nutrient management plan that are not in the planned crop rotation.

i) Where a CAFO includes alternative crops in its nutrient management plan, the crops must be listed by field, in addition to the crops identified in the planned crop rotation for that field, and the nutrient management plan must include realistic crop yield goals and the nitrogen and phosphorus recommendations according to Section 502.625 for each crop.

ii) Maximum amounts of nitrogen and phosphorus from all sources of nutrients and the amounts of livestock waste to be applied must be determined in

accordance with the methodology described in subsections (e)(1)(A) through (F) of this Section.

2) For CAFOs using this narrative approach, the following projections must be included in the nutrient management plan submitted to the Agency, but are not terms of the nutrient management plan:

A) the CAFO's planned crop rotations for each field for the period of permit coverage;

B) the projected amount of livestock waste to be applied;

C) projected credits for all nitrogen in the field that will be plant available;

D) consideration of multi-year phosphorus application;

E) accounting for all other additions of plant available nitrogen and phosphorus to the field;

F) the predicted form, source, and method of application of livestock waste for each crop; and

G) timing of application for each field, insofar as it concerns the calculation of rates of application, is not a term of the nutrient management plan.

3) CAFOs that use this narrative rate approach must calculate maximum amounts of livestock waste to be land applied at least once each year using the methodology required in subsections (e)(1)(A) through (F) of this Section before land applying livestock waste and must rely on the following data:

A) a field-specific determination of nitrogen that will be plant available consistent with the methodology required by subsections (e)(1)(A) through (F) of this Section, and for phosphorus, the results of the most recent soil test conducted in accordance with soil testing requirements approved by the Agency; and

B) the results of most recent representative livestock waste tests for nitrogen and phosphorus taken within 12 months of the date of land application, in order to determine the amount of nitrogen and phosphorus in the livestock waste to be applied.

(Source: Added at ___ Ill. Reg. _____, effective _____)

Section 502.520 Changes to the Nutrient Management Plan

When a CAFO owner or operator makes changes to the CAFO's nutrient management plan previously submitted to the Agency, the procedures in this Section are applicable.

a) The CAFO owner or operator must identify changes to the nutrient management plan, except that the results of calculations made in accordance with the requirements of Sections 502.515(d)(3) and 502.515(e)(3) of this Part are not subject to the requirements of this Section. These calculations may be revised without submittal to the Agency provided the calculation revisions do not change the terms of the nutrient management plan.

b) The Agency must determine whether the changes to the nutrient management plan necessitate revision to the terms of the nutrient management plan incorporated into the permit issued to the CAFO.

1) If revision to the terms of the nutrient management plan is not necessary, the Agency must notify the CAFO owner or operator and upon such notification the CAFO may implement the revised nutrient management plan.

2) If revision to the terms of the nutrient management plan is necessary, the Agency must determine whether such changes are substantial changes as described in subsection (d) of this Section.

3) If the Agency determines that the changes to the terms of the nutrient management plan are not substantial, the Agency must notify the owner or operator and inform the public of any changes to the terms of the nutrient management plan that are incorporated into the permit.

c) If the Agency determines that the changes to the terms of the nutrient management plan are substantial, the Agency must notify the public and make the proposed changes and the information submitted by the CAFO owner or operator available for public review and comment.

1) The process and time limits for submitting public comments and hearing requests, the hearing process if a request for a hearing is granted and the process for responding to significant comments received during the comment period, will follow the procedures applicable to draft general permits found in 35 Ill. Adm. Code 502.310(d) through (f).

2) The Agency will require the CAFO owner or operator to further revise the nutrient management plan, if necessary, in order to approve the revision to the terms of the nutrient management plan incorporated into the CAFO's permit.

3) Once the Agency incorporates the revised terms of the nutrient management plan into the permit, the Agency must notify the owner or operator and inform the public of the final decision concerning the revisions to the terms and conditions of the permit.

d) Substantial changes to the terms of the nutrient management plan incorporated as terms and conditions of a permit include, but are not limited to:

1) Addition of new land application areas not previously included in the CAFO's nutrient management plan. Except if the land application area that is being added to the nutrient management plan is covered by the terms of a nutrient management plan incorporated into an existing NPDES permit in accordance with the requirements of Section 502.515, and the CAFO owner or operator applies livestock waste on the newly added land application area in accordance with the existing field-specific permit terms applicable to the newly added land application area, such addition of new land would be a change to the new CAFO owner or operator's nutrient management plan but not a substantial change for purposes of this Section;

2) For nutrient management plans using the Linear Approach as set forth in Section 502.515(d) changes to the field-specific maximum annual rates of land application (pounds of nitrogen and phosphorus from livestock waste). For nutrient management plans using the narrative rate approach, changes to the maximum amounts of nitrogen and phosphorus derived from all sources for each crop;

3) Addition of any crop or other uses not included in the terms of the CAFO's nutrient management plan and corresponding field-specific rates of application expressed in accordance with Section 502.515 of this Part; and

4) Changes to site-specific components of the CAFO's nutrient management plan, where such changes are likely to increase the risk of nitrogen and phosphorus transport to waters of the ~~United~~ State~~s~~.

(Source: Added at ___ Ill. Reg. _____, effective _____)

SUBPART F: LIVESTOCK WASTE DISCHARGE LIMITATIONS AND TECHNICAL STANDARDS

Section 502.600 Applicability

This Subpart provides livestock waste discharge limitations and technical standards for permitted CAFOs **and unpermitted Large CAFOs**. Permitted CAFOs must achieve the livestock waste discharge limitations and technical standards in this Subpart as of the date of permit coverage. Unpermitted Large CAFOs **must achieve the livestock waste discharge limitations and technical standards of 502.610(k) and 502.615 through 502.645**~~claiming an agricultural stormwater exemption consistent with Section 502.102 are also subject to portions of this Subpart~~. This Subpart does not apply to CAFOs that stable or confine Horses, Sheep or Ducks. Horses or Sheep CAFOs are subject to applicable production area livestock waste discharge limitations and technical standards found in Section 502.720. CAFOs that confine Ducks in either a Dry Lot or Wet Lot are subject to applicable production area livestock waste discharge limitations and technical standards found in Section 502.730.

(Source: Added at __ Ill. Reg._____, effective _____)

Section 502.605 Livestock Waste Discharge Limitations for the Production Area for Permitted CAFOs

a) Except as provided in subsections (a)(1), (a)(2) and (c) of this Section, there must be no discharge of livestock wastes into waters of the ~~United~~ State~~s~~ from the CAFO production area. Whenever precipitation causes an overflow of livestock wastes from the containment or storage structure, such wastes in the overflow may be discharged into waters of the ~~United~~ State~~s~~ provided:

1) The production area is designed, constructed, operated and maintained to contain all livestock wastes including the runoff and the direct precipitation from a 25-year, 24-hour precipitation event except for large swine, poultry or veal CAFOs that are new sources which must comply with Subpart H of this Part, and

2) The production area is operated in accordance with the additional measures and records required by Section 502.610.

b) Any point source subject to this Subpart must achieve the livestock waste discharge limitations in this Section as of the date of the permit coverage.

c) Voluntary alternative performance standards. Any CAFO subject to this Subpart may request the Agency to establish NPDES permit livestock waste discharge limitations based upon site-specific alternative technologies that achieve a quantity of pollutants discharged from the production area equal to or less than the quantity of pollutants that would be discharged under the baseline performance standards as provided by Section 502.605(a).

1) In requesting site-specific livestock waste discharge limitations to be included in the NPDES permit, the CAFO owner or operator must submit a supporting technical analysis and any other relevant information and data that would support such site-specific livestock waste discharge limitations within the time frame provided by the Agency.

2) The supporting technical analysis must include calculation of the quantity of pollutants discharged, on a mass basis where appropriate, based on a site-specific analysis of a system designed, constructed, operated, and maintained to contain all livestock waste, including the runoff from a 25-year, 24-hour rainfall event.

3) The technical analysis of the discharge of pollutants must include:

A) all daily inputs to the storage system, including livestock waste, direct precipitation, and runoff;

B) all daily outputs from the storage system, including losses due to evaporation, sludge removal, and the removal of wastewater for use on cropland at the CAFO or transport off site;

C) a calculation determining the predicted median annual overflow volume based on a 25-year period of actual rainfall data applicable to the site;

D) site-specific pollutant data, including nitrogen, phosphorus, BOD_5 and total suspended solids, for the CAFO from representative sampling and analysis of all sources of input to the storage system, or other appropriate pollutant data; and

E) predicted annual average discharge of pollutants, expressed where appropriate as a mass discharge on a daily basis (lbs/day), and calculated considering subsections (c)(3)(A) through (D) of this subsection.

4) The Agency has the discretion to request additional information to supplement the supporting technical analysis, including inspection of the CAFO.

(Source: Added at __ Ill. Reg. _____, effective _____)

Section 502.610 Additional Measures for CAFO Production Areas

Each CAFO subject to this Subpart must implement the following:

a) The CAFO owner or operator must at all times properly operate and maintain all structural and operational aspects of the facilities including all systems for livestock waste treatment, storage, management, monitoring and testing.

b) Livestock within a CAFO production area shall not come into contact with waters of the ~~United~~ State~~s~~.

c) Visual inspections. There must be routine visual inspections of the CAFO production area. At a minimum, the following must be visually inspected:

1) Weekly inspections of all stormwater diversion devices, runoff diversion structures, and devices channeling contaminated stormwater to the wastewater and manure storage and containment structure;

2) Daily inspection of water lines in the production areas, including drinking water or cooling water lines; and

3) Weekly inspections of the livestock waste storage facilities. The inspection will note the level in liquid livestock waste storage facility using the depth marker required in subsection (d) of this Section.

d) Depth marker. All open surface liquid livestock waste storage facilities must have a depth marker which clearly indicates the minimum capacity necessary to contain the runoff and direct precipitation of the 25-year, 24-hour rainfall event. In the case of new sources subject to livestock waste discharge limitations established pursuant to Section 502.830 of this Part, all open surface livestock waste storage structures associated with such sources must include a depth marker which clearly indicates the minimum capacity necessary to contain the maximum runoff and direct precipitation associated with the design storm used in sizing the storage facility for no discharge.

e) Corrective actions. Any deficiencies found as a result of these inspections must be corrected as soon as possible.

f) In addition to the requirement in subsection (e) of this Section, deficiencies not corrected within 30 days must be accompanied by an explanation of the factors preventing immediate correction.

g) Discharge to waters of the ~~United~~ State~~s~~ of pollutants from dead livestock or dead animal disposal facilities are prohibited. Dead livestock and water contaminated by dead livestock shall not be disposed in the liquid manure storage structures, egg wash wastewater facilities, egg processing wastewater facilities, or areas used to hold products, by-products or raw materials that are set aside for disposal, or contaminated stormwater facilities, other than facilities used solely for disposal of dead livestock.

h) Chemicals and other contaminants shall not be disposed of in any livestock waste or stormwater storage or treatment system unless specifically designed to treat such chemicals and other contaminants.

i) A CAFO owner or operator utilizing an earthen lagoon or other earthen manure storage area or waste containment area shall inspect all berm tops, exterior berm sides, and non-submerged interior berm sides for evidence of erosion, burrowing animal activity, and other indications of berm degradation on a frequency of not less than once every week.

j) The CAFO owner or operator shall perform periodic removal of livestock waste solids from liquid manure storage areas and the waste containment area to maintain proper operation of the storage structures. Soils that are contaminated with livestock waste removed from earthen manure storage structures shall be considered livestock waste.

k) Requirements relating to transfer of livestock waste to other persons.

1) In cases where livestock waste is sold, given away, or otherwise transferred to other persons and the land application of that waste is not under the operational control of the CAFO owner or operator that generates the waste, the owner or operator shall enter into signed contractual agreements with the other persons to accept the waste, which shall cover the period of time the persons will accept the waste.

2) The owner or operator shall use a written contract that documents all of the following information:

A) The owner or operator's name, mailing address, and telephone number;

B) The name and address of the recipient of the livestock waste;

C) The nutrient content of the livestock waste to be used in determining appropriate land application rates;

D) The total quantity of livestock waste (tons/gallons) to be transferred;

E) A statement that informs the person of his or her responsibility to comply with state land application rules and manage the waste to minimize the discharge of pollutants to waters of the State;

F) The following certification: "I hereby declare that the livestock waste is accurately described above and is suitable for land application;"

G) Address or other description of the final destination of the livestock waste, including the amount of acreage available for land application if the waste is to be land applied;

H) Signature and date lines.

3) The owner or operator shall do all of the following with respect to the contract or letter of intent:

(A) Retain 1 copy of the contract:

(B) Give the remaining copies to the transferee and the Agency;

~~4~~1) Prior to transferring livestock waste **off-site** to other persons, CAFOs must provide the recipient of the livestock waste with the most current nutrient analysis.

~~5~~2) The analysis provided must be consistent with applicable requirements to sample livestock wastes in Section 502.635(b).

~~6~~3) CAFOs must retain for five years **copies of waste transfer contracts and** records of the date, recipient name and address, and approximate amount of livestock waste transferred ~~to another person~~.

l) Livestock Waste Storage requirements

1) Livestock waste storage structures at the CAFO production area shall be designed to contain a volume equal to or greater than the sum of the volumes of the following:

A) the amount of waste generated during a 180-day period of operation at design capacity;

B) the runoff volumes generated during a 180-day period, including all runoff and precipitation from lots, roofs and other surfaces where precipitation is directed into the storage structure;

C) the volume of all wash down liquid generated during the 180-day period that is directed into the manure storage structure;

D) the volume of runoff and precipitation directed to the storage structure during a 25 year, 24 hour storm event;

E) the design volatile solids loading volume, if applicable;

F) the sludge accumulation volume, if applicable; and

G) a freeboard of 2 feet, except for structures with a cover or otherwise protected from precipitation.

2) The storage volume requirements in this subsection (l) do not apply to pump stations, settling tanks, pumps, piping or other components of the CAFO production area that temporarily hold or transport waste to a storage facility meeting the requirements of this subsection.

(Source: Added at ___ Ill. Reg. _____, effective _____)

Section 502.615 Nutrient Transport Potential

a) Field assessment. An individual field assessment of the potential for nitrogen and phosphorus transport from the field to surface waters must be conducted and the results contained in the nutrient management plan. The following factors must be identified for each field to determine nitrogen and phosphorus transport potential to waters of the ~~United~~ State~~s~~.

1) Soil type,

2) Slope,

3) Conservation practices,

4) Soil erodibility or potential for soil erosion,

5) Soil test phosphorus,

6) Tile inlet locations,

7) Distance to surface waters,

8) Proximity to wells, and

9) Location of conduits to surface water including preferential flow paths.

b) The applicant shall utilize the field assessment information obtained in subsection (a) of this Section to determine the appropriate phosphorus-based or nitrogen based application rate for each assessed field. The determination of phosphorus-based or nitrogen-based application of livestock waste on an assessed field must be consistent with subsection (c) or (d) or this Section and Sections 502.620, 502.625, 502.630, and 502.635 of this Part.

c) Nitrogen-based application of livestock waste must be conducted consistent with the following requirements:

1) livestock waste is applied consistent with the setback requirements in Section 502.645;

2) available soil phosphorus (Bray P1 or Mechlich 3) is equal to or less than **200** ~~300~~ pounds per acre;

3) the soil loss is less than the erosion factor T calculated using the Revised Universal Soil Loss Equation 2, found at http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm;

4) if conduits on the field are less than 400 feet from surface waters, the setback requirements in 502.645(b)(2) do not apply. Instead the following setbacks apply:

A) Livestock waste application shall be conducted no closer than 150 feet from a tile inlet, agricultural well head, sinkhole, or edge of a ditch that has no vegetative buffer; or

B) Livestock waste application shall be conducted no closer than 50 feet from a tile inlet, agricultural well head, sinkhole, or edge of a ditch that has a 50 foot vegetative buffer or 50 feet from the center of a grass waterway.

These setbacks do not apply if the CAFO is able to demonstrate to the Agency that a setback or buffer is not necessary because implementation of alternative conservation practices (including, but not limited to, injection and incorporation) or field-specific conditions will provide pollutant reductions equivalent or better than the reductions that would be achieved by the 150-foot setback.

5) if conduits on the field are greater than 400 feet from surface waters, the setback requirements in Section (c)(4) do not apply;

6) where surface waters are on the assessed field or within 200 feet of the field, the livestock waste applied to the field shall be injected or incorporated within 24 hours of the application or equivalent conservation practices must be installed and maintained on the field pursuant to the United States Department of Agriculture Natural Resources Conservation Service practice standards; and

7) if nitrogen-based application cannot be conducted in accordance with this Section, then phosphorus-based application must be conducted as specified in Section 502.615(d).

d) Phosphorus-based application of livestock waste must be conducted consistent with the following requirements:

1) livestock waste must be applied consistent with the setback requirements in Section 502.645;

2) the livestock waste application rate must not exceed the annual agronomic nitrogen demand of the next crop grown as provided in Section 502.625(a);

3) if the soil contains greater than 50 pounds of available soil phosphorus per acre (Bray P1 or Mechlich 3), phosphorus-based application rates must be neutral during the nutrient management plan period;

4) if the soil contains greater than **200** ~~300~~ pounds of available soil phosphorus per acre (Bray P1 or Mechlich 3), the amount of phosphorus applied in the livestock waste must not exceed the amount of phosphorus removed by the next year's crop grown and harvested; and

5) livestock waste shall not be applied to fields with available soil phosphorus (Bray P1 or Mechlich 3) greater than 400 pounds per acre.

(Source: Added at ___ Ill. Reg. _____, effective _____)

Section 502.620 Protocols to Land Apply Livestock Waste

a) Livestock wastes shall not be applied to waters of the ~~United~~ State~~s~~. Livestock waste application shall not cause runoff to waters of the ~~United~~ State~~s~~ during non-precipitation events. Livestock waste application shall not occur on land that is saturated at the time of application. Livestock waste shall not be applied onto land with ponded water.

b) Discharge of livestock waste to waters of the ~~United~~ State~~s~~ or off-site during dry weather through subsurface drains is prohibited.

c) Livestock waste shall not be applied during precipitation when runoff of livestock waste will be produced.

d) Surface land application of livestock waste shall not occur within 24 hours preceding a forecast of 0.5 inches or more of precipitation in a 24 hour period as measured in liquid form. The CAFO owner or operator shall use one of the two methods provided below for determining whether or not these conditions exist and shall maintain a record of the forecast from the source used.

1) A prediction of a 60 percent or greater chance of 0.5 inches or more of precipitation in a 24 hour period as measured in liquid form by the National Weather Service at http://www.nws.noaa.gov/mdl/forecast/graphics/MAV/ for the location nearest to the land application area; or

2) A prediction of 0.5 inches or more of precipitation in a 24 hour period as measured in liquid form and identified as higher than QPF category 3 by the National Weather Service at http://www.nws.noaa.gov/mdl/synop/products/bullform.mex.htm for the land application area location.

e) Determination of soil loss must be made for each field using Revised Universal Soil Loss Equation 2 at http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm that accounts for changes in factors affecting runoff, soil erodibility, slope length, slope steepness, cover management and supporting practices.

f) Surface land application may be used when the land slope is no greater than 5% or when the yearly average soil loss is equal to or less than 5 tons per acre per year or erosion factor T, whichever is less, regardless of slope, as determined by the Revised Universal Soil Loss Equation 2, at http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm. Injection or incorporation within 24 hours shall be used when the land slope is greater than 5% and the yearly average soil loss is greater than 5 tons per acre per year or erosion factor T, whichever is less.

g) Land application of livestock waste is prohibited on slopes greater than 15%.

h) Liquid livestock waste shall not be applied to land with less ~~10 inches~~ **five (5) feet of** soil covering fractured bedrock, sand or gravel.

i) Livestock waste shall not be applied to bedrock outcrops.

j) Livestock waste shall be applied at no greater than 50 percent of the agronomic nitrogen rate determined pursuant to Section 502.625 when there is less than 20 inches of unconsolidated material over bedrock.

k) Livestock waste shall be applied at no greater than 50 percent of the agronomic nitrogen rate determined pursuant to Section 502.625 when the minimum soil depth to seasonal high water table is less than or equal to 2 feet.

l) Livestock waste shall not be applied at rates that exceed the infiltration rates of the soil.

m) Liquid livestock waste containing less than 5% solids shall be applied at no greater than 13,000 gallons per acre per application on fields with subsurface drainage. Under drought conditions rated "moderate" or greater by the U.S. Drought Monitor, the application rate shall not exceed 6,800 gallons per acre per application. Tile outlets shall be monitored during and after application. If there is evidence that tiles are discharging waste, application shall stop immediately and tile plugs or other equipment shall be used to stop the discharge.

(Source: Added at ___ Ill. Reg. _____, effective _____)

Section 502.625 Determination of Livestock Waste Application Rates

a) Livestock waste application shall not exceed the agronomic nitrogen rate, which is defined as the annual application rate of nitrogen that can be expected to be required for a realistic crop yield goal. Multi-year phosphorus application is allowed when such application is specified in a nutrient management plan and meets the requirements in Section 502.615. Any such application must be consistent with nutrient management plan requirements. The agronomic rate must be determined in a manner consistent with this Section and Section 502.615.

b) Livestock Waste Volumes. The estimate of the annual volume of available livestock waste for application shall be obtained by multiplying the number of animals constituting the maximum design capacity of the facility by the appropriate amount of waste generated by the animals. The following sources may be used to obtain the amount of waste generated: Livestock Waste Facilities Handbook, Third Edition, Table 2-1, incorporated by reference at 35 Ill. Adm. Code 501.200, or 35 Ill. Adm. Code 560, Table 1. For purposes of this section, "maximum design capacity" means the maximum number of animals that can be housed at any time for a minimum of 45 days at a CAFO.

c) Nutrient Value of Livestock Waste. For new livestock facilities that have not generated livestock waste, the owner or operator must prepare a plan based on an average of the minimum and maximum numbers in the table values derived from Livestock Waste Facilities Handbook, Third Edition, (Table 2-1, 10-6, or 10-7), or Manure Characteristics, incorporated by reference at 35 Ill. Adm. Code 501.200, or the 35 Ill. Adm. Code 560, Table 1 or Table 2. If "as produced" or "as excreted" nutrient values are used, the nitrogen value shall be adjusted to account for losses due to the type of storage system utilized using an average of the ranges in Livestock Waste Facilities Handbook, Third Edition, Table 10-1. Other sources of nutrient values may be used if approved by the Agency. Owners or operators of existing livestock facilities, must prepare the plan based on representative sampling and analysis of the livestock waste generated by the CAFOs in accordance with Section 502.635(b).

d) Adjustments to Nitrogen Availability. Adjustments shall be made to nitrogen availability to account for the following:

1) Nitrogen loss from livestock waste due to method of application, based on an average of the ranges in Livestock Waste Facilities Handbook, Third Edition, Table 10-2; and

2) The first-year mineralization of organic nitrogen into a plant available form, as obtained from Livestock Waste Facilities Handbook, Third Edition, Table 10-5.

e) Realistic Crop Yield Goal

1) The realistic crop yield goal shall be determined for each field where the livestock waste is to be land applied. The realistic crop yield goal shall be determined using an average yield over a five-year period from the field where livestock waste is to be land applied. The source of data to be utilized to determine the realistic crop yield goal is provided in subsection (e)(2) of this Section.

