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National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations; Proposed Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 122 and 412

[FRL–6921–4]

RIN 2040–AD19

National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: Today the Environmental Protection Agency proposes to revise and update two regulations that address the impacts of manure, wastewater, and other process waters generated by concentrated animal feeding operations (CAFOs) on water quality. These two regulations are the National Pollutant Discharge Elimination System (NPDES) provisions that define which operations are CAFOs and establish permit requirements, and the Effluent Limitations Guidelines for feedlots (beef, dairy, swine and poultry subcategories), which establish the technology-based effluent discharge standards for CAFOs. EPA is proposing revisions to these regulations to address changes that have occurred in the animal industry sectors over the last 25 years, to clarify and improve implementation of CAFO permit requirements, and to improve the environmental protection achieved under these rules.

Environmental concerns being addressed by this rule include both ecological and human health effects. Manure from stockpiles, lagoons, or excessive land application can reach waterways through runoff, erosion, spills, or via groundwater. These discharges can result in excessive nutrients (nitrogen, phosphorus, and potassium), oxygen-depleting substances, and other pollutants in the water. This pollution can kill fish and shellfish, cause excess algae growth, harm marine mammals, and contaminate drinking water.

Today's action co-proposes two alternatives for how to structure the revised NPDES program for CAFOs; the alternatives offer comparable environmental benefits but differ in their administrative approach. EPA also requests comment on two other alternatives that the Agency is considering and may pursue after evaluating the comments.

EPA is also proposing to revise effluent guidelines applicable to beef, dairy, swine, and poultry operations that are defined as CAFOs, pursuant to the NPDES revisions. The proposed effluent guidelines include regulations for both new and existing animal feeding operations that meet the definition of a CAFO. Today's effluent guidelines revisions do not alter the requirements for horses, ducks, sheep or lambs.

DATES: Comments must be received or postmarked on or before midnight May 2, 2001.

ADDRESSES: Public comments regarding this proposed rule should be submitted by mail to: Concentrated Animal Feeding Operation Proposed Rule, Office of Water, Engineering and Analysis Division (4303), USEPA, 1200 Pennsylvania Avenue, NW., Washington, DC 20460. Hand deliveries (including overnight mail) should be submitted to the Concentrated Animal Feeding Operation Proposed Rule, USEPA, Waterside Mall, West Tower, Room 611, 401 M Street, SW., Washington, DC 20460. You also may submit comments electronically to CAFOS.comments@epa.gov. Please submit any references cited in your comments. Please submit an original and three copies of your written comments and enclosures. For additional information on how to submit comments, see ''**SUPPLEMENTARY INFORMATION**, How May I Submit Comments?''

FOR FURTHER INFORMATION CONTACT: For additional technical information contact Karen Metchis or Jan Goodwin at (202) 564–0766.

SUPPLEMENTARY INFORMATION:

What Entities Are Potentially Regulated by This Action?

This proposed rule would apply to new and existing animal feeding operations that meet the definition of a concentrated animal feeding operation, or which are designated by the permitting authority as such. Concentrated animal feeding operations are defined by the Clean Water Act as point sources for the purposes of the NPDES program. (33 U.S.C. § 1362).

The following table lists the types of entities that are potentially subject to this proposed rule. This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. Other types of entities not listed in the table could also be regulated. To determine whether your facility would be regulated by this action, you should carefully examine the applicability criteria proposed at § 122.23(a)(2) of the rule. If you have questions regarding the applicability of this action to a particular entity, consult one of the persons listed for technical information in the preceding **FOR FURTHER INFORMATION CONTACT** section.

Category	Examples of regulated entities	North American Industry Code (NAIC)	Standard Industrial Classification Codes
Federal, State and Local Government Industry	.....	See below	See below
	Operators of animal production operations that meet the definition of a concentrated animal feeding operation.		
	Beef cattle feedlots	112112	0211
	Hogs	11221	0213
	Sheep and goats	1241, 11242	0214
	General livestock, except dairy and poultry	11299	0219
	Dairy farms	112111, 11212	0241
	Broilers, fryers, and roaster chickens	11232	0251
	Chicken eggs	11231	0252
	Turkey and turkey eggs	11233	0253
	Poultry hatcheries	11234	0254
	Poultry and eggs, NEC	11239	0259
	Ducks	112390	0259
	Horses and other equines	11292	0272

Category	Examples of regulated entities	North American Industry Code (NAIC)	Standard Industrial Classification Codes
	Meat packing or poultry processing companies that may be a potential co-permittee because of substantial operational control over a CAFO.		
	Animal Slaughtering and Processing	3116	02
	Owners or operators of crop production operations that may receive CAFO manure for use as a fertilizer substitute.		
	Crop Production	111	01

How May I Review the Public Record?

The record (including supporting documentation) for this proposed rule is filed under docket number OW–00–27 (proposed rule). The record is available for inspection from 9 a.m. to 4 p.m. on Monday through Friday, excluding legal holidays, at the Water Docket, Room EB 57, USEPA Headquarters, 401 M Street, SW, Washington, DC 20460. For access to docket materials, please call (202) 260–3027 to schedule an appointment during the hours of operation stated above.

How May I Submit Comments?

To ensure that EPA can read, understand, and therefore properly respond to comments, the Agency requests that you cite, where possible, the paragraph(s) or sections in the preamble, rule, or supporting documents to which each comment refers. You should use a separate paragraph for each issue discussed.

If you want EPA to acknowledge receipt of your comments, enclose a self-addressed, stamped envelope. No faxes will be accepted. Comments may also be submitted electronically to CAFOS.comments@epa.gov. Electronic comments must be submitted as an ASCII, WordPerfect 5.1, WP6.1, or WP8 file avoiding the use of special characters and forms of encryption. Electronic comments must be identified by the docket number OW–00–27. EPA will accept comments and data on disks in WordPerfect 5.1, 6.1, or 8 format or in ASCII file format. Electronic comments on this notice may be filed on-line at many Federal depository libraries.

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I. Legal Authority

Today's proposed rule is issued under the authority of sections 301, 304, 306, 307, 308, 402, and 501 of the Clean

Water Act (CWA), 33 U.S.C. 1311, 1314, 1316, 1317, 1318, 1342, and 1361.

II. Purpose and Summary of the Proposed Regulation

Today, the Environmental Protection Agency proposes to revise and update two regulations that address the impacts on water quality from manure, wastewater, and other process waters generated by concentrated animal feeding operations (CAFOs). The National Pollutant Discharge Elimination System (NPDES) provisions in 40 CFR Part 122 define which operations are CAFOs and establish permit requirements for those operation. The Effluent Limitations Guidelines (ELG), or effluent guidelines, for feedlots in 40 CFR Part 412 establish technology-based effluent discharge standards that are applied to CAFOs. Both regulations were originally promulgated in the 1970s. EPA is proposing revisions to these regulations to address changes that have occurred in the animal industry sectors over the last 25 years, to clarify and improve implementation of CAFO permit requirements, and to improve the environmental protection achieved under these rules.

Environmental concerns being addressed by this rule include both ecological and human health effects. Manure from stockpiles, lagoons, or excessive land application rates can reach waterways through runoff, erosion, spills, or via groundwater. These discharges can result in excessive nutrients (nitrogen, phosphorus, and potassium), oxygen-depleting substances, and other pollutants in the water. This pollution can kill fish and shellfish, cause excess algae growth, harm marine mammals, and contaminate drinking water.

On October 30, 1989, Natural Resources Defense Council, Inc., and Public Citizen, Inc., filed an action against EPA in which they alleged, among other things, that EPA had failed to comply with CWA section 304(m). *Natural Resources Defense Council, Inc., et al.* v. *Reilly,* Civ. No. 89–2980 (RCL) (D.D.C.). Plaintiffs and EPA agreed to a settlement of that action in a consent decree entered on January 31, 1992. The consent decree, which has been modified several times, established a schedule by which EPA is to propose and take final action for eleven point source categories identified by name in the decree and for eight other point source categories identified only as new or revised rules, numbered 5 through 12. After completing a preliminary study of the feedlots industry under the decree, EPA selected the swine and poultry portion of the feedlots industry as the subject for New or Revised Rule #8, and the beef and dairy portion of that industry as the subject for New or Revised Rule #9. Under the decree, as modified, the Administrator was required to sign a proposed rule for both portions of the feedlots industry on or before December 15, 2000, and must take final action on that proposal no later than December 15, 2002. As part of EPA's negotiations with the plaintiffs regarding the deadlines for this rulemaking, EPA entered into a settlement agreement dated December 6, 1999, under which EPA agreed, by December 15, 2000, to also propose to revise the existing NPDES permitting regulations under 40 C.F.R. part 122 for CAFOs. EPA also agreed to perform certain evaluations, analyses or assessments and to develop certain preliminary options in connection with the proposed CAFO rules. (The Settlement Agreement expressly provides that nothing in the Agreement requires EPA to select any of these options as the basis for its proposed rule.)