2) Whenever five years of data is available for the field where livestock waste is to be land applied, proven yields shall be used in calculating the realistic crop yield, unless there is an agronomic basis for predicting a different realistic crop yield goal. The owner or operator shall indicate the method used to determine the proven yield. Data from years with crop disasters may be discarded.

A) If five years of proven yield data is not available for the field where the livestock waste is to be land applied or if an agronomic basis exists for predicting a different realistic crop yield goal, the owner or operator may calculate the realistic crop yield goal using crop insurance yields or Farm Service Agency United States Department of Agriculture yields. If either of these sources is used, a copy of the insurance or assigned crop yields shall be included with the nutrient management plan.

B) If data is not available on proven yields, crop insurance yields or Farm Service Agency yields or if an agronomic basis exists for predicting a different realistic crop yield goal, soils based yield data from the University of Illinois "Average Crop, Pasture, and Forestry Productivity Ratings for Illinois Soils; Bulletin No. 810" (Bulletin 810) or "Optimum Crop Productivity Ratings for Illinois Soils ; Bulletin 811" (Bulletin 811), incorporated by reference at 35 Ill. Adm. Code 501.200, shall be used by the owner or operator to calculate the realistic crop yield goal pursuant to subsection (e)(1).

i) If Bulletin 810 or 811 is used to calculate the realistic crop yield goal, a soil map of the land application areas shall be included in the nutrient management plan.

ii) If Bulletin 810 or 811 is used, the realistic crop yield goal shall be determined by a weighted average of the soil interpretation yield estimates for the fields where livestock waste is to be land applied.

iii) If Bulletin 811 is used, the owner or operator shall demonstrate in the nutrient management plan that the operational management and field conditions of the facility and land application areas meet the requirements for optimum conditions as provided in Bulletin 811.

f) Nitrogen Credits

1) Nitrogen credits shall be calculated by the CAFO owner or operator, pursuant to Section 502.505(n)(7) of this Part, for nitrogen-producing crops grown the previous year, for other sources of nitrogen applied for the growing season, and for mineralized organic nitrogen in livestock waste applied during the previous three years.

2) Nitrogen credits shall be calculated by the CAFO owner or operator for the mineralized organic nitrogen in livestock waste applied during the previous three years at the rate of 50%, 25%, and 12.5%, respectively, of that mineralized during the first year.

g) Phosphorus. The plan shall be developed or amended by the CAFO owner or operator to determine the maximum livestock waste application rate for each field. The plan for that field shall contain the following:

1) The phosphorus content of the livestock waste shall be determined in accordance with subsection (c) of this Section;

2) The realistic crop yield goal of each crop in the field, obtained pursuant to subsection (e)(1) of this Section;

3) The phosphorus amount needed for each crop in the planned crop rotation, expressed as P_2O_5, obtained from the Illinois Agronomy Handbook, 24th Edition, incorporated by reference at Section 501.200. The determination of this phosphorus amount shall be based on the realistic crop yield goal for each planned crop and the soil test for available phosphorus (Bray P1 or Mechlich 3);

4) The phosphorus carryover from previous years application of phosphorus or livestock waste;

5) Soil test phosphorus results for that field; and

6) The maximum livestock waste application rate shall be consistent with nitrogen-based or phosphorus-based applications allowed under Section 502.615.

h) Nitrogen and phosphorus fertilization rates for the realistic crop yield goal may be obtained from the Illinois Agronomy Handbook, 24th Edition, incorporated by reference at Section 501.200, or 35 Ill. Adm. Code 560, Appendix A.

(Source: Added at __ Ill. Reg. _____, effective _____)

Section 502.630 Protocols to Land Apply Livestock Waste During Winter

a) Winter Application Prohibition

1) Surface land application of livestock waste on frozen, ice covered or snow covered ground is prohibited, unless **permission is granted to the owner or operator by the Agency upon verification that the following criteria have been met:**

A) No practical alternative measures are available to handle the livestock waste within storage facilities or to dispose the livestock waste at other sites**. Examples of practical alternative measures include the transfer of waste to another waste handling facility or sewage treatment plant, rental or acquisition of a storage tank, reduction of herd size or depopulation, and protection of the facility from direct precipitation and clean stormwater runoff**;

B) Liquid livestock waste cannot be injected or incorporated within 24 hours due to soil conditions;

C) Prior to December 1, the owner or operator has taken steps to provide 120 days of available storage capacity of manure storage areas**. Examples of steps that should be taken include land application or transfer of waste to another party, protection of waste storage structures from direct precipitation and clean stormwater runoff, creation of additional storage capacity if animal units increase, and**

construction of a waste storage structure(s) with at least 120 days of capacity if one does not already exist;

D) The owner or operator has complied with subsection (a)(1)(C) and yet the storage volume available on December 1 of that winter season is less than 120 days of storage;

E) The owner or operator has notified the Agency in writing on December 1 of that winter season that the CAFO has less than 120 days storage available; and

F) The discharge of livestock waste from the structure to the surface waters is expected to occur due to shortage in storage capacity.

2) The storage volume calculation in subsection (a)(1)(C) must include runoff and direct precipitation plus the volume of livestock excreta, wash water and other process wastewater generated and expected to enter the storage structure during the period of December 1 to April 1. Runoff volume calculations must meet the following requirements:

A) Runoff calculations must be based on the runoff transferred into the storage structure under frozen ground conditions;

B) Direct precipitation that will reduce the available storage volume must be based on normal precipitation for the December 1 to April 1 period for the nearest weather station and for facilities exposed to precipitation, the 25-year, 24-hour storm event volume or the design storm event volume determined under Subpart H for Large swine, poultry and veal CAFOs that are new sources. The determination of normal precipitation shall be based on National Weather Service or State Water Survey Records;

C) The following sources may be used to determine normal precipitation:

i) http://www.isws.illinois.edu/atmos/statecli/newnormals/newnormals.htm

or

ii) http://cdo.ncdc.noaa.gov/cgi-bin/climatenormals/climatenormals.pl;

D) The owner or operator shall keep a record of the precipitation value used and the source from which the value was obtained; and

E) Calculations must allow for a freeboard of two feet.

3) In the event winter land application is necessary, it must be conducted pursuant to a winter application plan described in subsection (b) of this Section and according to the conditions of subsection (c) of this Section.

b) Winter Application Plan

In order to conduct surface land application on frozen, ice covered, or snow covered ground, the requirements of this subsection (b) conditions must be met.

1) No land application may occur within ¼ mile of a non-farm residence.

2) No discharge may occur during land application of livestock waste.

3) Surface land application on frozen ground shall not occur within 24 hours preceding a forecast of 0.25 inches or more of precipitation in a 24 hour period as measured in liquid form. The CAFO owner or operator shall use one of the two methods provided below for determining whether or not these conditions exist and shall maintain a record of the forecast from the source used.

A) A prediction of a 60 percent or greater chance of 0.25 inches or more of precipitation in a 24 hour period as measured in liquid form by the National Weather Service at http://www.nws.noaa.gov/mdl/forecast/graphics/MAV/ for the location nearest to the land application area; or

B) A prediction of 0.25 inches or more of precipitation in a 24 hour period as measured in liquid form and identified as higher than QPF category 2 by the National Weather Service at http://www.nws.noaa.gov/mdl/synop/products/bullform.mex.htm for the land application area location.

4) Surface land application of livestock waste on ice covered or snow covered land shall not occur within 24 hours preceding a forecast

of 0.1 inches or more of precipitation in a 24 hour period as measured in liquid form. The CAFO owner or operator shall use one of the two methods provided below for determining whether or not these conditions exist and shall maintain a record of the forecast from the source used.

A) A prediction of a 60 percent or greater chance of 0.1 inches or more of precipitation in a 24-hour period as measured in liquid form by the National Weather Service at http://www.nws.noaa.gov/mdl/forecast/graphics/MAV/ for the location nearest to the land application area; or

B) A prediction of 0.1 inches or more of precipitation in a 24-hour period as measured in liquid form and identified as higher than QPF category 1 by the National Weather Service at http://www.nws.noaa.gov/mdl/synop/products/bullform.mex.htm for the land application area location.

5) If the land application of livestock waste is on ice covered or snow covered land, surface land application shall not occur when the predicted high temperature exceeds 32 degrees F on the day of land application or on any of the 7 days following land application as predicted by the National Weather Service at one of the following sources for the location nearest to the land application area, and the owner or operator shall maintain a record of the forecast from the source used;

A) http://www.nws.noaa.gov/mdl/forecast/graphics/MEX/index.html or

B) http://www.nws.noaa.gov/mdl/synop/products/bullform.mex.htm.

6) If the surface land application of livestock waste is on ice covered or snow covered land, the CAFO owner or operator shall visually monitor for runoff from the site. The CAFO owner or operator must monitor each ice covered or snow covered field where land application has been conducted daily when the ambient temperature is 32 degrees F or greater following winter land application until all the ice or snow melts from the land application area.

7) If the surface land application of livestock waste is on ice covered or snow covered land and a runoff from the land application area occurs, the CAFO owner or operator shall report any discharge of

livestock waste within 24 hours of the discovery of the discharge as follows:

A) The report shall be made to the Agency through the Illinois Emergency Management Agency by calling 1-800-782-7860 or 1-217-782-7860;

B) Within 5 days of this telephone report, the CAFO owner or operator shall file a written report with the Agency that includes the name and telephone number of the person filing the report, location of the discharge, an estimate of the quantity of the discharge, time and duration of the discharge, actions taken in response to the discharge, and observations of the condition of the discharge with regards to turbidity, color, foaming, floatable solids and other deleterious conditions of the runoff for each day of each runoff event until the ice or snow melts off the site.

c) Availability of Individual Fields for Winter Application

If livestock waste is to be surface applied on frozen ground, ice covered land or snow covered land, the land application may only be conducted on land that meets the following requirements:

1) Adequate erosion and runoff control practices exist, including, but not limited to, vegetative fence rows around the site, contour farming, terracing, catchment basins and buffer areas that intercept surface runoff from the site;

2) A crop stubble, crop residue or vegetative buffer of 200 feet exists between the land application area and surface waters, waterways, open tile line intake structures, sinkholes, agricultural wellheads, or other conduits to surface water and the vegetative buffer zone is down gradient of the livestock waste application area;

3) Application on land with slopes greater than 5% is prohibited;

4) Application may only occur on sites that have field specific soil erosion loss less than the erosion factor T as determined using Revised Universal Soil Loss Equation 2, and have a median Bray P1 or Mechlich 3 soil level of phosphorus equal to or less than 300 pounds per acre;

5) Surface Application may only occur after application of three times the otherwise applicable setbacks from Sections 502.615 and 502.645 if the slope of the field is between 2 percent and 5 percent.

This setback requirement does not include the ¼ mile distance from residences contained in Section 502.645(a); and

6) For fields with slopes of less than 2 percent, the surface application may only occur after application of two times the otherwise applicable setbacks from Sections 502.615 and 502.645. This setback requirement does not include the ¼ mile distance from residences contained in Section 502.645(a).

d) If livestock waste is to be surface applied on frozen ground, ice covered land or snow covered land, the maximum application rate shall not exceed the amount of phosphorus removed by the next year's crop grown and harvested.

(Source: Added at __ Ill. Reg. _____, effective _____)

Section 502.635 Manure and Soil Sampling and Analysis

a) Soil Phosphorus Sampling. Soil samples shall be obtained and analyzed from each field of the land application area where applications are planned. Fields where livestock waste is applied shall be sampled twice for each field during the term of the permit. Soil testing must be conducted as follows:

1) Soil sampling for phosphorus shall be in accordance with the sampling protocols in Chapter 8 of the Illinois Agronomy Handbook, 24th Edition, incorporated by reference at Section 501.200. Laboratory analysis for soil Bray P1 or Mehlich 3 shall be in accordance with Recommended Chemical Soil Test Procedures for the North Central Region, incorporated by reference at Section 501.200;

2) Soil samples shall be at the same time in the cropping cycle and rotation so that results are comparable year to year; and

3) The two required soil samples for each field must be taken at least one year apart.

b) Manure Sampling.

1) The CAFO owner or operator shall annually obtain a laboratory analysis of the nutrient content representative of the livestock waste to be land applied as provided within the nutrient management plan. Livestock waste shall be sampled during the application process. Multiple subsamples shall be obtained and combined into one sample so that a representative sample is

obtained for analysis. Results of a sample taken during waste application the previous year can be used for plan preparation unless there has been a change in the waste management practices during the year. The analytical results of livestock waste samples shall be used for calculation of the application rate allowed by the NPDES permit.

2) The laboratory analysis of livestock waste sample shall include total kjeldahl nitrogen, ammonia or ammonium nitrogen, total phosphorus, total potassium, and percent total solids. The nutrient results shall be reported in mg/kg dry weight basis or mg/l wet weight basis on the laboratory analysis sheet. The results of these analyses are to be used in determining application rates for livestock waste.

(Source: Added at __ Ill. Reg. _____, effective _____)

Section 502.640 Inspection of Land Application Equipment for Leaks

The requirements in this Section apply to permitted CAFOs and Large unpermitted CAFOs.

a) For all ~~permitted~~ CAFOs that land apply livestock waste, the CAFO owner or operator must periodically inspect equipment used for land application of livestock waste for leaks or problems that result in improper operation.

b) The CAFO owner or operator must ensure that the land application equipment is properly calibrated for application of livestock waste on a routine basis.

c) Calibration procedures and schedules shall be described for all equipment in the CAFO's nutrient management plan.

(Source: Added at __ Ill. Reg. _____, effective _____)

Section 502.645 Land Application Setback Requirements

a) Distance from Residences

Livestock waste shall not be land applied within 1/4 mile of any residence not part of the CAFO, unless it is injected or incorporated on the day of application.

b) Setbacks from Waters

1) Livestock waste shall not be land applied within 200 feet of surface water, unless the water is upgrade or there is adequate

diking.

2) Livestock waste shall not be land applied within 100 feet of down gradient open subsurface drainage intakes, agricultural drainage wells, sinkholes, grassed waterways or other conduits to surface waters, unless a 35 foot vegetative buffer exists between the land application area and the grassed waterways, open subsurface drainage intakes, agricultural drainage wells, sinkholes or other conduits to surface water.

3) The setback requirements in subsection (b)(2) do not apply if the CAFO is able to demonstrate to the Agency that a setback or buffer is not necessary because implementation of alternative conservation practices (including, but not limited to, injection and incorporation) or field-specific conditions will provide pollutant reductions equivalent or better than the reductions that would be achieved by the 100-foot setback.

c) Livestock waste shall not be applied in a 10-year flood plain unless the injection or incorporation method of application is used.

d) Livestock waste shall not be land applied to waters of the ~~United~~ State~~s~~, grassed waterways or other conduits to surface waters.

e) Livestock waste shall not be land applied within 200 feet of potable water supply wells.

f) Livestock waste shall not be land applied within 500 feet of biologically significant streams, outstanding resource waters and designated surface drinking water supplies.

(Source: Added at __ Ill. Reg. _____, effective _____)

SUBPART G: ADDITIONAL LIVESTOCK WASTE DISCHARGE LIMITATIONS

Section 502.710 New Source Performance Standards For Dairy Cows and Cattle Other Than Veal Calves

a) New Source Performance Standards (NSPS) applicability

Any CAFO with the capacity to stable or confine 700 or more mature dairy cows whether milked or dry or 1,000 or more cattle other than mature dairy cows or veal calves that is a new source must achieve the livestock waste discharge limitations representing the application of NSPS

as of the date of permit coverage or within the timelines provided in Section 502.303.

b) The livestock waste discharge limitations representing NSPS for the CAFO production area for CAFOs subject to this Section are the livestock waste discharge limitations found in Sections 502.605 and 502.610.

c) The livestock waste discharge limitations representing NSPS for the CAFO land application area are the livestock waste discharge limitations and requirements found in Sections 502.615 through 502.645.

d) CAFOs subject to this Section shall attain the limitations and requirements in Subpart F as of the date of permit coverage or within the timelines provided in Section 502.303.

(Source: Added at __ Ill. Reg. _____, effective _____)

Section 502.720 Horse and Sheep CAFOs: BPT, BAT and NSPS

This Section contains the effluent limitations applicable to discharges resulting from the production area at horse and sheep CAFOs. CAFOs subject to this Section shall attain the limitations and requirements of this Section as of the date of permit coverage. CAFOs with the capacity to stable or confine fewer than 10,000 sheep or fewer than 500 horses are exempt from these effluent limitations.

a) Effluent limitations attainable by the application of the best practicable control technology currently available (BPT) for Horse and Sheep CAFOs

1) Except as provided in subsection (a)(2) of this Section, any existing point source subject to this Section shall have no discharge of process wastewater pollutants to waters of the ~~United~~ State~~s~~. Achievement of no process wastewater discharge to waters of the ~~United~~ State~~s~~ is the effluent limitation representing the application of BPT for Horse and Sheep CAFOs.

2) Process waste pollutants in the overflow may be discharged to waters of the ~~United~~ State~~s~~ whenever rainfall events, either chronic or catastrophic, cause an overflow of process waste water from a facility designed, constructed and operated to contain all process generated wastewaters plus the runoff from a 10-year, 24-hour rainfall event for the location of the point source.

b) Effluent limitations attainable by the application of the best available technology economically achievable (BAT) for Horse and Sheep CAFOs

1) Except when the provisions of subsection (b)(2) of this Section apply, any existing point source subject to this Section shall have no discharge of process wastewater pollutants to waters of the United States. Achievement of no process wastewater discharge to waters of the ~~United~~ State~~s~~ is the effluent limitation representing the application of BAT for Horse and Sheep CAFOs.

2) Whenever rainfall events cause an overflow of process wastewater from a facility designed, constructed, operated and maintained to contain all process-generated wastewaters plus the runoff from a 25-year, 24-hour rainfall event at the location of the point source, any process wastewater pollutants in the overflow may be discharged to waters of the ~~United~~ State~~s~~.

c) New Source Performance Standards (NSPS) for Horse and Sheep CAFOs Except as provided in subsection (b)(2) of this Section, any new source subject this Section shall have no discharge of process wastewater pollutants to waters of the ~~United~~ State~~s~~. Achievement of no process wastewater discharge to waters of the ~~United~~ State~~s~~ is the performance standard representing New Source Performance Standards for Horse and Sheep CAFOs.

(Source: Added at __ Ill. Reg. _____, effective _____)

Section 502.730 Duck CAFOs: BPT and NSPS

This Section contains the effluent limitations applicable to discharges resulting from the production areas at dry lot and wet lot duck CAFOs. CAFOs subject to this Section shall attain the limitations and requirements of this Section as of the date of permit coverage. CAFOs with the capacity to stable or confine fewer than 5,000 ducks are exempt from these effluent limitations.

a) Effluent limitations attainable by the application of the best practicable control technology currently available (BPT) for Wet Lot and Dry Lot Duck CAFOs

Any existing point source subject to this Section shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of BPT:

1) BOD_5 is limited to a maximum daily limit of 3.66 pounds/1,000 ducks or 1.66 kilograms/1,000 ducks.

2) BOD_5 is limited to a maximum monthly average of 2.0 pounds/1,000 ducks or 0.91 kilograms/1,000 ducks.

3) Fecal coliform is not to exceed MPN of 400/100 ml at any time.

b) New Source Performance Standards for Wet Lot and Dry Lot Duck CAFOs

1) Except as provided in subsection (b)(2) of this Section, any new source subject to this Section shall have no discharge of process wastewater pollutants to waters of the ~~United~~ State~~s~~. Achievement of no process wastewater discharge to waters of the ~~United~~ State~~s~~ is the performance standard representing NSPS for Duck CAFOs.

2) Whenever rainfall events cause an overflow of process wastewater from a facility designed, constructed, operated and maintained to contain all process-generated wastewaters plus the runoff from a 25-year, 24-hour rainfall event at the location of the point source, any process wastewater pollutants in the overflow may be discharged to waters of the ~~United~~ State~~s~~.

(Source: Added at __ Ill. Reg. _____, effective _____)

SUBPART H: NEW SOURCE PERFORMANCE STANDARDS FOR NEW, LARGE SWINE, POULTRY AND VEAL CAFOS

Section 502.800 Applicability

a) This Subpart applies to all New Swine, Poultry and Veal CAFOs with the capacity to stable or confine the numbers of animals of the types provided for in the definition of large CAFOs in Section 502.103.

b) The requirements of this Subpart H are in addition to the livestock waste discharge limitations and technical standards in Subpart F of this Part, except Section 502.605.

c) These limitations and requirements must be attained as of the date of NPDES permit coverage or within the timelines provided in Section 502.303.

(Source: Added at __ Ill. Reg. _____, effective _____)

Section 502.810 Production Area Requirements

There must be no discharge of livestock waste pollutants to waters of the ~~United~~ State~~s~~ from the production area unless the CAFO complies with the alternative livestock waste discharge limitations provided in Section 502.830 of this Part.

(Source: Added at __ Ill. Reg. _____, effective _____)

Section 502.820 Land Application Area Requirements

For CAFOs subject to this Subpart, the land application areas shall attain the same limitations and requirements as specified in Sections 502.615 through 502.645.