The existing regulation defines facilities with 1,000 animal units (''AU'') or more as CAFOs. The regulation also states that facilities with 300–1000 AU are CAFOs if they meet certain conditions. The term AU is a measurement established in the 1970 regulations that attempted to equalize the characteristics of the wastes among different animal types.

Today's proposals presents two alternatives for how to structure the revised NPDES program for CAFOs. The first alternative is a ''two-tier structure'' that simplifies the definition of CAFOs by establishing a single threshold for each animal sector. This alternative would establish a single threshold at the equivalent of 500 AU above which operations would be defined as CAFOs and below which facilities would become CAFOs only if designated by the permit authority. The 500 AU equivalent for each animal sector would be as follows.

500 cattle excluding mature dairy or veal cattle
500 veal cattle
350 mature dairy cattle (whether milked or dry)
1,250 mature swine weighing over 55 pounds
5,000 immature swine weighing 55 pounds or less
50,000 chickens
27,500 turkeys
2,500 ducks
250 horses
5,000 sheep or lambs

The second proposal would retain the ''three-tier structure'' of the existing regulation. Under this alternative, all operations with 1,000 AU or more would be defined as CAFOs; those with 300 AU to 1,000 AU would be CAFOs only if they meet certain conditions or if designated by the permit authority; and those with fewer than 300 AU would only be CAFOs if designated by the permit authority. These conditions are detailed in section VII of this preamble and differ from those in the current rule. Facilities with 300 AU to 1,000 AU would certify that they do not meet the conditions for being defined as a CAFO or apply for a permit. The 300 AU and 1,000 AU equivalent number of animals for each sector would be as follows:

Animal type	1,000 AU equivalent (no. of animals)	300 AU equivalent (no. of animals)
Cattle excluding mature dairy or veal cattle	1,000	300
Veal	1,000	300
Mature Dairy Cattle	700	200
Swine weighing more than 55 pounds	2,500	750
Swine weighing 55 pounds or less	10,000	3,000
Chickens	100,000	30,000
Turkeys	55,000	16,500
Ducks	5,000	1,500
Horses	500	150
Sheep or Lambs	10,000	3,000

The Agency is also taking comment on two other alternatives that the Agency is considering and may pursue after evaluating comments.

Today's proposal would also expand the regulatory definition of CAFOs to include all types of poultry operations regardless of the type of manure handling system or watering system they use, and also would include standalone immature swine and heifer operations.

Under the two-tier proposal, EPA is proposing to simplify the criteria for being designated as a CAFO by eliminating two specific criteria that have proven difficult to implement, the ''direct contact'' criterion and the ''man made device'' criterion. Under the three-tier proposal, EPA is proposing to retain those criteria for designating operations which have less than 300 AU. Both proposals retain the existing requirement for the permit authority to consider a number of factors to determine whether the facility is a significant contributor of pollution to waters of the U.S., and the requirement for an on-site inspection prior to designation. EPA is also proposing to clarify that EPA has the authority to designate CAFOs both in states where EPA is the permit authority and in States with NPDES authorized programs.

EPA is proposing to eliminate the 25-year, 24-hour storm event permit exclusion and to impose a broader, more explicit duty for all CAFOs to apply for a permit (with one exception as described below). Under the current regulations, facilities are excluded from being defined as, and thus subject to permitting as, CAFOs if they discharge only in the event of a 25-year, 24-hour storm. This exclusion has proven to be problematic in practice, as described below, and ultimately unnecessary. There are many operations that currently may be avoiding permitting by an inappropriate reliance on this exclusion. The Agency believes there is no reason to retain this exclusion from the definition of a CAFO. However, EPA is proposing to retain the 25-year, 24-hour storm standard as a *design standard* in the effluent guidelines for certain sectors (specifically, the beef and dairy sectors). CAFOs in those sectors would need to obtain permits, but the permits would allow certain discharges as long as the facility met the 25-year, 24-hour storm design standard.