(Source: Added at __ Ill. Reg. _____, effective _____)

Section 502.830 Alternative Best Management Practice Livestock Waste Discharge Limitations

a) Any CAFO subject to this Subpart may request that the Agency establish NPDES permit best management practice livestock waste discharge limitations designed to ensure no discharge of livestock waste based upon a site-specific evaluation of the CAFO's open surface livestock storage structure.

b) The NPDES permit best management practice livestock waste discharge limitations must address the CAFO's entire production area. In the case of any CAFO using an open surface livestock waste storage structure for which the Agency establishes such livestock waste discharge limitations, "no discharge of livestock waste pollutants," as used in this subpart H, means that the storage structure is designed, operated, and maintained in accordance with best management practices established by the Agency on a site-specific basis after a technical evaluation of the storage structure.

c) The technical evaluation must address the elements listed in Section 502.840.

(Source: Added at __ Ill. Reg. _____, effective _____)

Section 502.840 Technical Evaluation

All technical evaluations conducted pursuant to this Subpart H must address the minimum elements contained in this Section. Waste management and storage facilities designed, constructed, operated, and maintained consistent with the analysis conducted in subsections (a) through (g) of this Section and operated in accordance with the additional measures and records required by Section 502.610 will fulfill the requirements of this Subpart.

a) Information to be used in the design of the open manure storage structure including, but not limited to:

1) Minimum storage periods for rainy seasons;

2) Additional minimum capacity for chronic rainfalls;

3) Applicable technical standards that prohibit or otherwise limit land application on frozen, saturated or snow-covered ground found in Section 502.630 of this Part;

4) Planned emptying and dewatering schedules consistent with the CAFO's nutrient management plan;

5) Additional storage capacity for livestock waste intended to be transferred to another recipient at a later time; and

6) Any other factors that would affect the sizing of the structure.

b) The design of the open livestock waste storage structure as determined by the most recent version of the National Resource Conservation Service's Animal Waste Management (AWM) software found at http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/mnm/?&cid=stelprdb1045812. CAFOs may use equivalent design software or procedures as approved by the Agency.

c) All inputs used in the open livestock waste storage structure design including:

1) actual climate data for the previous 30 years consisting of historical average monthly precipitation and evaporation values;

2) the number and types of animals;

3) anticipated animal sizes or weights;

4) any added water and bedding;

5) any other process wastewater; and

6) the size and condition of outside areas exposed to rainfall and contributing runoff to the open livestock waste storage structure.

d) The planned minimum period of storage in months including, but not limited to, the factors for designing an open livestock waste storage structure listed in subsection (a) of this Section. Alternatively the CAFO may determine the minimum period of storage by specifying times the storage pond will be emptied consistent with the CAFO's nutrient management plan.

e) Site-specific predicted design specifications including:

1) dimensions of the storage facility;

2) daily manure and wastewater additions;

3) the size and characteristics of the land application areas; and

4) the total calculated storage period in months.

f) An evaluation of the adequacy of the designed manure storage structure using the most recent version of the Soil Plant Air Water (SPAW) Hydrology Tool found at http://hydrolab.arsusda.gov/SPAW/Index.htm.

1) The evaluation must include all inputs to SPAW including but not limited to:

A) daily precipitation, temperature, and evaporation data for the previous 100 years;

B) user-specified soil profiles representative of the CAFO's land application areas;

C) planned crop rotations consistent with the CAFO's nutrient management plan; and

D) the final modeled result of no overflows from the designed open livestock waste storage structure.

2) For those CAFOs where 100 years of local weather data for the CAFO's location is not available, CAFOs may use a simulation with a confidence interval analysis conducted over a period of 100 years.

3) The Agency may approve equivalent evaluation and simulation procedures.

g) The Agency may waive the requirement in subsection (f) of this Section for a site-specific evaluation of the designed livestock waste storage structure and instead authorize a CAFO to use a technical evaluation developed for a class of specific facilities within a specified geographical area.

h) The Agency may request additional information to support a request for livestock waste discharge limitations based on a site-specific open surface livestock waste storage structure.

(Source: Added at __ Ill. Reg. _____, effective _____)

Attachment 4:

Statewide Survey for Agricultural Chemicals in Rural, Private Water-Supply Wells in Illinois
Goetsch, et al.

Statewide Survey for Agricultural Chemicals in Rural, Private Water-Supply Wells in Illinois

by

W. D. Goetsch, D. P. McKenna, and T. J. Bicki

The statewide survey was a statistically-designed sampling program to estimate the occurrence of agricultural chemicals in rural, private water-supply wells in Illinois. Groundwater samples were collected one time from 337 randomly selected wells and analyzed for nitrate, nitrite, and a number of pesticides and pesticide metabolites. Sampling began in March 1991 and was completed in April 1992. The Illinois Department of Agriculture (IDOA), the Cooperative Extension Service-University of Illinois at Urbana-Champaign (CES), and the Illinois State Geological Survey (ISGS) conducted the survey as a cooperative interagency project.

This fact sheet summarizes the overall design and implementation of the study, significant results, and preliminary interpretations of the results of water-quality analyses. Additional reports will present detailed results and interpretations of the relationships between well-water quality and agricultural chemical usage, land use, well construction, and various factors affecting aquifer vulnerability.

Results of the statewide survey provide the first statistically reliable estimates of the extent of pesticide and nitrate contamination of rural, private water-supply wells in Illinois.

Initial results indicate that:

- About 12 percent of the estimated 360,000 rural, private wells in the state contained detectable concentrations of at least one pesticide or pesticide degradation product. However, only a small portion of wells (about 2 percent) contained concentrations of pesticides that exceed health-based guidelines for drinking water.
- More than one fourth of rural wells contained nitrate at levels greater than 3 parts per million (mg/L). These concentrations frequently indicate contamination from sources such as nitrogen fertilizer, septic systems, or animal wastes. About 38,000 wells (10.5 percent) are estimated to contain nitrate at levels exceeding the drinking water standard (MCL) of 10 mg/L.
- Contamination of sampled wells was related to well construction and well depth.
- Sampled wells in areas where aquifers occur within 20 feet of land surface were more likely to contain high levels of nitrate.

Statewide estimates for percent and number of rural, private wells containing pesticides and nitrate

	Estimated percent of wells	Confidence interval[1]			Estimated number of wells	Confidence interval		
Pesticides (one or more detected)	12.1	7.5	---	16.7	43,600	27,000	---	60,100
Pesticides (> MCL/HAL)[2]	2.1	0.6	---	3.6	7,560	2,160	---	13,000
Nitrate-nitrogen (>10 mg/L)	10.5	6.7	---	14.3	37,800	24,100	---	51,500
Nitrate-nitrogen (>3 mg/L)	29.5	20.8	---	38.3	106,000	74,900	---	138,000

[1] The confidence interval is a statistical measure of the precision of the statewide estimates on the occurrence of pesticides and nitrate in rural private wells. The confidence interval indicates that there is a 95 percent probability that the true percentage of wells statewide is between the lower and upper limits shown. The confidence interval is determined by how the wells were selected for sampling, the number of wells sampled, and the percentage of wells contaminated.

[2] The MCL (maximum contaminant level) is the maximum level of a contaminant permitted in public water supply systems. These enforceable standards do not apply to rural private wells. The HAL (health advisory level) is the concentration of a contaminant in water that may be consumed over a person's lifetime without harmful effects. HALs are non-enforceable health-based guidelines that consider only non-cancer effects. Only pesticides with MCLs or HALs were included in estimating the number of wells containing pesticides above health-based drinking water levels.

STUDY DESIGN

The primary goal of the statewide survey was to provide, for the first time, statistically reliable estimates of the occurrence of agricultural chemicals in rural, private wells in Illinois. The survey was not designed to allow for reliable estimates to be made about the concentrations of the various analytes in wells, nor are the results representative of wells at a regional or county level. The survey results provide an estimate of the quality of water in rural wells in Illinois but can not be used to estimate the quality of groundwater or drinking water in the state.

Sampling Plan

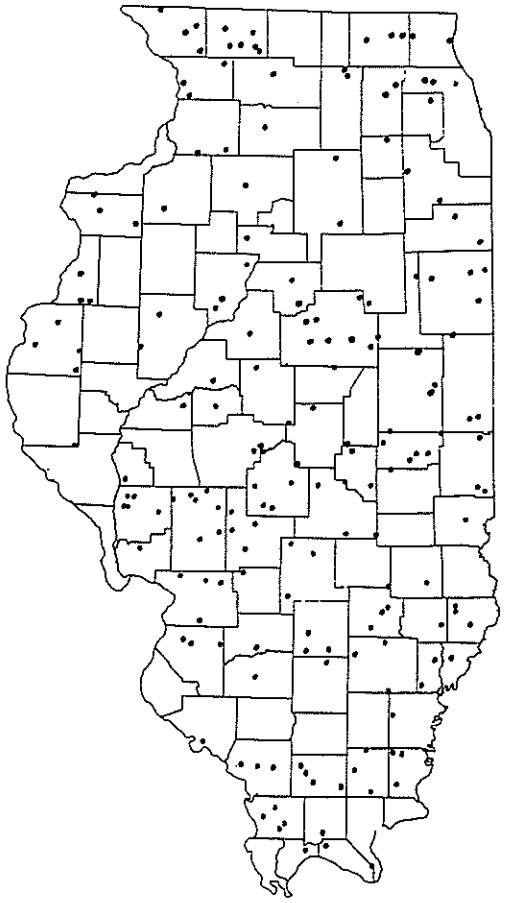
Because there is no list of rural, private water-supply wells in Illinois, a two-stage, probability sampling plan was developed in consultation with the Illinois Statistical Office at the University of Illinois at Urbana-Champaign. The first-stage sampling unit was a land section, normally 1 square mile. The second-stage sampling unit was a rural, private water-supply well. In stage 1, 200 land sections were randomly selected. In each section, land use (rural or urban) was determined, and all dwellings and private wells in rural areas were enumerated. Six sections were entirely urban and there were no private wells in 23 rural sections. One section of land was not inventoried. More than 1,500 dwellings were inventoried. A total of 875 rural private wells were identified in 170 sections in 74 counties.

In stage 2, two private water-supply wells were randomly selected from the rural area of each section with private wells. If there was only one well in the section or if a well user refused permission to sample, additional wells were randomly selected from other randomly selected sections with wells. This process continued until permission to sample was acquired for about 340 wells. Additional wells were selected to provide alternate wells in case any of the well users later decided not to participate and to account for losses of samples during the course of the study.

Because the number of wells within each land section was not equal, the probability of selection of a well varied from section to section. These selection probabilities are reflected in the confidence intervals (margin of error) for the statewide estimates of the occurrence of agricultural chemicals in rural, private wells.

About 20 percent of the well users contacted refused to participate in spite of repeated assurances that confidentiality was guaranteed, no regulatory action could be taken, and no fee would be charged. This nonresponse rate is higher than the 13-percent nonresponse rate for rural, domestic wells in the USEPA National Pesticide Survey (NPS) and the 8-percent rate reported for a statewide survey in Iowa.

Data compiled on nonresponse wells indicate that rural residents were more likely than farmers to refuse to participate in the study. However, data from sampled wells indicate that rural residence wells and farmstead wells did not differ significantly in terms of factors affecting well contamination -- well type, well depth, and depth to the aquifer.



Location of 200 randomly selected sections.

Well Site Characterization

A well-user interview and well-site characterization form was used to characterize conditions and management practices at each well site. Two questionnaires were developed: one with 83 questions for rural residences and another with 136 questions for farmsteads. Both forms requested information about well construction, previous water testing, lawn and garden activities, well-setback distances from potential point sources, and farming practices on adjacent land. The farmstead questionnaire also asked for information about pesticide storage, use, and disposal; fertilizer storage and use; and soil and crop management practices.

Sample Collection

The scheduling of wells for sample collection was patterned after the approach used in the NPS and the Iowa survey. Samples were collected from March 1991 through April 1992. A sampling schedule of 27 two-week sampling periods was used to spread sample collection across all seasons and pesticide- and fertilizer-application periods, meet sample holding-time requirements of the analytical methods, and not exceed laboratory capacity. During each sampling period, 13 to 15 wells were sampled; 3 to 5 wells were randomly selected for sampling within each of three sampling regions. Two wells within the same land section were not sampled in consecutive sampling periods.

Sample-collection procedures were similar to those used in the NPS. A "Well-Water Sample Collection Manual" provided step-by-step instructions for all activities related to sample collection. Whenever possible, well-water samples were collected at an outside faucet located before any water storage or treatment device. Wells were purged prior to sample collection to ensure collection of representative samples. Sample bottles were immediately packed in ice and returned to the laboratory within 36 hours of collection.

Sample Analyses

All sample analyses were performed in the IDOA Pesticide Water Laboratory in Springfield, using USEPA and American Society for Testing and Materials methods. Field blanks, duplicate well-water samples, and duplicate samples for laboratory spiking with the analytes were collected at about 15 percent of the sites during each sampling period. Quality assurance (QA) for sample-collection activities also included field reviews of the procedures followed by each sampler, and review of all well-purging records to ensure that the criteria for collecting representative samples were met.

Quality assurance for sample analyses included collection and analysis of external quality-control samples; compliance with the internal QA requirements of each analytical method; and periodic reviews of all procedures and data by the senior chemist, the IDOA quality-assurance officer, and the IDOA project manager.

Well-User Notification

Each well user was sent an information packet containing a cover letter that summarized the results of water-quality analyses of samples from their well, the IDOA laboratory report, definitions of terms used in the laboratory report, and a CES publication on testing and treating drinking-water supplies. If an analyte was detected, the packet also included a copy of the USEPA health advisory summary for that compound, and, if appropriate, a letter from the chief toxicologist at the Illinois Department of Public Health. Each well user was also provided with the names, addresses, and phone numbers of specific individuals to contact for further information. To ensure confidentiality, none of the contacts from outside agencies were provided with copies of the results sent to the well user.

RESULTS AND INTERPRETATIONS

Pesticide Contamination of Rural Wells

Chemicals selected as analytes were those with high usage in Illinois or high potential to cause groundwater contamination. Most of the pesticides detected are commonly used herbicides. Two of the three degradation products detected are metabolites of herbicides. The most frequently detected pesticide was dinoseb, a herbicide which is no longer registered for use. No currently used insecticides were detected in the sampled wells. However, three insecticides with can-

Summary statistics for pesticides in rural wells

Pesticide (common name)	Percent wells with detections	95 percent confidence interval	Method detection limit (ug/L[3])	MCL/HAL (ug/L[3])
aciflurofen (Blazer)	1.4	(<0.1 - 2.8)	0.68	1
alachlor (Lasso)	0.7	(<0.1 - 1.4)	1.3	0.4
aldrin[1]	0.3	(<0.1 - 0.8)	0.004	--[4]
atrazine (AAtrex)	2.1	(0.7 - 3.4)	0.43	3
atrazine dealkylated[2]	0.1	(<0.1 - 0.4)	1.4	--[4]
bentazon (Basagran)	1.4	(0.4 - 2.6)	0.21	20
bromacil (Hyvar-X)	0.3	(<0.1 - 0.7)	17	90
chloramben (Amiben)	0.2	(<0.1 - 0.6)	0.26	100
2,4-D	0.1	(<0.1 - 0.4)	0.57	70
dieldrin[1]	1.6	(0.3 - 2.9)	0.004	0.002
dinoseb (Dyanap)[1]	3.7	(<0.1 - 7.7)	0.16	7
endrin[1]	0.8	(<0.1 - 2.2)	0.006	0.3
heptachlor epoxide[2]	0.5	(<0.1 - 1.1)	0.004	0.004
metolachlor (Dual)	0.3	(<0.1 - 0.8)	1.4	100
metribuzin (Sencor)	0.1	(<0.1 - 0.4)	0.43	200
metribuzin DADK[2]	0.3	(<0.1 - 0.7)	0.7	--[4]
prometon (Pramitol)	1.2	(0.2 - 2.2)	0.37	100
simazine (Princep)	0.2	(<0.1 - 0.5)	0.12	4
trifluralin (Treflan)	1.0	(<0.1 - 2.0)	0.003	2

[1] All or most uses of this compound have been cancelled.
[2] Environmental degradation product.
[3] Micrograms per liter (1 ug/L is equivalent to 1 part per billion).
[4] No MCL or HAL has been established for this compound.

celled registrations were detected: aldrin, dieldrin, and endrin. These persistent insecticides were widely used in Illinois in the 1960s, are toxic at low concentrations, and have previously been detected in groundwater in Illinois. Heptachlor epoxide is a degradation product of an insecticide which also is no longer registered for use.

Only alachlor, dieldrin, and heptachlor epoxide were present in concentrations greater than the health-based standards for drinking water. Nineteen of the pesticides for which groundwater samples were analyzed were not detected in any of the 337 wells sampled. The pesticides not detected were (trade name in parentheses): butylate (Sutan+), carbaryl (Sevin), carbofuran (Furadan), carbofuran phenol (metabolite), carboxin (Vitavax), cyanazine (Bladex), 2,4-DB (Butoxone), diazinon (Diazinon), dicamba (Banvel), endrin aldehyde (metabolite), EPTC (Eptam), ethoprop (Mocap), heptachlor (Drinox), linuron (Lorox), metribuzin DA (metabolite), metribuzin DK (metabolite), propachlor (Ramrod), tebuthiuron (Spike), and vernolate (Reward).

Factors related to well contamination

Initial analysis of survey results indicates that well-water contamination by pesticides, and especially nitrate, is related to the type of well and, for drilled and sand point wells, the depth of the well and the depth to the uppermost aquifer. The vulnerability of a well to contamination from nonpoint sources, such as pesticides or nitrate, is a function of all of the processes and factors affecting contaminant transport through earth materials and the properties of the well itself. Well-specific factors affecting the potential for contamination include adequacy of the surface seal, depth of the screened interval, and position in the groundwater flow-path in relation to sources of contamination.

Well type

Of the 337 wells sampled in the survey, a significantly greater proportion of large-diameter dug or bored wells than drilled wells were contaminated with pesticides and nitrate. Large-diameter wells which are generally less than 50 feet deep, occur most frequently in western and southern Illinois. The source of water for these wells is generally thin sand layers or joints and fractures within fine-grained glacial materials. Sand point wells also had high levels of contamination, but because only six of these wells were sampled, statistical comparisons to other types of wells were not made.

Well type (number sampled)	Drilled (190)	Large-diameter (141)
Percent with pesticides	9.5	22.7
Percent with NO_3-N		
> 3 mg/L	24.2	61.0
>10 mg/L	8.9	30.5

Well depth

Among drilled and sand point wells, there was a significant difference in the proportion of wells less than 100 feet deep containing high levels of nitrate compared to wells greater than 100 feet deep. However, there was no significant difference in the frequency of detection of pesticides.

Depth (feet)	Number sampled[1]	Percent wells with Pesticides	NO_3-N levels >3 mg/L	>10 mg/L
< 100	64	10.9	37.5	12.5
> 100	108	10.2	17.6	8.3

[1] 172 sampled drilled and sand point wells for which the well user provided information on total depth.

Depth to aquifer

Geologic mapping has been used to identify areas of Illinois with aquifers vulnerable to contamination by agricultural chemicals. Vulnerability was estimated on the basis of the thickness and character of materials overlying the aquifer. While not intended for use in predicting the vulnerability of individual wells to contamination, initial analysis of data from the statewide survey indicates that the depth to the uppermost aquifer is associated with the probability of finding contaminants in rural private wells. A significantly greater proportion of wells in areas with shallow aquifers contained high levels of nitrate compared to areas with greater depth to an aquifer. Although the occurrence of pesticides followed a similar trend, it was not statistically significant.

Depth to aquifer (feet)	Number sampled[1]	Percent wells with Pesticides	NO_3-N levels >3 mg/L	>10 mg/L
<20	78	14.1	43.6	19.2
>20	118	6.8	13.6	3.4

[1] 196 sampled drilled and sand point wells.

Acknowledgement

The cooperation of the well users who allowed their wells to be sampled is gratefully acknowledged.

For additional information on the results of the statewide survey, contact the Bureau of Environmental Programs, Illinois Department of Agriculture, State Fairgrounds, Springfield, IL. Phone: (217) 785-8218. For information on well-testing services, contact your county health department or Cooperative Extension Service office.

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Attachment 5:

Mich. Admin. Code R. 323.2196

Mich. Admin. Code R. 323.2196

R 323.2196 CAFO permits.

Rule 2196. (1) CAFOs are point sources that require NPDES permits for discharges or potential discharges and require all of the following:

(a) If an operation becomes a CAFO, then the NPDES requirements for CAFOs apply to all animals in confinement at the operation and all production area waste and CAFO process wastewater generated by those animals or the production of those animals, regardless of the type of animal.

(b) All CAFO owners or operators shall apply either for an individual NPDES permit, or a certificate of coverage under an NPDES general permit, unless the owner or operator has received a determination from the department, made after providing notice and opportunity for public comment, that the CAFO has "no potential to discharge" pursuant to subrule (4) of this rule.

(c) The discharge to waters of the state from land application areas is a discharge from the CAFO subject to NPDES permit requirements.

(2) The schedule for permit application, coverage, and renewal shall include all of the following:

(a) A CAFO shall apply for an NPDES permit not later than the effective date of these rules, except as specified in subdivisions (b), (d), or (e) of this subrule.

(b) An existing CAFO, or an existing AFO that becomes a CAFO, that has not had a regulated discharge since January 14, 2000, shall apply for coverage under NPDES general permit no. MIG440000 (effective January 1, 2003), or equivalent document approved by the department, not later than 90 days after notification by the department or by September 1, 2005, whichever is sooner. Before July 1, 2007, all CAFOs that are operating under an equivalent document approved by the department shall apply for an NPDES permit. An existing CAFO or existing AFO is any CAFO or AFO that is constructed and populated before January 30, 2004.

(c) For the purposes of subdivision (b) of this subrule, a regulated discharge is any of the following:

(i) A discharge that causes or contributes to a violation of R 323.1041 to R 323.1117 of the water quality standards.

(ii) A discharge from the process or production area due to precipitation events, either by overland, drainage tiles, or other mechanisms, except the discharge of uncontaminated runoff that does not come into contact with any animals, animal waste, or production area waste.

(iii) A dry-weather discharge, including an accidental release.

(d) Newly constructed CAFOs shall apply for an NPDES permit at least 180 days before commencing operation.

(e) AFOs that become CAFOs after September 1, 2005, shall apply for an NPDES permit at least 180 days before becoming a CAFO.

(f) For AFOs that are designated as CAFOs per subrule (3), the CAFO shall apply for an NPDES permit no later than 90 days after receiving notification of the designation.

(g) Not later than 180 days before the expiration of the permit or equivalent document approved by the department, the permittee shall submit an application to renew its permit. However, the permittee need not continue to seek continued permit coverage or reapply for a permit if both of the following conditions are true:

(i) The facility has ceased operation or is no longer a CAFO.

(ii) The permittee has demonstrated to the satisfaction of the department that there is no remaining potential for a discharge.

(3) In designating an AFO as a CAFO, the following apply:

(a) The department may designate any AFO as a CAFO upon determining that it is a significant contributor of pollutants to waters of the state. In making this designation, the department shall consider all of the following factors:

(i) The size of the AFO and the amount of production area waste and CAFO process wastewater reaching waters of the state.

(ii) The location of the AFO relative to waters of the state.

(iii) The means of conveyance of production area waste and CAFO process wastewater into waters of the state.

(iv) The slope, vegetation, rainfall, and other factors affecting the likelihood or frequency of discharge of production area waste and CAFO process wastewater into waters of the state.

(v) Other relevant factors.

(b) An AFO shall not be designated under this subrule unless the department has conducted an inspection of the operation.

(c) An AFO with numbers of animals below those established in R 323.2103(m) shall not be designated as a CAFO unless either of the following occurs:

(i) Pollutants are discharged from the production area into waters of the state through a manmade ditch, pipe, tile, swale, flushing system, or other similar manmade conveyance.

(ii) Pollutants are discharged from the production area directly into waters of the state which originate outside of the facility and pass over, across, or through the facility or otherwise come into direct contact with the animals confined in the operation.

(4) In making determinations for no potential to discharge for large CAFOs, all of the following apply:

(a) The department, upon request, may make a determination that a specific large CAFO has no potential to discharge pollutants to waters of the state. In making this determination, the department shall consider the potential for discharges from both the production area and any land application areas. The department shall also consider any record of prior discharges by the CAFO. In no case may the CAFO be determined to have no potential to discharge if it has had a discharge within 5 years before the date of the request submitted under subdivision (b) of this subrule. For purposes of this rule, the term ‘no potential to discharge’ means that there is no potential for any CAFO production area waste or CAFO process wastewater to be added to waters of the state under any circumstance or climatic condition. A determination that there is no potential to discharge only relates to discharges of production area waste and CAFO process wastewater covered by this rule.

(b) In requesting a determination of no potential to discharge, the CAFO owner or operator shall submit any information that will support such a determination. Such information shall include all of the information specified in 40 C.F.R. §§122.21(f) and (i)(1)(i) to (ix) (2003) and include documentation showing that the CAFO has been verified under the livestock system of the **Michigan** agriculture environmental assurance program (MAEAP), or successor program, if such a program is available. The department has discretion to require additional information to supplement the request, and may also gather additional information through physical inspection of the CAFO.

(c) Before making a final decision to grant a no potential to discharge determination, the department shall issue a notice to the public stating that a no potential to discharge request has been received. This notice shall be accompanied by a fact sheet which includes the following, if applicable:

(i) A brief description of the type of facility or activity which is the subject of the no potential to discharge determination.

(ii) A brief summary of the factual basis, upon which the request is based, for granting the no potential to discharge determination.

(iii) A description of the procedures for reaching a final decision on the no potential to discharge determination. The department shall base the decision to grant a no potential to discharge determination on the administrative record, which includes all information submitted in support of or against a no potential to discharge determination and any other data gathered by the department. The department shall notify any CAFO seeking a no potential to discharge determination of its final determination within 180 days of receiving the request.

(d) The owner or operator shall request a no potential to discharge determination by the applicable permit application dates. If the department's final decision is to deny the no potential to discharge determination, then the owner or operator shall seek coverage under a permit within 30 days after notice of the denial.

(e) The no potential to discharge determination does not relieve the CAFO from the consequences of an actual discharge. Any unpermitted CAFO that discharges pollutants into the waters of this state is in violation of the act even if it has received a no potential to discharge determination from the department. Any CAFO that has received a determination of no potential to discharge, but who anticipates changes in circumstances that could create the potential for a discharge, shall contact the department and apply for and obtain NPDES permit authorization prior to the change of circumstances. If any CAFO that has received a determination of no potential to discharge has unanticipated changes in circumstances that could create the potential for a discharge, then the CAFO shall immediately notify the department and submit a complete application for coverage under an NPDES permit within 30 days after the change in circumstances.

(f) Where the department has issued a determination of no potential to discharge, the department retains the authority to subsequently require NPDES permit coverage for any of the following:

(i) If circumstances at the facility change.

(ii) If new information becomes available.

(iii) If there is another reason for the department to determine that the CAFO has a potential to discharge.

(g) Notwithstanding any other provision of this section, a CAFO that has received a no potential to discharge determination from the department is not required to seek coverage under an NPDES permit that would otherwise be required.

(5) CAFO NPDES permits shall include all of the following:

(a) A requirement to develop and implement a comprehensive nutrient management plan (CNMP). The CNMP shall be approved by a certified CNMP provider. At a minimum, a CNMP shall include best management practices and procedures necessary to implement applicable effluent limitations and technical standards established by the department including all of the following:

(i) Ensure adequate storage of production area waste and CAFO process wastewater, including procedures to ensure proper operation and maintenance of the storage facilities.

(ii) Ensure proper management of mortalities and ensure that they are not disposed of in a liquid **manure**, storm water, or CAFO process wastewater storage or treatment system.

(iii) Ensure clean water is diverted from the production area.

(iv) Prevent direct contact of confined animals with waters of the state.

(v) Ensure chemicals and other contaminants handled at the CAFO, that are not part of the normal agricultural practice at the production area, are not disposed of in any production area waste, CAFO process wastewater, or storm water storage or treatment system.

(vi) Identify specific conservation practices to control runoff of pollutants to waters of the state.

(vii) Identify protocols for testing of production area waste, CAFO process wastewater, and soil.

(viii) Conduct a field-by-field assessment of land application areas and address the form, source, amount, timing, rate, and method of application of nutrients to demonstrate that land application of production area waste or CAFO process wastewater is in accordance with field-specific nutrient management practices that ensures proper agricultural utilization of the nutrients in the production area waste or CAFO process wastewater. The assessment shall take into account field-specific conditions including locations of tile outlets, tile risers, and tile depth before land application to determine suitability of land application and to prevent discharge of any potential polluting material.

(ix) Ensure proper land application by complying with all of the following conditions:

(A) Production area waste and CAFO process wastewater shall not be land-applied on ground that is flooded, saturated with water, frozen, or snow-covered where the production area waste and CAFO process wastewater may enter waters of the state.

(B) Production area waste and CAFO process wastewater shall not be applied to frozen or snow-covered ground unless it is subsurface injected and there is substantial soil coverage of the applied production area waste and CAFO process wastewater, or it is surface-applied and incorporated within 24 hours.

(C) Production area waste and CAFO process wastewater may be surface-applied to frozen or snow-covered ground and not incorporated within 24 hours only if there is a field-by-field demonstration in the CNMP showing that such land application will not result in a situation where production area waste and CAFO process wastewater may enter waters of the state.

(D) Production area waste and CAFO process wastewater shall not be applied when precipitation exceeding ½ inch is forecast within 24 hours or if precipitation is forecast that may cause the production area waste and CAFO process wastewater to enter waters of the state.

(E) On ground that is not frozen or snow-covered, production area waste and CAFO process wastewater, if not subsurface-injected, shall be incorporated into the soil within 24 hours of application except on no-till fields.

(x) Identify specific records that will be maintained to document the implementation and management of the CNMP.

(b) A copy of the CAFO's CNMP shall be maintained at the CAFO and made available to the department on request. In addition, the executive summary shall be submitted to the department.

(c) A prohibition on dry weather discharges from the CAFO except in accordance with 40 C.F.R. §412.31(a)(2) (2003) or 40 C.F.R. §412.46(d) (2003).

(d) Storm water discharges from land areas under the control of a CAFO where production area waste or CAFO process wastewater has been applied in compliance with field-specific nutrient management practices developed in accordance with R 323.2196(5)(a), and such discharges do not cause or contribute to a violation of water quality standards, are in compliance with this rule, provided such discharges are authorized by an NPDES permit.

(e) Unless the department determines otherwise, in cases where production area waste or CAFO process wastewater is sold, given away, or otherwise transferred to other persons (recipient) and the land application of that production area waste or CAFO process wastewater is not under the operational control of the CAFO owner or operator that generates the production area waste or CAFO process wastewater (generator), a **manifest** shall be used to track the transfer and use of the production area waste or CAFO process wastewater.

(i) The CAFO owner or operator shall do all of the following:

(A) Prepare a **manifest** for tracking the production area waste or CAFO process wastewater before transferring the production area waste or CAFO process wastewater.

(B) Designate on the **manifest** the recipient of the production area waste or CAFO process wastewater.

(ii) The generator shall use a **manifest** form which is approved by the department and which has locations for recording all of the following information:

(A) A **manifest** document number.

(B) The generator's name, mailing address, and telephone number.

(C) The name and address of the recipient of the production area waste or CAFO process wastewater.

(D) The nutrient content of the production area waste or CAFO process wastewater to be used in determining the appropriate land application rates.

(E) The total quantity of production area waste or CAFO process wastewater by units of weight or volume and the number and size of the loads or containers used to transfer that quantity of production area waste or CAFO process wastewater.

(F) A statement that informs the recipient of his or her responsibility to properly manage the land application of the **manure** and/or wastewater to minimize the discharge of pollutants to waters of the state.

(G) The following certification: "I hereby declare that the production area waste or CAFO process wastewater is accurately described above and is suitable for land application."

(H) Other certification statements as may be required by the department.

(I) Address or other description for the final destination of the production area waste or CAFO process wastewater.

(J) Locations for dates and signatures.

(iii) The generator shall do all of the following with respect to the **manifest**:

(A) Sign the **manifest** certification by hand.

(B) Obtain the handwritten signature of the recipient and the date of acceptance on the **manifest**.

(C) Retain 1 copy of the **manifest**.

(D) Give the remaining copies to the recipient.

(E) Advise the recipient of his or her responsibilities to complete the **manifest** and return a copy to the generator within 30 days after completion of the land application or other disposal or use of the production area waste or CAFO process wastewater.

(iv) One **manifest** may be used for multiple loads or containers of the same production area waste or CAFO process wastewater transferred to the same recipient.

(v) The generator shall not sell, give away, or otherwise transfer production area waste or CAFO process wastewater to a recipient if any of the following occurs:

(A) The recipient has previously not returned a copy of the completed **manifest** to the generator.

(B) The returned **manifest** indicates improper land application, use, or disposal.

(C) The generator has been advised by the department that the department or a court of appropriate jurisdiction has determined that the recipient has improperly land-applied, used, or disposed of a **manifested** production area waste or CAFO process wastewater.

(D) The recipient fails or refuses to provide accurate information on the **manifest** in a timely manner.

(vi) If the generator has been prohibited from selling, giving, or otherwise transferring large CAFO waste to a particular recipient under paragraph (v), above, and the generator wishes to resume selling, giving, or otherwise transferring large CAFO waste to that particular recipient, then the one of the following shall be accomplished:

(A) For improper paperwork only, such as incomplete or inaccurate information on the **manifest**, the recipient must provide the correct, complete information.

(B) For improper land application, use, or disposal of the large CAFO waste by the recipient, the generator must demonstrate, in writing, to the department that the improper land application, use, or disposal has been corrected, and the department has provided approval of the demonstration.

(vii) All copies of **manifests** shall be kept with the CAFO owner or operator's CNMP for a minimum of 5 years.

(viii) The requirements of this rule do not apply to quantities of production area waste or CAFO process wastewater less than 1 pick-up truck load, 1 cubic yard, or 1 ton per recipient per day.

(f) A requirement that the CAFO owner or operator shall submit annual reports to the department. The annual report shall include, but is not limited to, all of the following:

(i) The number and type of animals, whether in open confinement or housed under roof (beef cattle, broilers, layers, swine weighing 55 pounds or more, swine weighing less than 55 pounds, mature dairy cows, dairy heifers, veal calves, sheep and lambs, horses, ducks, and turkeys).

(ii) Estimated amount of total production area waste and CAFO process wastewater generated by the CAFO in the previous 12 months (tons/gallons).

(iii) Estimated amount of total production area waste and CAFO process wastewater transferred to another person by the CAFO in the previous 12 months (tons/gallons).

(iv) Total number of acres for land application covered by the CNMP developed in accordance with subdivision (a) of this subrule.

(v) Total number of acres under control of the CAFO that were used for land application of production area waste and CAFO process wastewater in the previous 12 months.

(vi) Summary of all production area waste and CAFO process wastewater discharges from the production area that have occurred in the previous 12 months, including date, time, and approximate volume.

(vii) A statement indicating whether the current version of the CAFO's CNMP was developed or approved by a certified CNMP provider.

Credits

(By authority conferred on the department of environmental quality by sections 3103 and 3106 of 1994 PA 451, MCL 324.3103 and 324.3106)

Current through 2012 Register #22 (December 15, 2012)

Mich. Admin. Code R. 323.2196, MI ADC R. 323.2196

End of Document

Attachment 7:

Groundwater Underlying Two Swine Resistance Genes in Lagoons and Occurrence and Diversity of Tetracycline Production Facilities
Chee-Sanford et al., 2001

Applied and Environmental Microbiology

Occurrence and Diversity of Tetracycline Resistance Genes in Lagoons and Groundwater Underlying Two Swine Production Facilities

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Occurrence and Diversity of Tetracycline Resistance Genes in Lagoons and Groundwater Underlying Two Swine Production Facilities

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In this study, we used PCR typing methods to assess the presence of tetracycline resistance determinants conferring ribosomal protection in waste lagoons and in groundwater underlying two swine farms. All eight classes of genes encoding this mechanism of resistance [*tet*(O), *tet*(Q), *tet*(W), *tet*(M), *tetB*(P), *tet*(S), *tet*(T), and *otrA*] were found in total DNA extracted from water of two lagoons. These determinants were found to be seeping into the underlying groundwater and could be detected as far as 250 m downstream from the lagoons. The identities and origin of these genes in groundwater were confirmed by PCR-denaturing gradient gel electrophoresis and sequence analyses. Tetracycline-resistant bacterial isolates from groundwater harbored the *tet*(M) gene, which was not predominant in the environmental samples and was identical to *tet*(M) from the lagoons. The presence of this gene in some typical soil inhabitants suggests that the vector of antibiotic resistance gene dissemination is not limited to strains of gastrointestinal origin carrying the gene but can be mobilized into the indigenous soil microbiota. This study demonstrated that *tet* genes occur in the environment as a direct result of agriculture and suggested that groundwater may be a potential source of antibiotic resistance in the food chain.

The widespread use of antibiotics in humans and animals has raised several concerns related to human and animal health. The principal area of concern has been the increasing emergence of antibiotic resistance phenotypes in both clinically relevant strains and normal commensal microbiota. In two recent studies, a link between the agricultural use of antibiotics and antibiotic-resistant human infections has been suggested (24, 33). Because consumption of tainted food is considered the main route of transmission of drug resistance, other possible means of antibiotic resistance dissemination have received relatively little attention. One of these possible means could be natural water and soil environments impacted by antibiotics and antibiotic-resistant bacteria from agriculture, where antibiotics are used for disease treatment, prophylaxis, and growth promotion. The concern over the use of antibiotics in agriculture, especially for prophylactic and growth-promoting purposes, has not been limited to the presumed role of antibiotics in selection of antibiotic-resistant bacteria (pathogenic or nonpathogenic) in the animal gut. The more debatable issue arising from chronic low-level exposure to antibiotics is whether this practice contributes significantly to increased gene frequencies and dissemination of resistance genes into other ecosystems.

Furthermore, many antibiotics used in animal agriculture are poorly absorbed in the animal gut. It is estimated that 25% to as much as 75% of the antibiotics administered to feedlot animals could be excreted unaltered in feces (6, 7) and can persist in soil after land application (4, 11). There is little information available concerning the fate of antibiotics in the environment and their link to the emergence of resistant genotypes found there. The annual production of livestock and poultry waste in the United States is nearly 180 million tons (dry weight basis) (13, 34), and coupled with antibiotic usage, this waste is a potentially large source of both antibiotics and antibiotic-resistant bacteria released into the environment.

Lagoons and pit systems are typically used for waste disposal in animal agriculture. Seepage and runoff into watershed systems are of particular concern due to potential mobilization of constituents and exposure of contaminants to humans and other animals. Groundwater, in particular, constitutes about 40% of the water used for public water supplies and provides drinking water for more than 97% of the rural population in the United States (http://water.usgs.gov/wid/html/GW.html). Recent monitoring studies have demonstrated the vulnerability of groundwater to seepage from waste lagoons (19). Over a period of several years, Krapac and coworkers found indicators such as ammonia and fecal enterococci at elevated levels in groundwater samples obtained up to 100 m downstream of from swine waste lagoons, indicating that both long-term impact and environmental migration of contaminants occur (19, 20).

Recent studies have attempted to evaluate the impact of antibiotic use on populations of bacteria in natural waters (12, 23, 39). Antibiotic resistance analysis has been used to identify sources of fecal pollution (14, 18, 27, 38, 39). The traditional method involving cultivation and phenotypic testing is still relied upon but has a clear bias when it is used to determine the representative phenotypes and genotypes in this environment. The use of techniques such as PCR and molecular gene probe analysis has allowed sensitive detection of specific genes in the environment in the absence of cultivation. PCR amplification of small-subunit ribosomal DNA (rDNA) genes coupled with denaturing gradient gel electrophoresis (DGGE) has

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been used primarily to determine the genetic fingerprints of microbial communities. The repertoire of genes used for such analyses has been extended to specific metabolic genes (2, 8, 17, 31, 37) and, recently, to antibiotic resistance genes (1). In the latter work, we used a phylogenetic approach to design a set of primers to target tetracycline resistance genes encoding ribosomal protection proteins (RPPs). These primers were used to detect the corresponding tetracycline resistance genes in ruminal fluid, swine feed and feces, and pig intestinal fecal streptococci. In the present study, we used these techniques to determine the occurrence and migration of RPP tetracycline resistance genes in lagoons and in groundwater underlying two large swine production facilities known to be impacted by waste seepage (19). The use of tetracycline resistance as the key determinant to monitor resistance genes is relevant due to the common use of this antibiotic in the swine industry. To our knowledge, this is the first study in which the genes for one major class of antibiotic resistance were characterized in natural groundwater that is directly impacted by animal agriculture.

MATERIALS AND METHODS

Description of the sampling sites. Site A, which began operation in February 1995, is a finishing operation that houses 4,000 pigs (Fig. 1). Antibiotics are used in this facility, but the relevant information concerning such use could not be obtained from the producer. The facility includes a two-stage waste-handling system in which a concrete settling basin collects most of the solids before the supernatant liquid passively enters an earthen lagoon. The area of the lagoon is approximately 1.2 ha, and the lagoon is unlined. No special construction techniques were used to compress the soil during lagoon construction. The average depth of liquid in the lagoon during a study conducted by Krapac et al. (19) was about 1.5 m. The concrete settling basin is periodically pumped, and the manure is applied to crop fields both on-site and off-site.

Site A is located on glacial outwash and terrace deposits along a stream valley that is incised into a till plain formed during the Illinois Episode of glaciation. The topsoils are silt or silty clay loams developed on alluvial deposits that are 1.3 to 2 m thick (Fig. 1). These deposits overlie a 0.6- to 1.3-m-thick upper layer of fluvial silty sand and gravel outwash, which is continuous across the site. Twelve of the 16 monitoring wells were installed in this upper sand layer (Fig. 1). Slug test results suggested that this upper sand has a saturated hydraulic conductivity of approximately 6.8×10^{-4} m/s. Below the silty sand and gravel is 1.6 to 3 m of silt loam diamicton, which may be colluvial. Below the silt loam diamicton is a 1- to 2-m-thick lower sand layer composed of sand and gravel outwash that is being used locally as an aquifer. Four monitoring wells were installed in this lower sand layer (Fig. 1). The saturated hydraulic conductivity of this deeper sand was estimated to be 8.2×10^{-6} m/s based on slug tests. Below this sand and gravel is more silt loam diamicton. Logs from water wells drilled in the vicinity show the presence of discontinuous sand and gravel outwash units below the diamicton that are used locally as aquifers. The multiple sand layers make this site particularly susceptible to leachate migration from the lagoon.

Site C is a farrowing and nursery operation that houses 1,200 sows (Fig. 1). The facility uses chlortetracycline, which is added once per quarter for about 2 weeks to the feed (400 g per ton). The feed consumption rate is about 3 kg/animal per day, and thus, each animal consumes about 17 g of chlortetracycline over the 2-week period. The facility began operation in the fall of 1992 and every year produces approximately 24,000 pigs. The facility uses a single-stage lagoon. Lagoon water is recycled to partially fill and flush the shallow pits below the confinement buildings. The area of the lagoon is approximately 0.8 ha, and the lagoon is unlined. The average depth of waste in the lagoon was about 6 m. Waste has never been applied to the crop fields surrounding the lagoon.

Site C is located on a glacial till plain formed during the Illinois Episode of glaciation. It is underlain by a silt loam glacial diamicton that is 3 to 15 m thick and overlies shale bedrock (Fig. 1). Thin (less than 30-cm-thick) glacial gravelly loam layers were found in two of the seven borings at the site. An intermittent stream borders the site on the west, and a small pond is located about 100 m south of the lagoon. Large-diameter bored and dug wells and ponds are the predominant sources of drinking water in the area.