In sum, under today's proposal, all operations that meet the definition of a CAFO under either of the two alternative structures (as well as all operations that are designated as CAFOs) would be required to apply for a permit. There would, however, be one exception to this requirement, as described in more detail below: If the operator could demonstrate to the permitting authority that the facility has ''no potential to discharge,'' then a permit application and a permit would not be required.

Under the two-tier structure, the net effect of the revisions for determining which facilities are CAFOs is to require approximately 26,000 operations to apply for a NPDES permit. Under the three-tier structure, EPA estimates that approximately 13,000 operations would be required to apply for a permit, and an additional 26,000 operations could either certify that they are not a CAFO or apply for a permit. Under the existing regulation, EPA estimates that about 12,000 facilities should be permitted but only 2,530 have actually applied for a permit.

Today's proposal would clarify the definition of a CAFO as including both the production areas (animal confinement areas, manure storage areas, raw materials storage areas and waste containment areas) and the land application areas that are under the control of the CAFO owner or operator. As the industry trend is to larger, more specialized feedlots with less cropland needing the manure for fertilizer, EPA is concerned that manure is being land applied in excess of agricultural uses and, therefore, being managed as a waste product, and that this practice is causing runoff or leaching to waters of the U.S. The permit would address practices at the production area as well as the land application area, and would impose record keeping and other requirements with regard to transfer of manure off-site.

EPA is further proposing to clarify that entities that exercise ''substantial operational control'' over the CAFO are ''operators'' of the CAFO and thus would need to obtain a permit along with the CAFO owner or operator. The trend toward specialized animal production under contract with processors, packers and other integrators has increasingly resulted in concentrations of excess manure beyond agricultural needs in certain geographic areas. Especially in the poultry and swine sector, the processor provides the animals, feed, medication and/or specifies growing practices. EPA believes that clarifying that both parties are liable for compliance with the terms of the permit as well as responsible for the excess manure generated by CAFOs will lead to better management of manure.

The proposed effluent guidelines revisions would apply only to beef, dairy, swine, poultry and veal operations that are defined or designated as CAFOs under either of the two alternative structures and that are above the threshold for the effluent guideline. For those CAFOs below the threshold for being subject to the effluent guidelines, the permit writer would use best professional judgment (BPJ) to develop the site-specific permit conditions.

Today's proposed effluent guidelines revisions would not alter the existing effluent guideline regulations for horses, ducks, sheep or lambs. In these sectors, only facilities with 1,000 AU or more are subject to the effluent guidelines. Permits for operations in these subcategories with fewer than 1,000 AU would continue to be developed based on the best professional judgement of the permit writer.

The proposed effluent guidelines regulations for beef, dairy, swine, poultry and veal operations will establish the Best Practicable Control Technology (BPT), Best Conventional Pollutant Control Technology (BCT), and the Best Available Technology (BAT) limitations as well as New Source Performance Standards, including specific best management practices which ensure that manure storage and handling systems are inspected and maintained adequately. A description of these requirements is in Section III.

Under the BPT requirements for all of the subcategories, EPA is proposing to require zero discharge from the production area except that an overflow due to catastrophic or chronic storms would be allowed if the CAFO met a certain design standard for its containment structures. If a CAFO uses a liquid manure handling system, the storage structure or lagoon would be required to be designed, constructed and maintained to capture all process wastewater and manure, plus all the storm water runoff from the 25-year, 24-hour storm.

The proposed BPT limitations also include specific requirements on the application of manure and wastewater to land that is owned or under the operational control of the CAFO. EPA is proposing to require that CAFOs apply their manure at a rate calculated to meet the requirements of the crop for either nitrogen or phosphorus (depending on the soil conditions for phosphorus). Livestock manure tends to be phosphorus rich, meaning that if manure is applied to meet the nitrogen requirements of a crop, then phosphorus is being applied at rates higher than needed by the crop. Repeated application of manure on a nitrogen basis may build up phosphorus levels in

the soil, and potentially result in saturation, thus contributing to the contamination of surface waters through erosion, snow melt and rainfall events. Therefore, EPA is also proposing that manure must be applied to cropland at rates not to exceed the crop requirements for nutrients and the ability of the soil to absorb any excess phosphorus. BPT establishes specific record keeping requirements associated with ensuring the achievement of the zero discharge limitation for the production area and that the application of manure and wastewater is done in accordance with land application requirements. EPA also proposes to require the CAFO operator to maintain records of any excess manure that is transported off-site.