Groundwater and lagoon sampling. Groundwater was collected from 14 monitoring wells at site A and from six monitoring wells at site C (Fig. 1). Water samples from the waste lagoons were also taken from each site. A polyethylene bailer dedicated to each sample was sterilized with alcohol and rinsed with sterile water prior to use for sample collection. Between 1.5 and 3 well volumes of groundwater was removed from each well before collection as described previously (19). Samples were stored in clean, sterile plastic bottles and kept on ice in the field. Samples were refrigerated at 4°C in the laboratory until they were analyzed.

Bacterial identification and isolation. Tetracycline-resistant bacteria from lagoon and groundwater samples were grown aerobically on Enterococcosel agar (BBL, Cockeysville, Md.) and MR2A agar (9); 20 μg of tetracycline (Sigma, St. Louis, Mo.) per ml was added to each medium. Undiluted groundwater samples (100 μl) were directly plated onto agar media, while lagoon samples were plated by using 10-fold serial dilutions up to 1,000-fold. Media lacking tetracycline were inoculated similarly. Cultures grown on Enterococcosel agar were incubated at 37°C for 48 h. Cultures grown on MR2A agar were incubated at room temperature for up to 14 days. Tetracycline-resistant colonies were further purified by restreaking on the same media and were used for PCR screening as described previously (1). Gram staining was performed with a Protocol kit (Biochemical Sciences, Swedesboro, N.J.).

DNA extraction. Groundwater samples (250 ml) were centrifuged at 17,700 × *g* for 20 min at 4°C. The supernatants were discarded, and the pellets were washed three times with 0.1 volume of phosphate-buffered saline (120 mM NaH_2PO_4 [pH 8.0], 0.85% NaCl) before extraction of total DNA by the method of Tsai and Olsen (36). Lagoon samples (50 ml) were centrifuged at 10,000 × *g* for 10 min at 4°C before DNA extraction as described above. DNA (final concentration, 125 ng/μl) was stored in TE buffer (10 mM Tris-HCl, 1 mM EDTA [pH 8.0]) at −20°C.

PCR amplification. The primers and PCR protocol used to amplify tetracycline resistance genes in this study were described previously (1). Briefly, PCR was performed with 25 pmol of each primer and an ExTaq PCR kit (purchased from PanVera Corporation, Madison, Wis.) by using a final reaction mixture volume of 25 μl. Purified DNA (125 ng) or one-half of a 1- to 2-mm-diameter individual colony that was resuspended in sterile water was used as the PCR template. PCR amplification was performed with a GeneAmp PCR system 2400 thermocycler (Perkin-Elmer, Norwalk, Conn.). The temperature program consisted of denaturation at 94°C for 5 min, followed by 30 cycles consisting of 94°C for 30 s, annealing for 30 s, and extension at 72°C for 30 s and a final extension at 72°C for 7 min. The annealing temperatures used for amplification of different RPP genes were as follows: *tet*(O), 60°C; *tet*(Q), 63°C; *tet*(W), 64°C; *tet*(M), 55°C; *tetB*(P), 47°C; *tet*(S), 50°C; *otrA*, 66°C; and *tet*(T), 46°C. The PCR protocol was modified for DNA obtained from groundwater samples due to the presence of unidentified PCR-inhibiting substances. For these samples, a second, nested PCR was performed by using 1 μl of the first PCR mixture as the template and amplifying the template for 25 or 30 cycles as described above. Nested PCR was also performed with DNA from lagoon samples when necessary. The control reactions included PCR amplification with bacterial 16S rDNA primers 27F and 1525R (21) and sterile water or DNA of tetracycline-sensitive *Escherichia coli* EPEC as the negative control template for all primer sets and the positive control strains for each primer set as described previously (1). PCR product aliquots (5 μl) were analyzed by electrophoresis on a 2.5% (wt/vol) agarose gel (NuSieve; FMC Bioproducts, Rockland, Maine) and were stained with ethidium bromide. The sizes of the PCR products obtained from amplification were 167 bp for *tet*(O), *tet*(Q), *tet*(W), *tet*(M), *tetB*(P), *tet*(S), and *tet*(T) and 212 bp for *otrA*.

DGGE analysis. DNA from groundwater, lagoons, and bacterial isolates was PCR amplified as described above, except that in the nested PCR the forward primer included a GC clamp at the 5′ end. Primers that targeted tetracycline resistance genes and the V3 variable region of 16S rDNA (25) were used. DGGE analyses of the amplified tetracycline resistance genes were performed as described previously (1). Briefly, electrophoretic separation of the PCR products was accomplished by using a polyacrylamide gel with a gradient containing urea and formamide (8% acrylamide, 30 to 60% urea–formamide, 0.5× TAE buffer [pH 7.4]). Electrophoresis was performed at 60°C for 2 h at 150 V and then for 1 h at 200 V, using a D-Code system (Bio-Rad, Hercules, Calif.). The gels were silver stained, and images were captured by using the Bio-Rad Diversity Database fingerprinting software on a G3 Macintosh computer equipped with a Bio-Rad GS-710 calibrated imaging densitometer. The gel standard markers consisted of known mixtures of PCR-amplified RPP tetracycline resistance genes or the V3 variable region of 16S rDNA.

Cloning and sequencing. DNA bands were excised from DGGE gels, crushed, equilibrated in 50 μl of sterile water, and then subjected to three cycles of freezing and thawing (at −20°C and room temperature). Eluted DNA (1 μl) was reamplified with the corresponding primers and reelectrophoresed on a DGGE gel as described above. PCR products were cloned by using a TOPO-TA Cloning

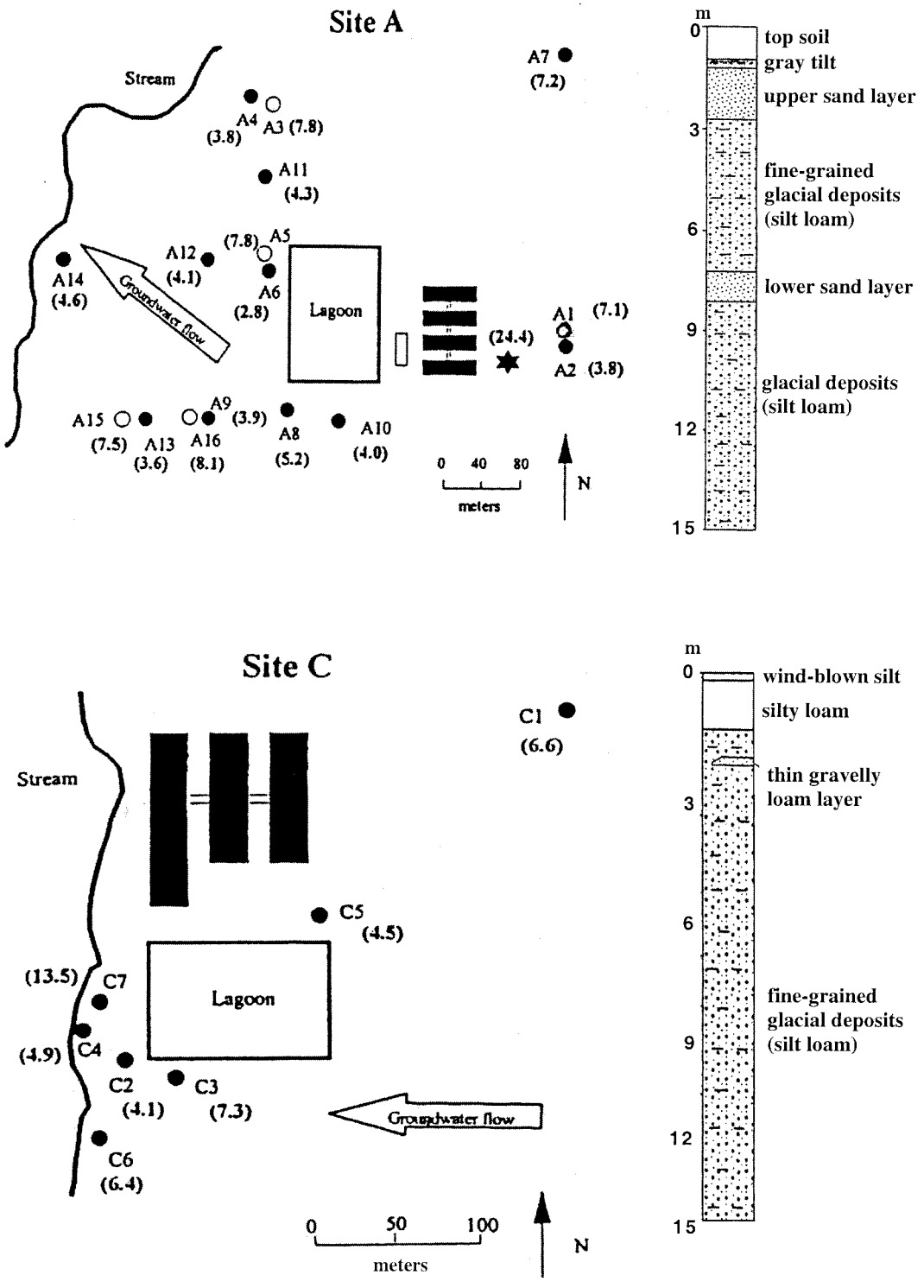

FIG. 1. Maps of sites A and C and corresponding stratigraphic columns indicating the locations and characteristics of sand layers. The direction of groundwater flow is indicated by large open arrows, and the locations of monitoring wells are indicated by circles; open circles represent nested wells screened in deeper sand layers. Well depths (in meters) are indicated in parentheses. The solid rectangles represent confinement buildings.

kit (Invitrogen, Carlsbad, Calif.) according to the manufacturer's instructions. White colonies harboring the corresponding *tet* fragments were identified by PCR by using the small amounts of colony biomass and the corresponding primer sets. Representative bacterial isolates from the groundwater and lagoons were identified by sequencing of the cloned 16S rRNA genes, which were amplified with the bacterial primer set (21). Sequence analysis of the cloned *tet* and small-subunit rDNA fragments was performed by the University of Illinois Keck Center for Functional and Comparative Genomics. Sequences were analyzed on-line by using the BLAST (Basic Local Alignment Search Tool) family of programs of GenBank (22).

TABLE 1. Tetracycline resistance genes detected in total DNA from lagoons and groundwater

Sample	Tetracycline resistance genes							
	tet(W)	*tet*(O)	*tet*(Q)	*tet*(M)	*tet*(S)	*tet*(T)	*tetB*(P)	*otrA*
Site A lagoon	+	+	+	+	+	+	+	+
A7 bkg[a]	−	−	−	−	−	+	−	−
A10	−	−	−	−	−	−	−	−
A8	+	+	+	+	+	+	−	−
A9	+	−	+	+	−	+	−	−
A16	+	+	+	+	−	−	−	−
A13	+	+	+	+	−	−	−	−
A15	+	−	+	+	−	+	−	−
A6	+	−	+	−	−	−	−	−
A5	+	+	+	+	−	+	−	−
A12	+	−	+	−	−	+	−	−
A14	−	−	+	−	−	−	−	−
A11	+	−	+	+	−	+	−	−
A3	+	+	+	+	−	+	−	−
A4	−	−	−	−	−	−	−	−
Site C lagoon	+	+	+	+	+	+	+	+
C1 bkg[a]	−	−	−	−	−	−	−	−
C3	−	−	−	−	−	−	−	−
C2	+	−	+	+	−	+	−	−
C4	−	−	−	−	−	−	−	−
C6	+	+	+	+	−	+	−	+
C7	+	+	+	+	−	−	−	−

[a] Background control well located upstream of the lagoon.

Nucleotide sequence accession number. The 16S rDNA sequence data reported in this paper have been deposited in the GenBank database under accession no. AY017049 to AY017063.

RESULTS

PCR amplification of *tet* genes from lagoon and groundwater samples. All of the known ribosomal protection tetracycline resistance determinants were detected in the lagoon samples (Table 1). Most of them were detected in total DNA from the lagoons after the initial 30 cycles of PCR; the only exception was *otrA*, which was detected only after a second, nested PCR. The most frequently detected determinants in groundwater samples from both sites were Tet Q, Tet W, Tet M, Tet T, and Tet O. Groundwater from well A8 contained Tet S, and well C6 water contained detectable *otrA*. None of the groundwater samples contained detectable *tetB*(P). Background well A7 at site A contained *tet*(T), which was also detected in more than one-half of the wells located downstream of the site lagoon in the direction of groundwater flow. Site C background well C1 did not contain any of the ribosomal protection tetracycline resistance determinants. Two of the shallow wells at site A, wells A10 and A4, also did not contain any detectable levels of these determinants. Well C3, located close to the lagoon but perpendicular to the general direction of groundwater flow away from the lagoon, did not contain any determinant. Sample A14 from the well located farthest away from the site A lagoon contained Tet Q, which was the most frequently detected determinant.

One of the objectives of this study was to determine whether the genetic diversity of tetracycline resistance genes uncovered by in vitro analysis of total DNA overlapped the genetic diversity of the cultivable isolates. Also, amplification of *tet* genes from total-DNA preparations is not discriminatory in terms of the host strains in which *tet* genes occur, and our aim was to determine whether *tet* gene dissemination to groundwater and indigenous soil microbiota could occur. The experiments which we performed are described below.

Phenotypic characterization and tetracycline resistance genotypes of bacterial isolates. Approximately 4×10^3 and 3×10^4 CFU per ml were obtained on Enterococcosel agar containing 20 μg of tetracycline per ml after direct plating of 100 μl of slurry from the lagoons at sites A and C, respectively. Several presumptive enterococci (gram-positive, catalase-negative cocci) were randomly selected and isolated (Table 2). All of the enterococcal isolates contained *tet*(M) as determined by PCR, and one isolate (CLE3) also carried *tet*(S). Another randomly selected isolate obtained from the Enterococcosel medium was a gram-positive rod (CLE4) which also harbored the *tet*(M) gene. Few tetracycline-resistant colonies were obtained after direct plating of groundwater on Enterococcosel agar.

Cultivation of aerobic heterotrophs from undiluted groundwater on MR2A medium yielded counts between approximately 1.3×10^3 and $>10^5$ CFU per ml. In the presence of 20 μg of tetracycline per ml, only groundwater from well A8 (1.7×10^2 CFU per ml) and the lagoons ($>10^5$ CFU per ml) yielded significant numbers of tetracycline-resistant colonies. Tetracycline-resistant colonies were obtained sporadically from direct plating of groundwater from several wells (wells A7, A3, A16, C2, and C7). These colonies, along with several randomly selected tetracycline-resistant colonies from well A8 and lagoon samples, were isolated. All of the MR2A medium isolates from groundwater and lagoon samples were distinct gram-negative rods. Of the 16 tetracycline-resistant isolates, 10 contained the *tet*(M) gene. The remaining six resistant isolates did not harbor any of the ribosomal protection tetracycline resistance determinants and presumably harbored the efflux mechanism of resistance.

DGGE analysis. DGGE analysis of the *tet*(M) determinant was used to assess conservation of the gene in both environmental samples and individual isolates. One major band corresponding to *tet*(M) was present in all of the groundwater and lagoon samples (Fig. 2). Multiple minor bands were present in several samples (e.g., well C7); however, when these bands were extracted from the gel, reamplified, and reelectrophoresed on a DGGE gel, the migration was identical to the migration of the major band and the positive control for *tet*(M) (data not shown). DGGE analysis for the *tet*(M) gene in isolates also demonstrated that there was one principal band corresponding to the *tet*(M) control band. The isolates were also analyzed by DGGE by using primers specific for the V3 region of the 16S rDNA (Fig. 3). The results indicated that isolates harboring the same *tet*(M) gene were representatives of at least 10 different phylotypes at sites A and C.

Identification of tetracycline-resistant bacteria. Several tetracycline-resistant isolates were selected for further identification by 16S rDNA sequencing. The strains that were selected on Enterococcosel medium belonged to the low-G+C-content gram-positive bacterial phylum, and the closest relatives were *Enterococcus* sp., *Staphylococcus* sp., and *Lactobacillus reuteri* (Table 3). Growth on MR2A medium resulted in a wider range of taxonomic affiliations, including members of the alpha and gamma subdivisions of the class *Proteobacteria* and the *Acti-*

TABLE 2. Characteristics of bacterial isolates from lagoons and groundwater

Isolate[a]	Source	Phenotypic description	*tet*(M)[b]	*tet*(S)
ALE1	Site A lagoon	Gram-positive coccus	+	−
ALE2	Site A lagoon	Gram-positive coccus	+	−
ALE3	Site A lagoon	Gram-positive coccus	+	−
ALE4	Site A lagoon	Gram-positive coccus	+	−
CLE1	Site C lagoon	Gram-positive coccus	+	−
CLE2	Site C lagoon	Gram-positive coccus	+	−
CLE3	Site C lagoon	Gram-positive coccus	+	+
CLE4	Site C lagoon	Gram-positive, large, bent rod	+	−
A7-2	Bkg well A7[c]	Gram-negative, short, motile rod	−	−
A8-2	Well A8	Gram-positive, short, slender, nonmotile rod	+	−
A8-3	Well A8	Gram-negative, short, motile rod	+	−
A8-4	Well A8	Gram-negative, short, plump, motile rod	+	−
AL-1	Site A lagoon	Gram-negative, short, plump, motile rod	−	−
AL-2	Site A lagoon	Gram-negative, short, nonmotile rod	+	−
AL-3	Site A lagoon	Gram-negative, short, plump, motile rod	+	−
AL-4	Site A lagoon	Gram-negative, short, motile, rod	+	−
AL-5	Site A lagoon	Gram-negative, short, nonmotile rod	−	−
CL-1	Site C lagoon	Gram-negative, oval, motile	+	−
CL-2	Site C lagoon	Gram-negative, short, motile rod	−	−
CL-3	Site C lagoon	Gram-negative, short, plump, motile rod	+	−
C2-1	Well C2	Gram-negative, short, nonmotile rod	+	−
A3-1	Well A3	Gram-negative, small, nonmotile rod	−	−
C7-1	Well C7	Gram-negative, plump, nonmotile rod	−	−
A16-2	Well A16	Gram-negative, short, plump, nonmotile rod	+	−

[a] Isolates ALE1, ALE2, ALE3, ALE4, CLE1, CLE2, CLE3, and CLE4 were isolated on Enterococcosel agar containing 20 μg of tetracycline per ml. All other isolates were obtained from MR2A agar containing 20 μg of tetracycline per ml.
[b] No *tet*(W), *tet*(O), *tet*(Q), *tet*(T), *tetB*(P), or *otrA* was detected in any isolate.
[c] Background control well located upstream of the lagoon.

nobacteridae subclass of high-G+C-content gram-positive bacteria (Table 3). The only tetracycline-resistant isolate obtained from the background well at site A was identified as a member of the genus *Bosea*, which includes bacteria mostly of soil origin. With the exception of *L. reuteri*, all of the isolates had levels of similarity with database entries between 91 and 96%, which allowed only approximate taxonomic identification at the genus level and higher taxa levels.

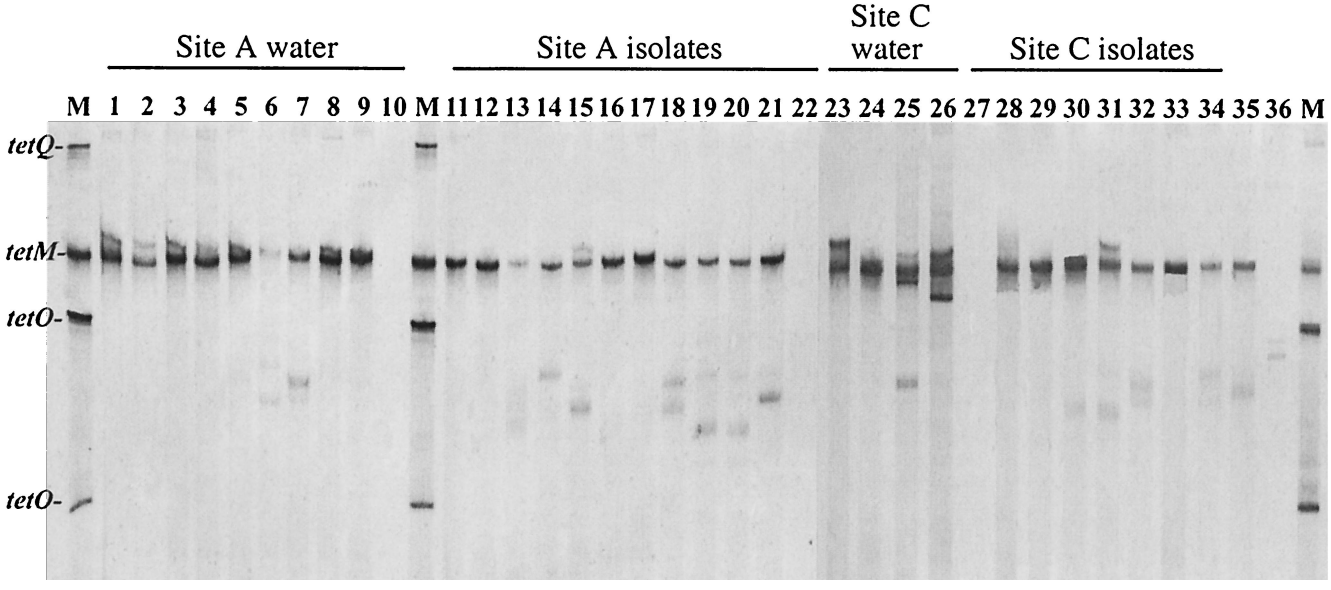

FIG. 2. DGGE analysis of *tet*(M) in water samples and in bacterial isolates. Lane 1, site A lagoon; lane 2, A8; lane 3, A9; lane 4, A16; lane 5, A3; lane 6, A13; lane 7, A15; lane 8, A5; lane 9, A11; lane 10, A7 (site A background well); lane 11, ALE1; lane 12, ALE2; lane 13, ALE3; lane 14, ALE4; lane 15, A8-2; lane 16, A8-3; lane 17, A8-4; lane 18, AL-2; lane 19, AL-3; lane 20, AL-4; lane 21, A16-2; lane 22, AL-1; lane 23, site C lagoon; lane 24, C2; lane 25, C6; lane 26, C7; lane 27, C1 (site C background well); lane 28, CLE1; lane 29, CLE2; lane 30, CLE3; lane 31, CLE4, lane 32, CL-1; lane 33, CL-3; lane 34, C2-1; lane 35, *tet*(M) positive control strain; lane 36, CL-2. Lanes M contained markers consisting of *tet*(Q), *tet*(M), and *tet*(O).

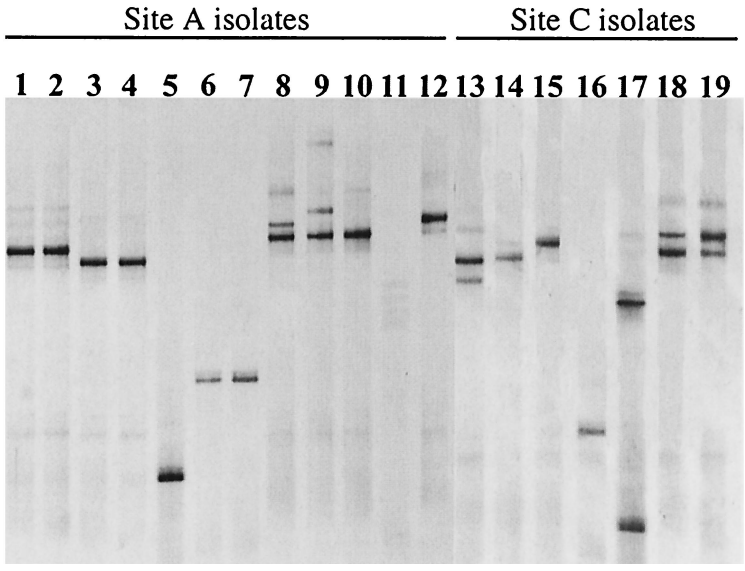

FIG. 3. DGGE analysis of V3 variable region of 16S rDNA from tetracycline-resistant bacterial isolates. Lane 1, ALE1; lane 2, ALE2; lane 3, ALE3; lane 4, ALE4; lane 5, A8-2; lane 6, A8-3; lane 7, A8-4; lane 8, AL-2; lane 9, AL-3; lane 10, AL-4; lane 11, A16-1 (fungal isolate, negative control); lane 12, AL-1; lane 13, CLE1; lane 14, CLE2; lane 15, CLE3; lane 16, CLE4; lane 17, CL-1; lane 18, CL-3; lane 19, CL-2.

DISCUSSION

Tetracycline is commonly used in animal agriculture, particularly in the swine industry (16). Because of this use, selection for tetracycline resistance occurs in the normal swine gut microflora, and in our previous study we demonstrated that the reservoir of tetracycline resistance determinants in the swine intestinal microbiota is substantial and diverse (1). However, the details of what happens with this pool of antibiotic resistance genes further downstream remain largely unknown. Since animal production systems are not closed ecosystems, this pool may be released into the environment. In this study, we demonstrated that a broad range of tetracycline resistance genes occur in two swine waste lagoons and that upon release into the environment these genes can potentially mobilize and persist.

Detection of all of the RPP genes in the waste lagoons at both sites clearly indicated that selection for this drug resistance trait occurs and that a number of resistance genes can be maintained in the microbial populations present. A wide range of RPP genes were detected in groundwater downstream of the waste lagoons. Greater occurrence of RPP genes was detected in wells proximal to both lagoons in the direction of groundwater flow, and the detection of *tet*(Q) in well A14, located more than 250 m downstream of the lagoon at site A (Fig. 1), suggested that the mobility of resistance genes in the environment can be substantial. Two of the locations at site A had nested wells (Fig. 1, wells A4 and A6), and second wells were screened in deeper sand layers (wells A3 and A5). The occurrence of RPP tetracycline resistance genes was greater in the deep wells than in the corresponding shallow wells, demonstrating that contaminants may be vertically mobile depending on the hydrogeology of the location. Although this study was based on a single sampling event, the data suggest that the presence of the tetracycline resistance genes is due to seepage and movement of groundwater underlying the lagoons. Wells A10 and C3 did not contain any of the tetracycline resistance determinants, as expected due to the locations of the wells relative to the lagoons and the direction of groundwater flow. Thus, there were clear gradients of relative frequency and diversity of tetracycline resistance genes, with the maximal values occurring at waste lagoons and a gradual decline in the direction of groundwater flow; however, the genes were still detectable 250 m downstream. These observations may have important implications for understanding the circulation and acquisition of antibiotic resistance genes. Groundwater constitutes a substantial part of the public water supply in the United

TABLE 3. Identification of tetracycline-resistant isolates by using 16S rDNA sequences

Isolate	Size of 16S rDNA fragment analyzed (bp)	Closest taxon (% similarity)	Taxonomic affiliation
ALE1	1,438	*Enterococcus hirae* (94)	Low-G+C-content gram-positive bacteria
ALE3	1,103	*Staphylococcus cohnii* (96)	Low-G+C-content gram-positive bacteria
CLE2	520	*Enterococcus* sp. (91)	Low-G+C-content gram-positive bacteria
CLE4	1,312	*Lactobacillus reuteri* (97)	Low-G+C-content gram-positive bacteria
A7-2	1,445	*Bosea thiooxidans* (95)	*Proteobacteria*, alpha subdivision
A8-2	1,424	*Microbacterium oxydans* (95)	High-G+C-content gram-positive bacteria, subclass *Actinobacteridae*
A8-3	1,102	*Afipia* genospecies 9 (96)	*Proteobacteria*, alpha subdivision
CL-2	1,363	*Pseudomonas pseudoalcaligenes* (93)	*Proteobacteria*, gamma subdivision

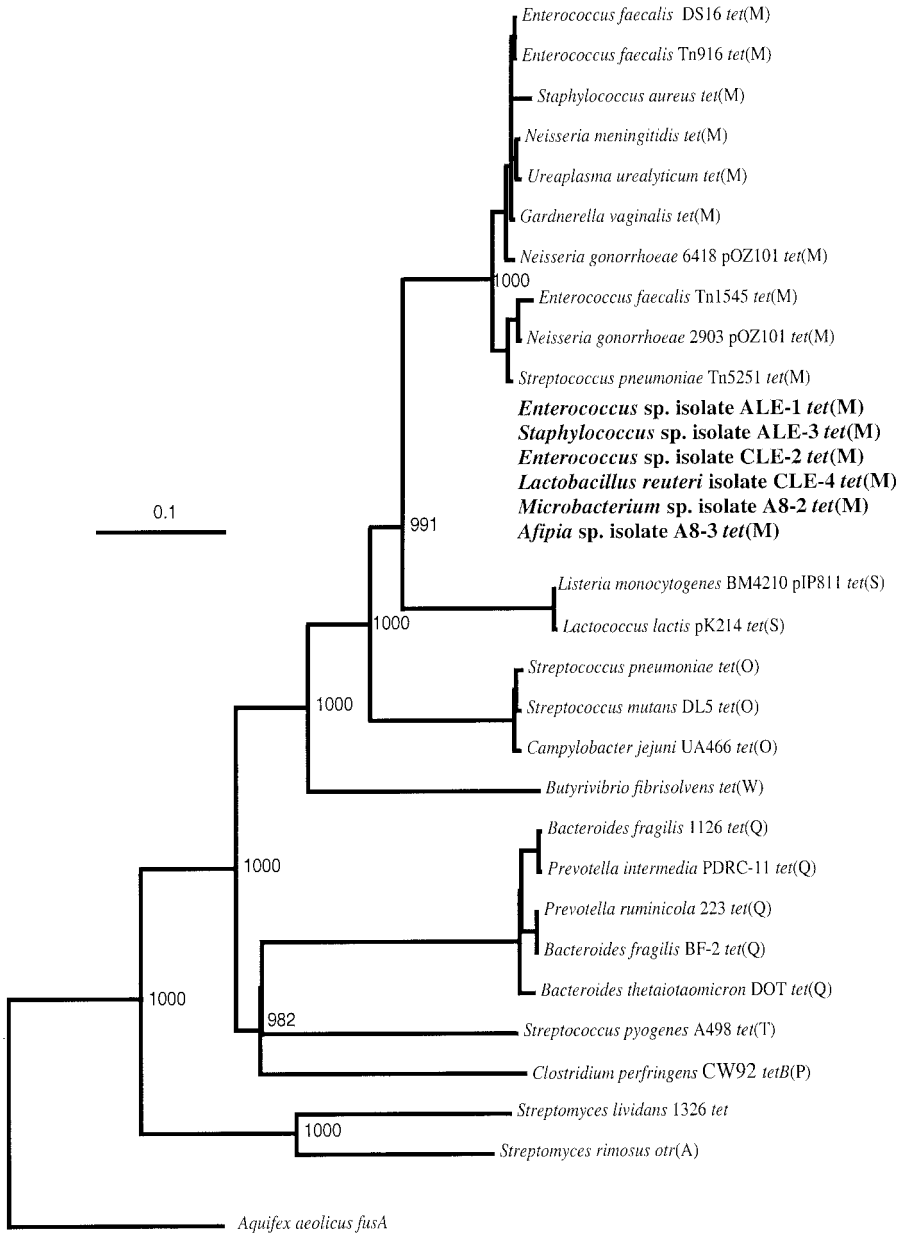

FIG. 4. Phylogenetic placement of tetracycline resistance genes encoding RPPs. The sequence of the *Aquifex aeolicus fusA* gene encoding translation elongation factor EF-G is used as the outgroup for rooting the tree. The numbers above nodes indicate the number of times that a tree configuration occurred among 1,000 bootstrap trials. Scale bar = 0.1 fixed nucleotide substitution per sequence position. The *tet*(M)-harboring strains isolated in this work are indicated by boldface type. These strains were not incorporated into the phylogenetic analysis and were placed in the Tet M cluster arbitrarily based on sequence similarity.

States (http://water.usgs.gov/wid/html/GW.html), and at both study sites it is used as the predominant source of untreated drinking water. Thus, along with other ways of acquiring antibiotic resistance, such as consumption of tainted food, the occurrence of antibiotic resistance genes in drinking water provides a possible way for antibiotic resistance to enter the animal and human food chain.

Several *tet* genes, particularly *tet*(M), *tet*(O), *tet*(Q), and *tet*(W), were dominant in the total communities in the lagoons and groundwater. These genes were found to be predominant in the gastrointestinal tracts of pigs and steers (1), and in this study the elevated frequencies of these genes in the environment surrounding the farms were consistent with the hypothesis that this occurrence was the result of gene flow from the animals. Tetracycline-resistant bacteria obtained from the lagoon and groundwater samples primarily harbored the *tet*(M) gene, probably because the cultivation technique was biased towards aerobic growth and the group of bacteria containing the known *tet*(M) genes includes members of a broad range of genera, including genera of gastrointestinal origin (Fig. 4). Furthermore, it is known that alleles of *tet*(M) are present in a broad range of bacteria, and their transfer is presumably me-

diated by conjugative transposons Tn*916*, Tn*1545*, and Tn*5251* and large conjugative plasmids. It is notable, however, that the use of two different media and random selection of tetracycline-resistant colonies resulted primarily (75%) in bacteria harboring *tet*(M). No groundwater isolates were correlated with a high occurrence of Tet T and Tet O, the two determinants which occur in aerotolerant *Streptococcus* spp. (Fig. 4). None of the other RPP tetracycline resistance genes were detected in any of the *tet*(M)-harboring isolates except CLE3, which contained both *tet*(M) and *tet*(S). In some tetracycline-resistant isolates (A7-2, AL-1, AL-5, CL-2, A3-1, and C7-1) no genes conferring ribosomal protection were detected, and these isolates most likely have an alternative mechanism of tetracycline resistance, such as energy-dependent efflux of tetracycline. Anaerobic genera such as *Prevotella, Bacteroides*, and *Butyrivibrio* were not targeted for cultivation in our study, and consequently, isolates containing the two most prominent lagoon and groundwater markers [*tet*(Q) and *tet*(W)] were not represented. Few groundwater samples contained *tet*(S), *otr*A, and *tet*B(P); however, these determinants were detected in the lagoons, which suggested that they were present at significantly lower levels than the other RPP tetracycline resistance genes.

Enterococci were the dominant fecal bacteria detected in lagoons and in several groundwater samples. Tetracycline-resistant *Enterococcus* spp. were isolated along with an organism known to be of gastrointestinal origin, *L. reuteri*. The presence of identical *tet*(M) alleles in these bacteria suggests that lateral transfer of the gene occurred; however, it cannot be determined if this event occurred in the gut of an animal, in the lagoon environment, or in the groundwater. This gene and *tet*(O) were found to be circulating among the fecal streptococci in the pig gut (1). In this work, more significantly, the potential for transfer of the *tet*(M) allele involving groundwater and commensal soil bacteria was evident. Taxonomic analysis of isolates carrying the same *tet*(M) gene and belonging to the genera *Afipia* and *Microbacterium* confirmed that they probably originated from soil. Very little is known about the occurrence of *tet*(M) and other tetracycline resistance genes in phenotypically tetracycline-resistant bacteria in soil. Most of the *tet*(M) genotyping work has been done with clinical isolates, and interestingly, the genes are genetically quite diverse (92 to 96.8% identity) and display a mosaic structure consistent with homologous recombination between different lineages (3, 10, 15, 26). In our experiments, we observed extreme homogeneity of these genes in taxonomically (and ecologically) diverse bacteria, including intestinal lactobacilli, enterococci, and staphylococci, as well as soil species of *Microbacterium* and *Afipia* (Fig. 4). Consistent with this observation, we hypothesize that in our case we found a point source of genetic contamination originating on farms with the selective pressure of tetracycline. It is likely that transfer events occur in part because of the high density of bacteria in the lagoons, but it is not known to what extent such events occur in less populated groundwater environments. The observed horizontal spread of *tet*(M) genes to soil bacteria may have several notable implications. First, such spread suggests that antibiotic resistance gene dissemination is not restricted to the release of antibiotic-resistant gastrointestinal microbiota, which may have limited viability outside the gastrointestinal tract. The dissemination vector is not interrupted even if the original antibiotic resistance-harboring bacteria are not viable anymore. Second, when the resistance gene pool is mobilized into the indigenous bacteria in the environment, it has a much better chance of survival, persistence, and mobility, effectively increasing the gene frequency in local populations and having increased potential for reaching other ecosystems.

Another explanation for the elevated occurrence of *tet*(M) in soil bacteria may be the selective pressure of tetracycline, which may move through the soil layers to the groundwater and select for tetracycline resistance genes residing in soil microbiota. Few previous studies have addressed the fate of antibiotics in the environment and, if they are present, whether they exert any selective pressure for resistance. Tetracycline is not known to be readily degradable and is reportedly strongly absorbed in various soil types (28). This, along with the constant input of tetracycline via animal waste, can potentially provide a concentrated environment in which selection can occur. However, because of the strong sorption of tetracycline in soil (28), this antibiotic may have limited ability to reach distant groundwater layers and is concentrated primarily in soil layers close to lagoons. Despite the possibility of accumulation of tetracycline in soil environments, even low levels can substantially increase the transfer frequency of large conjugative transposons, such as Tn*916* (32) and Tn*1545* (5), Tn*916*-like elements (29, 35), or *Bacteroides* transposons (30) on which tetracycline resistance genes reside. Other factors conducive to resistance persistence and acquisition in the environment are not known, and groundwater is a unique environment for study. In particular, these factors could be naturally occurring compounds with structural similarity to tetracyclines, such as certain plant flavonoids.

In this study, we estimated the pool, diversity, and possible transmission of one group of tetracycline resistance genes in two animal production systems and their surrounding environments. Although previous studies have addressed the occurrence of specific antibiotic resistance characteristics in the environment, none of these studies included a more thorough genotypic characterization of a specific antibiotic resistance trait. While the set of genes which we targeted in our study includes only a limited portion of the bacterial resistance genes that may be present, it provides the basis for using a similar approach in order to combine molecularly and phenotypically based methods to characterize the occurrence, diversity, and routes of transmission of antibiotic genes in nature. The data obtained can be used to address the question of whether environments such as groundwater and soil are significant reservoirs for dissemination of resistance genes. In addition, long-term surveillance can provide an indication of the mobility, persistence, and transfer of resistance genes and begin to address the issue of agriculture as a source of resistance genes for entry into the environment.

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Attachment 8:

Bacteria Contamination of Groundwater in a Mixed Land-Use Karst Region
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ORIGINAL PAPER

Bacteria Contamination of Groundwater in a Mixed Land-Use Karst Region

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Abstract Enteric bacteria, many of which are opportunistic pathogens, were detected in groundwater from springs, wells, and a cave stream in the karst region of southwestern Illinois, and concentrations generally were very high in the springs and cave stream. The two main sources of bacterial contamination were determined to be domestic wastewater treatment discharge and livestock manure. The water chemistry in the springs and caves indicated substantial dilution of any wastewater discharge, but the dilution was not sufficient to lower bacteria concentrations to regulatory levels. High counts of enteric bacteria were found throughout the year, suggesting a continuous source of contamination, most likely domestic wastewater discharge. Although wells generally were less contaminated than springs, wells located in livestock areas usually were contaminated with enteric bacteria, and their water chemistry was indicative of contamination by animal waste.

Keywords Karst · Enteric bacteria · Fecal contamination · Springs · Nitrate · Chloride

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Introduction

The term "karst" refers to terrain underlain by an aquifer whose water flows through solution-enlarged crevices (typically greater than 1 cm wide) and sometimes large conduits, most commonly in carbonate rocks. The landscape typically possesses sinkholes, numerous and large springs, sinking streams, subterranean drainage, and caves. Water resources in these areas are vulnerable to surface-borne contamination because the recharge and flow of groundwater through bedrock fissures and conduits is often rapid, with little or no attenuation of contaminants (White 1988). Groundwater contamination can be exacerbated during or following heavy precipitation events when large volumes of sediment-laden water containing surface-borne contaminants are rapidly flushed through conduits in the subsurface. In agricultural areas, elevated levels of nitrate (NO_3^-), pesticides, and suspended sediments in surface water and karst groundwater are common (Pasquarell and Boyer 1995; Ryan and Meiman 1996; Currens 2002; Panno and Kelly 2004). Pathogenic bacteria also have been found in high densities in karst waters where there are sources of fecal matter such as livestock and private wastewater treatment systems (Personné et al. 1998; Hunter et al. 1999; Peterson et al. 2000; Currens 2002). Factors affecting bacterial contamination of karst groundwater include land use, timing and rate of precipitation, soil properties, amount of suspended material, existence of subsurface conduits, and seasonality (Pasquarell and Boyer 1995; Mahler et al. 2000; Celico et al. 2004). This investigation was undertaken to determine the factors affecting enteric bacteria contamination in springs, wells, and a cave in the sinkhole plain karst region of southwestern Illinois. Potentially important variables that were evaluated include aqueous chemistry, ge-

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ological terrain, hydrogeological conditions, land use, and spring discharges.

Methods

Study Area

Illinois' sinkhole plain is located primarily within St. Clair, Monroe, and Randolph counties in southwestern Illinois, on the western margin of the Illinois Basin (Fig. 1). The bedrock is primarily the calcite-rich Mississippian Salem, St. Louis, and Ste. Genevieve limestones. Approximately 10,000 sinkholes (up to 90 sinkholes per square kilometer), numerous large springs, and the longest caves in the state are found here (Panno et al. 1997). Although small areas of exposed karstic bedrock occur in the sinkhole plain, most of the bedrock is blanketed by loess (wind-blown silt) and/or glacial till up to 15 m thick (Herzog et al. 1994). Surficial karst features, i.e., cover-collapse sinkholes, are primarily found in the southwestern part of St. Clair County and the western part of Monroe County where the water table is often coincident with subsurface conduits that discharge at springs. The region defined as "covered karst" in Fig. 1 is underlain by karstic carbonate bedrock with no surface expression of karst. In these areas, the water table is situated above the soil–bedrock interface. Consequently, the sediment cover is supported by hydrostatic pressure and does not collapse into underlying crevices in bedrock (Panno et al. 1994).

Approximately 65% of land use in the three-county region was in row crops during the study period of 1994–2000 (Illinois Agricultural Statistics Service 2007). Hogs and cattle are the primary livestock raised in the region. The hog population varied annually between 26,000 and 73,700 (median 44,000), and the cattle population varied between 8500 and 10,700 (median 10,000) in Monroe County during the study period (Illinois Agricultural Statistics Service 2007). Cattle generally are allowed to graze in pastures most of the year, while hogs primarily are kept in confined indoor facilities with waste collection pits (J. Wagner, Monroe–Randolph Bi-County Health Department, personal communication, 2007). Hog waste is pumped out and spread on fields in the late fall or early spring. Residential development has increased dramatically since the 1980s in areas that possess a relatively high density of sinkholes, and most of these houses have on-site wastewater treatment systems. The local health department issued approximately 200 septic system permits annually during the study period, with a total of between 4000 and 5000 septic systems in Monroe County at the end of the study period (J. Wagner, Monroe–Randolph Bi-County Health Department, personal communication, 2007). Concentrations of enteric bacteria and many chemical constituents, including nitrate nitrogen (NO_3-N) and chloride (Cl^-), are elevated in effluent from on-site wastewater treatment systems in the study area (Panno et al. 2007).

Sampling and Analysis

Water samples were collected for chemical and bacterial analysis. Bacterial analysis included indicator bacteria (total coliform (TC), fecal coliform (FC), fecal enterococci (FE), and total aerobic bacteria (TA)) and bacterial genera and species. The presence of FC in a sample indicates the presence of mammal or bird feces in the water (Geldreich 1996). The presence of FE also indicates that there are feces from warm-blooded animals in the water; these bacteria are more closely linked to the transmission of water-borne diseases than are FC. Drinking water regulations in Illinois dictate that FC must be absent from drinking water samples, and fewer than 5% of samples are allowed to have positive TC results per month (Illinois Environmental Protection Agency 1999).

A total of 140 samples were collected from 16 springs (Fig. 1). Nine of the springs were sampled six times on a quarterly basis between November 1998 and March 2000. Two springs (Collier and Indian Hole) also were sampled approximately bi-weekly between January 1997 and August 1998. Samples were collected as close to the mouth of the springs as possible. Discharge measurements were made on 15 occasions between November 1997 and August 1998 at Collier and Indian Hole springs. A total of 52 samples were collected from 16 stream locations in Illinois Caverns between July 1996 and March 2000. The cave stream samples were collected from a midstream location.