BAT limitations for the beef and dairy subcategories would include all of the BPT limitations described above and, in addition, would require CAFOs to achieve zero discharge to ground water beneath the production area that has a direct hydrologic connection to surface water. In addition, the proposed BAT requirements for the swine, veal and poultry subcategories would eliminate the provision for overflow in the event of a chronic or catastrophic storm. CAFOs in the swine, veal and poultry subcategories typically house their animals under roof instead of in open areas, thus avoiding or minimizing the runoff of contaminated storm water and the need to contain storm water.

EPA is also proposing to revise New Source Performance Standards (NSPS) based on the same technology requirements as BAT for the beef and dairy subcategories. For the swine, veal and poultry subcategories, EPA proposes revised NSPS based on the same technology as BAT with the additional requirement that there be no discharge of pollutants through ground water beneath the production area that has a direct hydrological connection to surface waters. Both the BAT and NSPS requirements have the same land application and record keeping requirements as proposed for BPT.

Today's proposal would make several other changes to the existing regulation, which would:

- require the CAFO operator to develop a Permit Nutrient Plan for managing manure and wastewater at both the production area and the land application area;
- require certain record keeping, reporting, and monitoring;
- revise the definition of an animal feeding operation (AFO) to more clearly exclude areas such as pastures and rangeland that sustain crops or forage during the entire time that animals are present;
- eliminate the mixed-animal type calculation for determining which AFOs are CAFOs; and
- require permit authorities to include the following conditions in permits to:

(1) require retention of a permit until proper facility closure; (2) establish the method for operators to calculate the allowable manure application rate; (3) specify restrictions on timing and methods of application of manure and wastewater to assure use for an agricultural purpose (e.g., certain applications to frozen, snow covered or saturated land) to prevent impairment of water quality; (4) address risk of contamination via groundwater with a direct hydrological connection to surface water; (5) address the risk of improper manure application off-site by either requiring that the CAFO operator obtain from off-site recipients a certification that they are land applying CAFO manure according to proper agricultural practices or requiring the CAFO to provide information to manure recipients and keep appropriate records of off-site transfers, or both; and (6) establish design standards to account for chronic storm events.

Today's proposal would also:

- clarify EPA's interpretation of the agricultural storm water exemption and its implications for land application of manure both at the CAFO and off-site; and
- clarify application of the CWA to dry weather discharges at AFOs.

EPA is seeking comment on the entire proposal. Throughout the preamble, EPA identifies specific components of the proposed rule on which comment is particularly sought.

III. Background

A. The Clean Water Act

Congress passed the Federal Water Pollution Control Act (1972), also known as the Clean Water Act (CWA), to ''restore and maintain the chemical, physical, and biological integrity of the nation's waters.'' (33 U.S.C. § 1251(a)). The CWA establishes a comprehensive program for protecting our nation's waters. Among its core provisions, the CWA prohibits the discharge of pollutants from a point source to waters of the U.S. except as authorized by a National Pollutant Discharge Elimination System (NPDES) permit. The CWA establishes the NPDES permit program to authorize and regulate the discharges of pollutants to waters of the U.S. EPA has issued comprehensive regulations that implement the NPDES program at 40 CFR Part 122. The CWA also provides for the development of technology-based and water quality-based effluent limitations that are imposed through NPDES permits to control discharges of pollutants.

1. The National Pollutant Discharge Elimination System (NPDES) Permit Program

Under the NPDES permit program, all point sources that directly discharge pollutants to waters of the U.S. must apply for a NPDES permit and may only discharge pollutants in compliance with the terms of that permit. Such permits must include any nationally established, technology based effluent discharge limitations (i.e., effluent guidelines) (discussed below, in subsection III.A.2). In the absence of national effluent limitations, NPDES permit writers must establish technology based limitations and standards on a case-by-case basis, based on their ''best professional judgement (BPJ).''