A total of 201 samples were collected from 64 domestic wells between 1994 and 1999; 41 wells were sampled more than once. TC and TA were analyzed in all well samples, FC in 169, and FE in 50 well samples. Twenty-nine of the wells were in karst areas (76 samples), 31 in covered karst areas (109 samples), and four in non-karst areas (16 samples) (Fig. 1). The four shallowest wells (6–13 m) were old dug wells in covered karst areas. All other wells were drilled, with depths ranging from 17 to 191 m. Well logs were found for 48 of the wells, from which some well information was available, usually including casing length, producing formation, and the presence of large crevices. Water samples from wells were collected from flame-sterilized outdoor faucets that bypassed water-treatment units, using standard techniques and following appropriate QA/QC procedures. Temperature and Eh were measured in the field. Samples collected for anions were filtered in the field through 0.45 μm membranes and stored in polyethylene bottles. Unfiltered samples for selected herbicide analysis were collected in clean 1 L glass bottles. Samples for bacterial analysis were

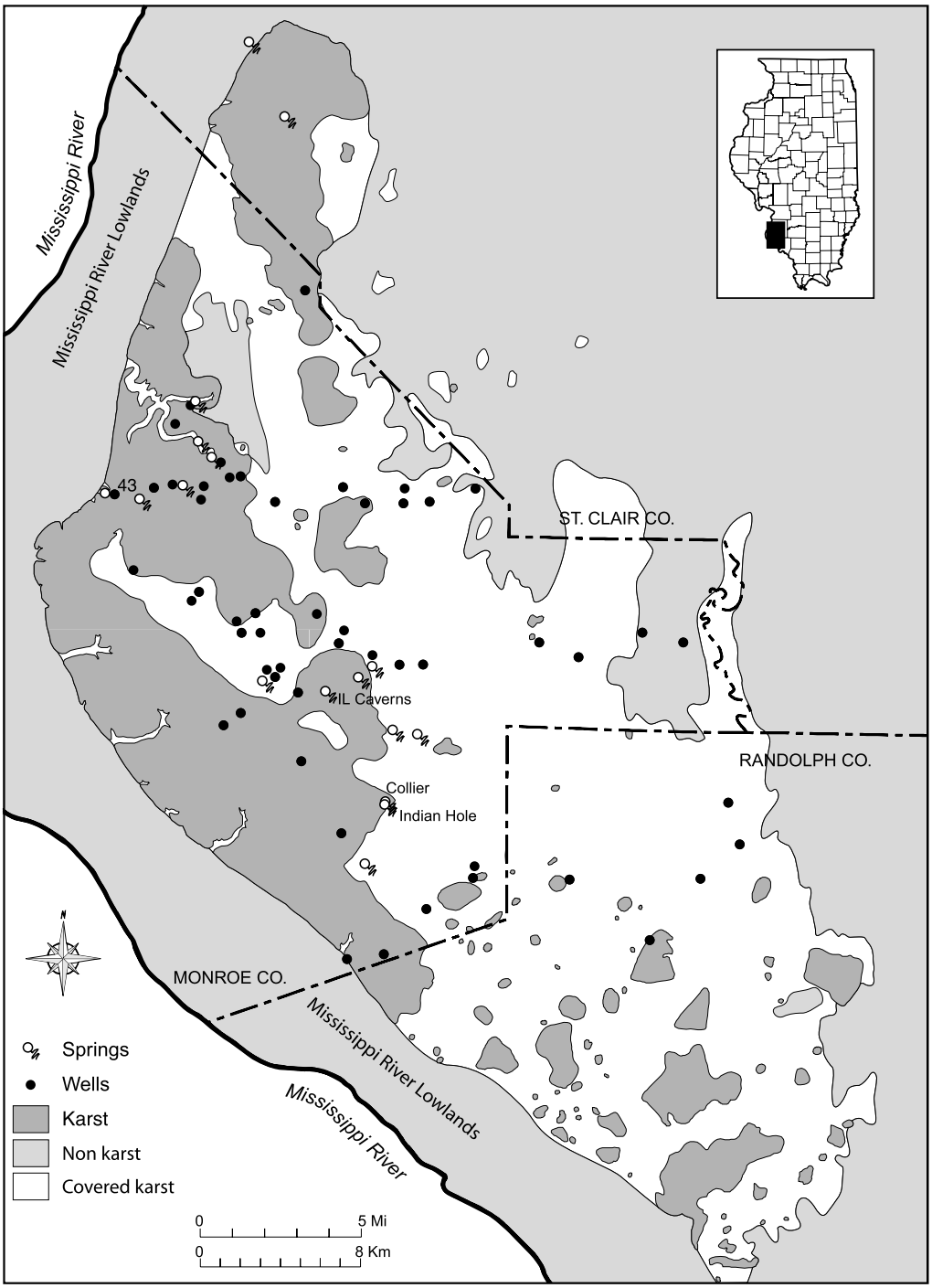

Fig. 1 Study area, showing karst, covered karst, and non-karst areas, modified from Panno et al. (1996)

collected unfiltered in sterile plastic bottles. The samples were transported in ice-filled coolers to analytical laboratories and kept refrigerated at approximately 4°C until analysis.

Anions were determined using ion chromatography. A subset of 232 samples were analyzed for bromide (Br^-) using neutron activation to aid in determining sources of Cl^- such as septic effluent, animal waste, and basin brines. Herbicides (atrazine, alachlor, metalachlor) were analyzed using enzyme-linked immunosorbent assays (ELISA), following the methods of Thurman et al. (1990). Detection limits for the herbicides were 0.1 µg/L.

Bacterial analyses were conducted at the Illinois Department of Agriculture's Animal Disease Laboratory in Cen-

tralia, IL, within 24 hours of collection. TC, FC, FE, and TA were determined using standard method filtration techniques, using Endo broth, FC agar, and KF Enterococcus agar (Greenberg et al. 1989; Cason et al. 1991); results are reported as colony forming units (cfu) per 100 mL of water.

Bacterial colonies were isolated using several standard methods (Clesceri et al. 1989; Cason et al. 1991). Growth media included MacConkey's agar, brilliant green agar, and tryptose blood agar, incubated at either 35° or 44.5°C for 24 to 48 hours. Gram-positive cocci were tested for catalase production and Gram-negative rods for oxidase production.

Logistic regression models (Hosmer and Lemeshow 2000) were used to assess the effects of NO_3-N, Cl^-, temperature, *Eh*, and total herbicides (present or absent), and, for wells, the additional explanatory variables–well depth, casing depth, and land use, on indicator bacteria data. Logistic regression allows prediction of a discrete outcome from a set of variables that may be continuous, discrete, dichotomous, or a mix. Because TC and FC were below detection for many well samples, they were made dichotomous, i.e., TC and FC were either detected or not detected. FE for wells was not considered because the data were too sparse. The TA and FE data for springs contained many observations above detection limits and hence were not exact values; thus they were made dichotomous, i.e., above or below a threshold value. Based on visual clustering of the data, threshold values of 120,000 cfu/100 mL and 2000 cfu/100 mL were selected for TA and FE, respectively. For consistency, FC in springs was also transformed to be dichotomous, with the same threshold that was used for FE (2000 cfu/100 mL). In logistic regression models, the logarithm of the odds (of detection or of being above the designated threshold) is fitted as a linear function of the explanatory variables. Significance was determined at the 95% confidence level.

Results and Discussion

Bacterial Indicators

Springs and Caves

More than 92% of the spring water samples and streams in Illinois Caverns had detectable levels of both FC and FE, with median values of 86 and 168 cfu/100 mL, respectively. Total coliform and TA were detected in all spring and stream samples, with median values of 3106 and 300,000 cfu/100 mL, respectively.

Some studies have shown a relationship between precipitation or spring discharge and bacteria concentrations (Pasquarell and Boyer 1995; Personné et al. 1998; Celico et al. 2004), but this was not observed consistently in the Collier and Indian Hole spring data. While elevated FC and/or FE levels were measured during the highest flow events, low levels were measured at other high flow events and elevated levels also were measured during some low flow events.

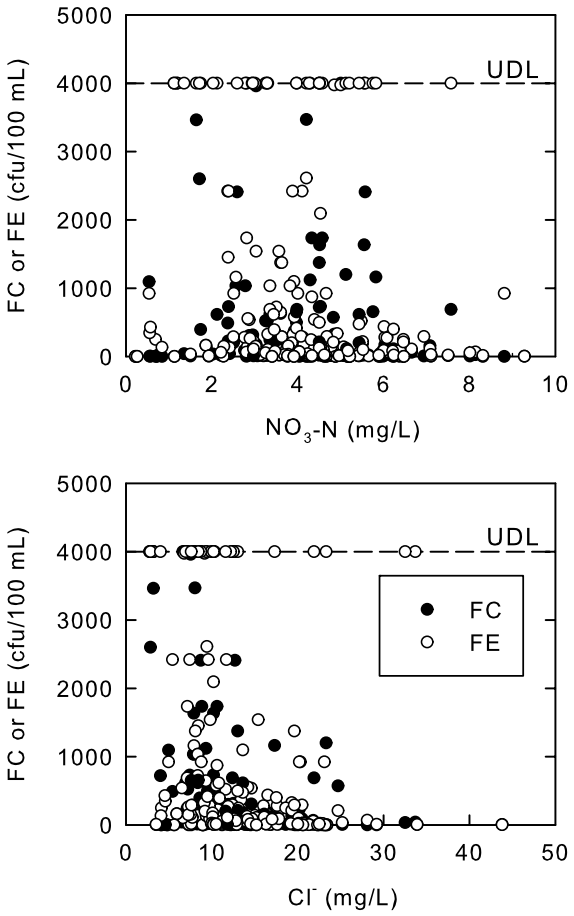

Fig. 2 FC and FE vs. NO_3-N and Cl^- for spring and cave samples. Symbols touching the *dotted line* represent samples with concentrations greater than the upper detection limit (UDL) of 4000 cfu/100 mL

The water chemistry of the springs and caves was not indicative of either septic or animal influences, and there were no obvious correlations between the chemistry and FC or FE (Fig. 2). Solutes from the wastewater or livestock sources were greatly diluted in the aquifer before spring discharge. In spite of this dilution, the enteric bacteria usually were not diluted to regulatory levels. Logistic modeling indicated that increases in Cl^- and temperature and the presence of herbicides were associated with decreases in the probability that TA and FE would be above 120,000 or 2000 cfu/100 mL, respectively, while NO_3-N and *Eh* did not have significant effect. For FC, only Cl^- was significant; as Cl^- increased, the probability that FC would be above 2000 cfu/100 mL decreased. The inverse relationship between Cl^- and FC and FE is indicative of how rapidly water moves from land surface to the spring outlet. During high flow periods, water passes rapidly from the surface, Cl^- concentrations are depressed due to the influx of dilute rainwater, and the water

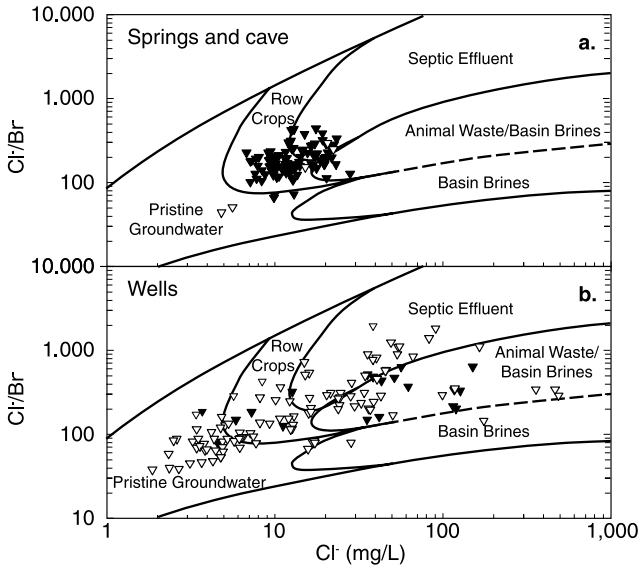

Fig. 3 Cl^-/Br^- vs. Cl^- plots for (**a**) spring and cave samples and (**b**) well samples. Domains were defined by Panno et al. (2006a). *Filled symbols* indicate samples where FC and/or FE were detected, open symbols are samples in which neither were detected

is more likely to contain fresh fecal material. During dry periods, discharge at the spring is primarily older water with higher Cl^- concentrations, water in which enteric bacteria is less viable. Panno et al. (2006a) used Cl^-/Br^- vs. Cl^- plots to distinguish among various sources of Cl^-, including human and animal waste and synthetic fertilizer (KCl). Plotting Cl^- and Br^- data from spring and cave samples on the Cl^- source domain plot developed by Panno et al. (2006a) indicates that the dominant source of Cl^- for most samples was row crops and, to a lesser extent, septic effluent and animal waste (Fig. 3a).

Bacterial contamination occurred in the springs and cave streams throughout the year. This suggests that wastewater discharge, which is not seasonally variable, is a greater problem than livestock waste. Hog manure is applied to fields only in the fall and spring, and cattle manure is less subject to decomposition and mobilization during the winter and thus less likely to enter the aquifer/cave systems.

Wells

Total aerobic bacteria were detected at least once in 58 of the 64 wells. This suggests that groundwater in the capture zones of these wells was generally oxygenated, which is supported by *Eh* values that were almost always greater than 300 mV. Total coliforms were detected at least once in 40 of the 64 wells. Concentrations were typically much lower in wells than in the spring and cave samples; about 76% of the well samples with detectable TC had concentrations <400 cfu/100 mL, with a median of 40 cfu/100 mL in samples with detectable TC. FC or FE were detected at least once in 23 wells, generally at low concentrations. About half of the detections were less than 10 cfu/100 mL, and the maximum concentration was 198 cfu/100 mL. All bacterial indicators were less likely to be detected in wells in non-karst than in the karst and covered karst areas, and concentrations were lower. Fecal coliform was detected in only one of 16 well samples from non-karst areas (FE was not measured in any non-karst wells). The highest concentrations of FC and FE were found in wells from covered karst areas. Shallow wells were more likely to have detectable TC, FC, and FE, and at higher concentrations regardless of terrain, with wells less than 20 m deep (all in covered karst) being the most vulnerable (Fig. 4). However, TC, FC, and/or FE were found in 10 of the 18 wells in karst or covered karst that were greater than 100 m deep, indicating that shallow groundwater was entering the well bore. Increases in NO_3-N, temperature, and *Eh*, the presence of livestock, and decreases in casing length were significantly associated with increase in the probability that TC would be detected. The presence of pesticides and livestock was associated with increase in the probability of detecting FC, while the presence of row crops was associated with decrease in probability of its detection. Increases in well depth were associated with decrease in the probability of detecting FC. Although the association between NO_3-N and FC was not significant, samples with elevated NO_3-N concentrations tended to have detectable FC or FE (Fig. 5). Panno et al. (2006b) concluded that wells that have NO_3-N concentrations greater than 15 mg/L in this region are contaminated with livestock waste. Nine of the 13 samples (from six wells) with NO_3-N concentrations above 15 mg/L had detectable FC and/or FE; the samples that had not, were collected from the two deepest (73 and 77 m) of these wells.

The two samples with Cl^- concentrations greater than 100 mg/L had high levels of FC and/or FE (Fig. 5). The plot of Cl^-/Br^- vs. Cl^- indicated that many well samples were affected by animal waste and septic effluent (Fig. 3b), which is in general agreement with observed land use activities in the area surrounding individual wells. There were, however, a number of well samples the Cl^-/Br^- data of which suggested contamination by animal and or human waste sources but which had no detectable FE or FC.

The fact that enteric bacteria were not detected in many of the samples with elevated NO_3-N and/or Cl^- concentrations may indicate sufficiently long travel times allowing for bacteria to die off in the environment. Enteric bacteria do not generally survive for extended periods outside the host organism. For example, *Escherichia coli* have a half life of approximately 15 days after separation from the host organism (Burks and Minnis 1994). Many of the most contaminated wells were shallow (<20 m) and located in areas where livestock were present.

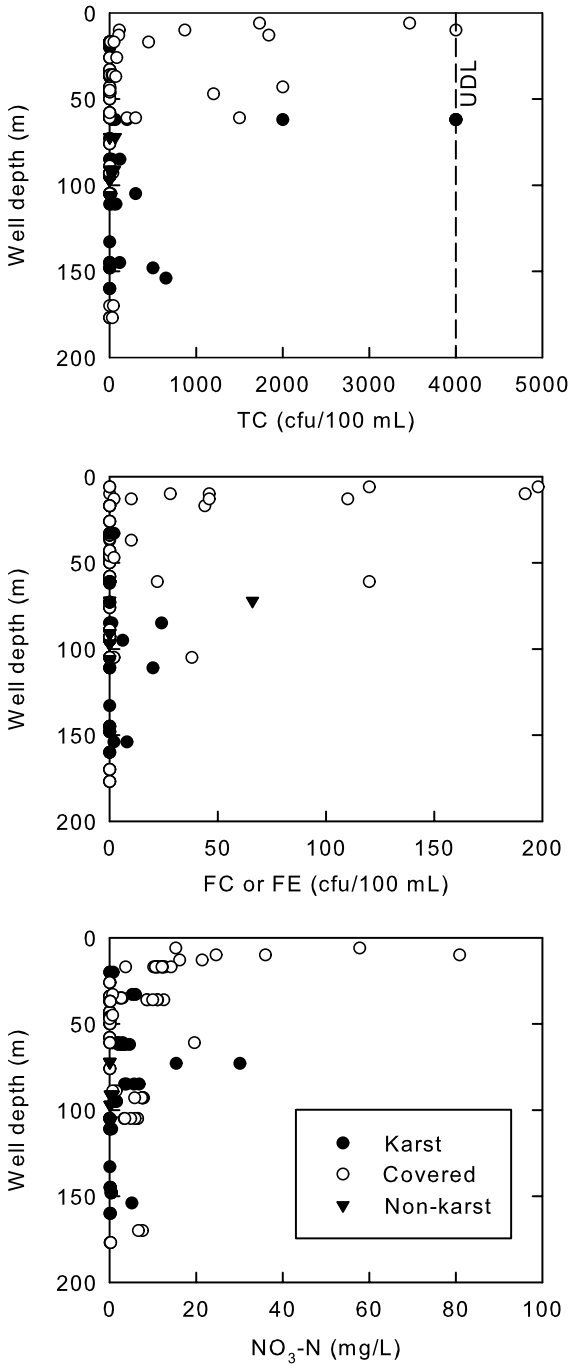

Fig. 4 TC, FC, FE, and NO_3-N concentrations vs. well depth. *Symbols touching the dotted line* represent samples with TC concentrations greater than the upper detection limit (UDL) of 4000 cfu/100 mL

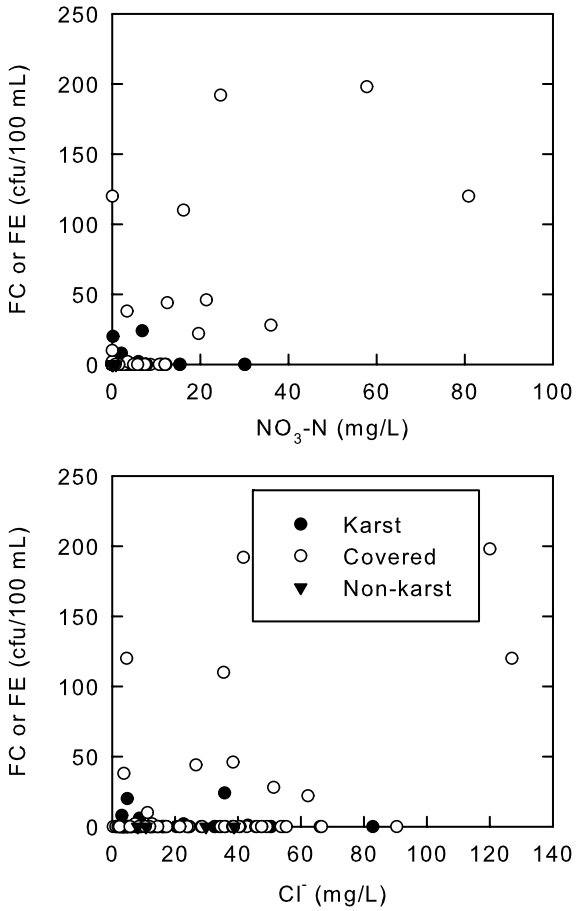

Fig. 5 FC or FE vs. NO_3-N, Cl^-, and total herbicides for well samples as a function of terrain. For samples in which both FC and FE were analyzed, the higher concentration is plotted

Bacteria Isolates

More than 20 genera or species of bacteria were isolated from spring, cave stream, and well samples (Table 1). Five of the species were definitive for fecal contamination: *Escherichia coli*, *Enterococcus faecium*, *Enterococcus faecalis*, *Staphylococcus aureus*, and *Proteus mirabilis*. The springs were the most likely to have enteric bacteria, with *Escherichia coli*, *Enterococcus faecium*, and *Enterococcus faecalis* detected in more than 70% of the samples. *Enterococcus* species were present in all the springs during the summer sampling. The detection percentage of enteric species were similar to those found in on-site wastewater treatment effluent sampled in the study area (Panno et al. 2007) (Table 1).

Of the other genera/species isolated from the springs and caves, soil-type bacteria, such as *Bacillus*, *Pseudomonas*, *Klebsiella*, and *Serratia*, were common, the first three occurring in greater than 90% of the samples. *Aeromonas hydrophila*, commonly associated with cold-blooded invertebrates, were detected in more than half of the spring and cave samples. The coliform bacteria *Citrobacter* and *Enterobacter* were each detected in about 23% of the spring samples, but were rarely detected in cave stream samples (6% and 4%, respectively). Except for *Proteus mirabilis*, all the enteric species found in the springs were also found in the cave stream samples.