Water quality-based effluent limits also are included in a permit where technology-based limits are not sufficient to ensure compliance with State water quality standards that apply to the receiving water or where required to implement a Total Maximum Daily Load (TMDL). Permits may also include specific best management practices to achieve effluent limitations and standards, typically included as special conditions. In addition, NPDES permits normally include monitoring and reporting requirements, and standard conditions (i.e., conditions that apply to all NPDES permits, such as the duty to properly operate and maintain equipment and treatment systems).

NPDES permits may be issued by EPA or a State, Territory, or Tribe authorized by EPA to implement the NPDES program. Currently, 43 States and the Virgin Islands are authorized to administer the base NPDES program (the base program includes the federal requirements applicable to AFOs and CAFOs). Alaska, Arizona, the District of Columbia, Idaho, Maine, Massachusetts, New Hampshire, and New Mexico are not currently authorized to implement the NPDES program. In addition, Oklahoma, while authorized to administer the NPDES program, does not have CAFO regulatory authority. No tribe is currently authorized.

A NPDES permit may be either an individual permit tailored for a single facility or a general permit applicable to multiple facilities within a specific category. Prior to the issuance of an individual permit, the owner or operator submits a permit application with facility-specific information to the

permit authority, who reviews the information and prepares a draft permit. The permit authority prepares a fact sheet explaining the draft permit, and publishes the draft permit and fact sheet for public review and comment. Following consideration of public comments by the permit authority, a final permit is issued. Specific procedural requirements apply to the modification, revocation and reissuance, and termination of a NPDES permit. NPDES permits are subject to a maximum 5-year term.

General NPDES permits are available to address a category of discharges that involve similar operations with similar wastes. General permits are not developed based on facility-specific information. Instead, they are developed based on data that characterize the type of operations being addressed and the pollutants being discharged. Once a general permit is drafted, it is published for public review and comment accompanied by a fact sheet that explains the permit. Following EPA or State permit authority consideration of public comments, a final general permit is issued. The general permit specifies the type or category of facilities that may obtain coverage under the permit. Those facilities that fall within this category then must submit a ''notice of intent'' (NOI) to be covered under the general permit to gain permit coverage. [Under 40 CFR 122.28(b)(2)(vi), the permit authority also may notify a discharger that it is covered under a general permit even where that discharger has not submitted a notice of intent to be covered by the permit.] EPA anticipates that the Agency and authorized States will use general NPDES permits to a greater extent than individual permits to address CAFOs.

2. Effluent Limitation Guidelines and Standards

Effluent limitation guidelines and standards (which we also refer to today as ''effluent guidelines'' or ''ELG'') are national regulations that establish limitations on the discharge of pollutants by industrial category and subcategory. These limitations are subsequently incorporated into NPDES permits. The effluent guidelines are based on the degree of control that can be achieved using various levels of pollution control technology, as outlined below. The effluent guidelines may also include non-numeric effluent limitations in the form of best management practices requirements or directly impose best management practices as appropriate.

a. *Best Practicable Control Technology Currently Available (BPT)—Section 304(b)(1) of the CWA.* In the guidelines for an industry category, EPA defines BPT effluent limits for conventional, toxic, and non-conventional pollutants. In specifying BPT, EPA looks at a number of factors. EPA first considers the cost of achieving effluent reductions in relation to the effluent reduction benefits. The Agency also considers the age of the equipment and facilities, the processes employed and any required process changes, engineering aspects of the control technologies, non-water quality environmental impacts (including energy requirements), and such other factors as the Agency deems appropriate (CWA 304(b)(1)(B)). Traditionally, EPA establishes BPT effluent limitations based on the average of the best performances of facilities within the industry of various ages, sizes, processes or other common characteristics. Where existing performance is uniformly inadequate, EPA may require higher levels of control than currently in place in an industrial category if the Agency determines that the technology can be practically applied.