The bacterial species isolated from well-water samples were similar to those found in spring and cave samples,

Table 1 Bacteria species found in water samples from different environments. % Samples dominant = percentage of samples in which the bacteria was a dominant genera/species (1, 2, or 3 mean ranking). Septic data from Panno et al. (2007)

Bacterial genera/species	% Samples detected				% Samples dominant		
	Springs	Cave streams	Wells	Septic	Springs	Cave streams	Wells
Enteric bacteria							
Enterococcus avium	1	0	0	0	0	–	–
Enterococcus durans	1	6	0	0	0	0	–
Enterococcus faecalis	72	81	9	55	3	9	2
Enterococcus faecium	82	53	30	82	3	2	4
Escherichia coli	91	81	11	86	31	68	9
Proteus mirabilis	26	4	0	18	4	0	–
Providentia stuartii	11	0	0	0	1	–	–
Staphylococcus aureus	47	57	17	59	6	15	13
Soil bacteria							
Acinetobacter sp.	0	0	2	0	–	–	2
Bacillus sp.[a]	94	70	52	45	50	23	44
Flavobacter sp.	0	0	2	0	–	–	2
Klebsiella pneumoniae	92	77	39	82	74	72	33
Micrococcus sp.	2	0	0	0	0	–	–
Pseudomonas sp.[b]	96	96	78	100	87	68	72
Serratia sp.	70	55	13	41	30	8	11
Staphylococcus saprophyticus	1	4	0	0	–	4	–
Other							
Aeromonas hydrophila	52	57	7	9	11	26	6
Citrobacter sp.[c]	23	6	7	14	3	2	7
Enterobacter sp.[d]	23	6	15	45	6	2	4
Staphylococcus sciuri	0	0	0	5	–	–	–
Staphylococcus xylosis	0	0	0	5	–	–	–
Staphylococcus undifferentiated	16	15	2	–	1	2	2

[a]Includes *Bacillus cereus*

[b]Includes *Pseudomonas aeruginosa*

[c]Includes *Citrobacter freundii*

[d]Includes *Enterobacter aerogenes* and *cloacae*

but occurred in lower percentages. The most common were *Pseudomonas* and *Bacillus*.

Ranking was used to estimate the dominance of particular genera/species with respect to other genera/species in individual samples. The percentage of samples per sample group in which a genera/species had a dominance of 1 (most dominant), 2, or 3 are reported in Table 1. The common soil bacteria *Pseudomonas, Klebsiella*, and *Bacillus* were dominant in all sample groups. *Escherichia coli* was the second most dominant species in cave-stream samples, and also moderately dominant in spring samples. *Enterococcus faecium* and *Staphylococcus aureus* were usually not dominant species, typically occurring much less so than *Escherichia coli*. *Escherichia coli* and, in many cases, *Klebsiella pneumoniae*, are fecal coliform bacteria originating in the intestines of warm-blooded animals, and species of the genera *Pseudomonas* and *Bacillus* are ubiquitous in the environment; the first three bacteria are classified as opportunistic pathogens, which can cause diseases in compromised individuals but typically not in healthy (noncompromised) people (Geldreich 1996). *Staphylococcus aureus* and *Serratia* are also opportunistic pathogens. *Escherichia coli* were dominant over *Enterococcus faecalis* and *Enterococcus faecium* in the spring samples, all three of which are enteric bacteria, suggesting the influence of private septic systems and/or animal waste on the microflora of the springs. The movement of these bacteria to the springs was relatively rapid, given the 15-day half life of *Escherichia coli* once it is out of the host animal's body (Burks and Minnis 1994). *Bacillus* and *Serratia* species are typically associated with

soils; soil is washed into the aquifer via sinkholes, especially during storm events, leading to high turbidity levels.

Aeromonas hydrophila, which was detected in the majority of spring and cave samples but in only two well samples, is commonly associated with cold-blooded vertebrates (e.g., amphibians) (Freeman 1985). Salamanders are abundant in caves in the region, and we suggest that the species *Aeromonas hydrophila* may be an indicator of conduit systems of the sinkhole plain. These systems consist of conduits (defined as greater than 1 cm in width), contain an air–water interface, are connected to the surface at some point, and are large enough to provide habitats for amphibians.

Conceptual Model

In comparing water quality among springs, caves, and wells in the study area, it is important to consider the differences in hydrogeological and geochemical conditions. A conceptual model of the region is shown in Fig. 6. In covered karst areas, the water table is shallow and wells finished above the bedrock are vulnerable to surface contamination. For wells less than 20 m deep, median NO_3-N and Cl^- concentrations were 12.2 and 24 mg/L, respectively; in deeper wells, median NO_3-N and Cl^- concentrations were 0.19 and 12 mg/L. Pesticides and FC were detected in 60% and 31% of the shallow well samples, respectively, and 20% and 7% of the deeper well samples. In karst areas, the water table is within the bedrock, and there were no wells shallower than 20 m. Groundwater in the karst areas is generally well oxygenated, while in covered karst areas the groundwater is generally less oxygenated and often anoxic (Fig. 6). Conditions are generally fully anoxic in the bedrock in the covered karst region. The median *Eh* value in covered karst wells deeper than 20 m was 100 mV lower than in karst areas. At least four of the wells in the karst setting intersected a large crevice or cave.

Spring and cave-stream water is representative of groundwater from the shallow karst aquifer over relatively large areas (several to tens of square kilometers). Springs are the outlets for all shallow groundwater in a particular karst groundwater basin, and represent a mixture of water coming from throughout the basin, often from areas with different land uses. Thus, contamination from any point in the groundwater basin may be detected in discharge at a spring, but contamination is also diluted by water coming from uncontaminated areas. Residence times for groundwater also tend to be short; tritium concentrations in spring water from the study area were between about 4 and 8 tritium units, indicating recent recharge from a surficial source (Hackley et al. 2008).

Groundwater collected from wells generally represents a smaller source area and relatively longer residence times.

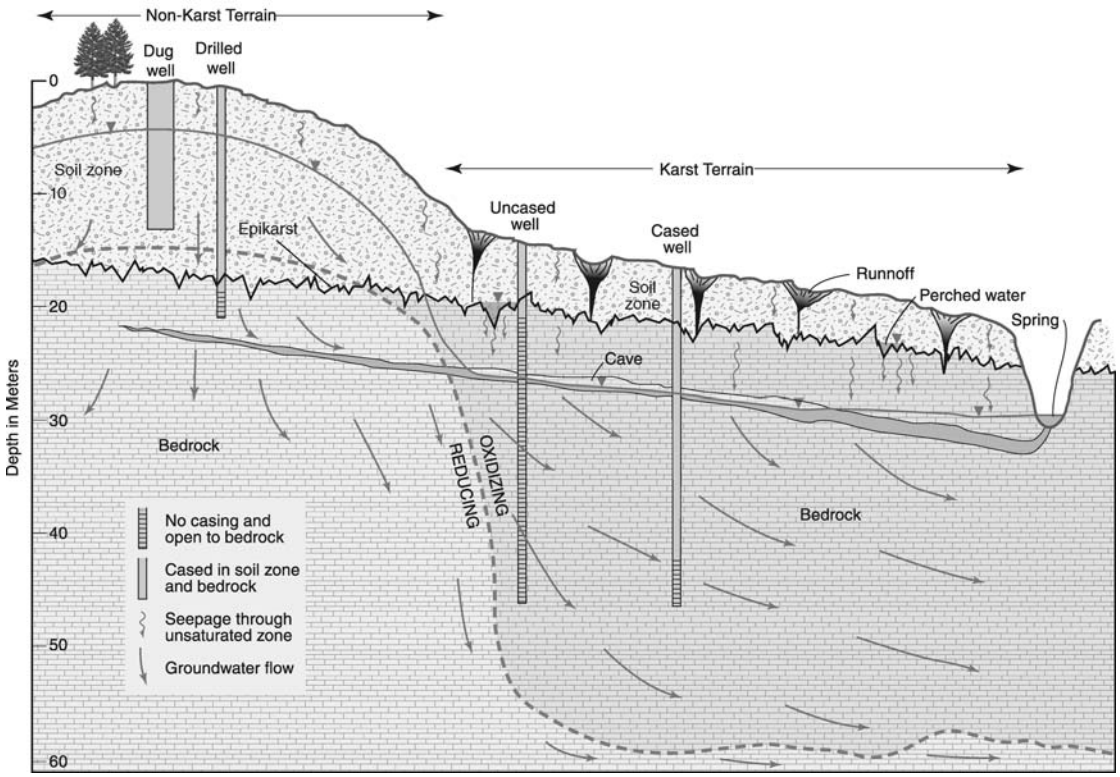

Fig. 6 A conceptual model of the hydrogeology and redox conditions of the karst aquifer in the sinkhole plain for a groundwater basin

The inverse correlation between well depth and enteric bacteria indicates that deeper groundwater is protected from surface contamination. On the other hand, contaminated wells were less likely than springs to be diluted. Thus, wells in the study area generally have lower NO_3-N concentrations than springs (median 0.66 vs. 3.8 mg/L), but a wider range of values. Sixteen percent of well samples had NO_3-N greater than 10 mg/L, while none of the spring or cave samples exceeded 10 mg/L.

The negative association between TC and casing length suggests that well construction practices in areas with limestone exhibiting significant dissolution features can contribute to bacterial contamination of the aquifer. Drilled wells are often cased and grouted only through the soil zone and into the top of bedrock; 16 of 40 wells for which data were available were cased into the bedrock 3 meters or less. This allows wells to be exposed to shallow groundwater that often migrates through conduits in the bedrock. This construction practice may result in the mixing of contaminated shallow groundwater with uncontaminated or less contaminated groundwater from deeper bedrock (Panno et al. 1996).

Sources of Contamination

Potential sources of fecal contamination of groundwater in the study area include discharge from domestic wastewater treatment systems and livestock waste. Discharge from treatment systems in the study area typically has high levels of nutrients and enteric bacteria (Panno et al. 2007). Hog waste is much more likely to be a significant source of bacterial contamination than cattle waste. Most cattle waste is solid and disbursed throughout pastures, and would need a source of water (i.e., precipitation) in order to be transported to the groundwater. Hog waste is applied to fields as a liquid, either in the early spring or late fall when soil moisture is generally high.

Domestic wastewater can travel rapidly into the subsurface because it is not uncommon for systems to discharge directly into sinkholes. The fact that contamination by enteric bacteria was observed year round suggests that domestic wastewater is an important source, as there are no seasonal differences in discharge. The year round contamination may also be due to existence of biofilms in the karst aquifer, i.e., diverse microcolonies of various bacterial species embedded in a matrix of extracellular organic polymers adhering to moist surfaces (Geldreich 1996). Biofilms have been observed in caves in the study area, although not in Illinois Caverns (Panno et al. 2006c). Bacteria species observed in this study that can form biofilms include *Klebsiella pneumoniae, Enterobacter aerogenes*, *Enterobacter cloacae*, *Citrobacter freundii*, and *Pseudomonas aeruginosa* (Geldreich 1996; Harrison et al. 2005). All of these species were found in cave stream and spring water and, to a lesser degree, well water.

Conclusions

Enteric bacteria, many of which are opportunistic pathogens, are abundant in groundwater in the karst region of southwestern Illinois, especially in springs and caves, but also in many wells. The most important sources of enteric bacteria are discharge from private wastewater treatment systems and hog manure applied to agricultural fields. Wells generally had fewer detections and lower concentrations of enteric bacteria than springs because they are generally better protected from surface contamination and represent water from a smaller area. Wells located in areas with livestock had the highest concentrations of enteric bacteria and the water chemistry was indicative of fecal contamination (elevated NO_3-N and Cl^-). Well construction practices may be an important factor contributing to well contamination, with even deep wells being open to the shallow, potentially contaminated, portion of the karst aquifer.

Almost all the springs were contaminated, but the fact that they represent a mixture of shallow waters from large areas means that it is unlikely that the source(s) of contamination can be readily pinpointed. The lack of consistent seasonal patterns in the data suggests that private wastewater treatment systems are an important source of enteric bacteria to springs because they discharge continually throughout the year, as opposed to hog manure, which is applied in the late fall and early spring. Many private wastewater treatment systems discharge into or near sinkholes, thus wastewater effluent enters the karst aquifer rapidly at many locations. The water chemistry in the springs and caves, however, was not indicative of sewage contamination, indicating substantial dilution of the wastewater discharge. This dilution, however, was not sufficient to lower bacteria concentrations to acceptable regulatory levels for drinking or contact.

The vulnerability of water resources in karst regions to contamination by enteric organisms clearly calls for stronger source water protection procedures than are typically used. These should include: (1) casing of wells through the upper part of a karst aquifer where stratified contamination is often present, in order to isolate the uncontaminated deeper part of the aquifer and prevent mixing with the upper contaminated zone; (2) discharge of on-site wastewater treatment systems within 100 feet of the drainage basin of a sinkhole should not be allowed; (3) livestock should not be allowed to graze within the drainage basin of a sinkhole; (4) concentrated animal feeding operation (CAFO) facilities or the application of animal waste from a CAFO on croplands should not be allowed within karst areas.

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land and home owners for permission to sample their springs and wells. This research was supported with funds from the Illinois Department of Natural Resources, ISWS, and ISGS divisions. Publication of this article has been authorized by the Chiefs of the ISWS and ISGS.

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Attachment 9:

Inwood Dairy, Elmwood, IL
Initial Groundwater Monitoring Results

Daily & Associates, Engineers, Inc.

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(309) 691-5300 • FAX (309) 691-1892

November 10, 1998

Illinois Department of Agriculture
Bureau of Environmental Programs
State Fairgrounds
PO Box 19281
Springfield, IL 62794-9281

Attn: Warren D. Goetsch, PE
Chief

Re: Initial Groundwater Monitoring
Inwood Dairy, Elmwood, IL
Facility ID# 1430010000
D/A File # 5755.01

Ladies & Gentlemen:

This letter and attachments are submitted pursuant to 35 IAC 506.206, Groundwater Monitoring, for the Inwood Dairy livestock waste lagoon. Attached are the following:

- Groundwater Monitoring Well As-Built Diagrams and Soil Boring Logs.
- Laboratory Test Report
- Summary Table of Groundwater Monitoring Results
- Groundwater Potentiometric Contour Plot for October 1998 Sampling Event

These results are the initial sampling results, as described under 35 IAC 506.206(g)(1). Regarding the timing of the initial sampling, please note that filling of the lagoon began on August 25, 1998. A partial certification was submitted on September 11, 1998, since some cows had been brought on site. The initial samples were obtained on October 15, 1998. We do not believe that the initial results have been impacted by premature placing in service of the facility. As quarterly monitoring continues at the site, we will track any trends and verify that the initial samples have not been impacted by the facility.

As shown on the potentiometric contour map, MW-1 is upgradient of the lagoon. The hydraulic gradient for the initial sampling event was 3.2% and suggests a groundwater flow direction toward the southeast and the existing drainage swale. The monitoring well screens are finished in a 1.5-4 foot sand and gravel seam. The sand and gravel in MW-1 is near the same elevation as the lagoon invert, while the sand and gravel in MW-2 and MW-3 is approximately 8 feet below the lagoon. As documented in the lagoon construction certification, all sand encountered during construction was removed to at least 2 feet below the lagoon invert and a 2 foot thick compacted

soil liner with a hydraulic conductivity less that 1 x 10-7 cm/sec was installed.

The groundwater monitoring results are summarized in the attached table. Review and discussion of the significance of the results yields the following:

- The upgradient well MW-1 exhibits the highest concentration for all the monitored constituents, except for phosphorus, pH and temperature.
- All results are less that the Class I groundwater quality standards, as defined by 35 IAC 620.
- Constituents not detected at any groundwater monitoring well location were fecal coliform, fecal streptococcus and nitrate/nitrite.
- No response action need be proposed, because this data does not indicate any existing or potential impact to groundwater.
- Continued quarterly monitoring is recommended (35 IAC 506.206(e)). As data is collected, trends and statistical calculations may be used to measure potential impact to groundwater quality.

Please call if you have any questions.

Very truly yours,

DAILY & ASSOCIATES, ENGINEERS, INC.

Patrick G. Sloan, P.E.

cc: Dave Inskeep

IDOA 01642

G:\DATA\5755-01\CORR\110498L1.PGS

Elmwood Farms (formerly Hi
History of Elmwood Fa

Test	Well #	16-Jan-04	14-Apr-04	22-Jul-04	27-Oct-04	19-Jan-05	26-Oct-05	19-Jan-06	27-Apr-06
Chloride	MW1	16	17	14	15	22	19	19	28
(mg/l)	MW2	13	13	12	10	11	9.7	13	21
	MW3	16	15	16	16	17	15	14	15
Ammonia	MW1	<0.20	<0.050	<0.10	<0.10	<0.10	<.10	<0.1	<0.10
as N	MW2	<0.20	<0.050	0.19	<0.10	<0.10	<.10	<0.1	<0.10
(mg/l)	MW3	<0.20	<0.050	<.10	<0.10	<0.10	<.10	<0.1	<0.10
Nitrate/	MW1	0.057	0.16	0.72	0.084	0.072	0.25	0.057	0.058
Nitrite	MW2	0.22	0.25	1.6	0.5	0.39	1.4	0.63	0.6
(mg/l)	MW3	0.29	0.39	0.82	0.31	0.23	0.32	0.98	0.88
Phosphorus	MW1	0.053	0.057	0.17	0.17	0.18	0.36	0.35	<0.10
(Total)	MW2	<0.020	0.023	0.18	0.053	0.083	<.10	0.11	<0.10
(mg/l)	MW3	0.085	0.086	0.19	0.064	0.098	<.10	0.52	0.12
Sulfate	MW1	47	45	44	44	45	48	41	44
(mg/l)	MW2	74	100	68	51	54	46	57	60
	MW3	130	130	150	140	140	120	140	140
Fecal	MW1	<10	<10	<10	<10	40	<10	<10	<10
Coliform	MW2	<10	<10	390	110	10	<10	<10	<10
(cfu/100 ml)	MW3	<10	<10	<10	10	10	<10	<10	<10
Fecal	MW1	<10.	<10	50	140	80	<10	<10	ND
Streptococcus	MW2	<10.	<10	>2000	390	10	<10	<10	ND
(cfu/100 ml)	MW3	<10.	<10	<10	200	270	<10	<10	ND

Test	Well #	29-Jul-09	28-Oct-09	1/28/2010	4/27/2010	7/29/2010	10/29/2010	1/28/2011	4/28/2011
Chloride	MW1	60	12	19	14	17	17	19	14
(mg/l)	MW2	28	12	28	25	25	23	19	29
	MW3	14	58	67	60	44	52	55	44
Ammonia	MW1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10
as N	MW2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10
(mg/l)	MW3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10
Nitrate/	MW1	0.08	0.065	0.1	<0.2	0.062	0.066	0.12	0.03
Nitrite	MW2	0.081	0.084	2	3.5	0.074	0.096	0.36	0.84
(mg/l)	MW3	0.07	0.046	<0.02	0.053	0.073	0.043	0.035	0.04
Phosphorus	MW1	0.11	0.14	<0.1	0.13	0.12	0.22	<0.1	0.15
(Total)	MW2	<0.1	<0.1	<0.1	0.13	0.12	<0.1	0.11	<0.10
(mg/l)	MW3	<0.1	0.17	0.25	0.23	0.15	0.13	0.18	0.2
Sulfate	MW1	42	120	120	130	110	170	130	110
(mg/l)	MW2	120	61	95	110	91	53	120	99
	MW3	130	41	38	40	38	45	45	32
Fecal	MW1	20	10	<10	<10	18	<10	<10	<10
Coliform	MW2	10	54	<10	<10	90	<10	<10	<10
(cfu/100 ml)	MW3	<10	<10	<10	<10	45	<10	<10	<10
Fecal	MW1	10	10	<10	<10	10	<10	<10	<10
Streptococcus	MW2	50	1600	310	<10	4900	1330	63	<10
(cfu/100 ml)	MW3	30	<10	18	<10	<10	<10	<10	<10

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ıs Monitoring Wells

27-Jul-06	18-Oct-06	7-Mar-07	25-Apr-07	31-Jul-07	31-Oct-07	29-Jan-08	16-Apr-08	29-7-08	30-Oct-08	30-Jan-09	28-Apr-0
22	12	23	23	22		37	29	32	13	FROZEN	17
16	30	15	15	25	43	51	18	18	19	16	40
15	15	13	11	13	13	14	11	13	42	43	60
<0.1	<0.1	0.12	1.2	<0.1		<0.1	<0.1	<0.1	<0.1	FROZEN	0.13
<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.11
<0.1	<0.1	<0.1	0.12	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.19
0.13	0.082	0.03	0.37	0.086		<0.02	<0.02	0.056	0.082	FROZEN	<0.02
0.57	0.24	0.028	0.15	0.053	0.047	0.049	0.038	0.48	0.076	<0.02	7.3
0.56	0.34	0.17	0.053	0.27	0.083	0.078	0.035	0.054	0.037	<0.02	0.12
1.2	0.4	0.72	0.58	0.33		0.24	0.18	0.25	<0.1	FROZEN	<0.1
0.21	<0.1	0.29	<0.1	0.2	0.27	0.16	0.13	0.12	<0.1	0.23	0.15
0.24	0.19	0.11	<0.1	0.13	0.23	0.15	0.11	0.19	0.2	0.33	0.29
44	28	49	48	45		45	42	46	130	FROZEN	150
69	64	120	110	130	72	76	100	100	110	110	140
150	140	140	140	140	140	140	130	140	44	40	45
<10	<10	<10	<10	<10		<10	<10	10	<10	FROZEN	<10
<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
<10	<10	<10	<10	10	10	30	<10	<10	<10	<10	<10
18000	<10	<10	<10	130		10	<10	200	<10	FROZEN	<10
150	<10	<10	<10	80	<10	20	<10	1600	<10	<10	<10
<10	10	<10	<10	20	<10	20	<10	80	<10	<10	<10

/21/2011
15
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0.17
130
61
47
<10
<10
200
20
1200
10

CERTIFICATE OF SERVICE

I, Jessica Dexter, hereby certify that I have filed the attached **NOTICE OF FILING and ENVIRONMENTAL GROUPS' FINAL COMMENTS** (with attachments 1-9 on CD) upon the attached service list by depositing said documents in the United States Mail, postage prepaid (or via email where indicated) in Chicago, Illinois on January 16, 2013.

Respectfully submitted,

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