b. *Best Available Technology Economically Achievable (BAT)—Section 304(b)(2) of the CWA.* In general, BAT effluent limitations represent the best existing economically achievable performance of direct discharging plants in the industrial subcategory or category. The factors considered in assessing BAT include the cost of achieving BAT effluent reductions, the age of equipment and facilities involved, the processes employed, engineering aspects of the control technology, potential process changes, non-water quality environmental impacts (including energy requirements), and such factors as the Administrator deems appropriate. The Agency retains considerable discretion in assigning the weight to be accorded to these factors. An additional statutory factor considered in setting BAT is economic achievability. Generally, the achievability is determined on the basis of the total cost to the industrial subcategory and the overall effect of the rule on the industry's financial health. BAT limitations may be based on effluent reductions attainable through changes in a facility's processes and operations. As with BPT, where existing performance is uniformly inadequate, BAT may be based on technology transferred from a different subcategory within an industry or from another industrial category. BAT may be based on process changes or internal controls, even when these technologies are not common industry practice.

c. *Best Conventional Pollutant Control Technology (BCT)—Section 304(b)(4) of the CWA.* The 1977 amendments to the CWA required EPA to identify effluent reduction levels for conventional pollutants associated with BCT technology for discharges from existing industrial point sources. BCT is not an additional limitation, but replaces Best Available Technology (BAT) for control of conventional pollutants. In addition to other factors specified in Section 304(b)(4)(B), the CWA requires that EPA establish BCT limitations after consideration of a two part ''cost-reasonableness'' test. EPA explained its methodology for the development of BCT limitations in July 1986 (51 FR 24974). Section 304(a)(4) designates the following as conventional pollutants: biochemical oxygen demand (BOD_5), total suspended solids (TSS), fecal coliform, pH, and any additional pollutants defined by the Administrator as conventional. The Administrator designated oil and grease as an additional conventional pollutant on July 30, 1979 (44 FR 44501).

d. *New Source Performance Standards (NSPS)—Section 306 of the CWA.* NSPS reflect effluent reductions that are achievable based on the best available demonstrated control technology. New facilities have the opportunity to install the best and most efficient production processes and wastewater treatment technologies. As a result, NSPS should represent the greatest degree of effluent reduction attainable through the application of the best available demonstrated control technology for all pollutants (i.e., conventional, non-conventional, and priority pollutants). In establishing NSPS, EPA is directed to take into consideration the cost of achieving the effluent reduction and any non-water quality environmental impacts and energy requirements.

B. History of EPA Actions to Address CAFOs

EPA's regulation of wastewater and manure from CAFOs dates to the 1970s. The existing NPDES CAFO regulations were issued on March 18, 1976 (41 FR 11458). The existing national effluent limitations guideline and standards for feedlots were issued on February 14, 1974 (39 FR 5704).

By 1992, it became apparent that the regulation and permitting of CAFOs needed review due to changes in the livestock industry, specifically the consolidation of the industry into fewer, but larger operations. In 1992, the Agency established a workgroup

composed of representatives of State agencies, EPA regional staff and EPA headquarters staff to address issues related to CAFOs. The workgroup issued The Report of the EPA/State Feedlot Workgroup in 1993. One of the workgroup's recommendations was that the Agency should provide additional guidance on how CAFOs are regulated under the NPDES permit program. The Agency issued such guidance, entitled Guide Manual On NPDES Regulations For Concentrated Animal Feeding Operations, in December 1995.

Massive spills of hog manure (see Section V.B.1.c) and Pfiesteria outbreaks (see Section V.C.1.a.), continued industry consolidation, and increased public awareness of the potential environmental and public health impacts of animal feeding operations resulted in EPA taking more comprehensive actions to improve existing regulatory and voluntary programs. In 1997, dialogues were initiated between EPA and the poultry and pork livestock sectors. On December 12, 1997, the Pork Dialogue participants, including representatives from the National Pork Producers Council (NPPC) and officials from EPA, U.S. Department of Agriculture (USDA), and several States, issued a Comprehensive Environmental Framework for Pork Production Operations. Continued discussions between EPA and the NPPC led to development of a Compliance Audit Program Agreement (CAP Agreement) that is available to any pork producer who participates in NPPC's environmental assessment program. The CAP Agreement for pork producers was issued by the Agency on November 24, 1998. Under the agreement, pork producers that voluntarily have their facilities inspected are eligible for reduced penalties for any CWA violations discovered and corrected. The Poultry Dialogue produced a report in December 1998 that established a voluntary program focused on promoting protection of the environment and water quality through implementation of litter management plans and other actions: Environmental Framework and Implementation Strategy: A Voluntary Program Developed and adopted by the Poultry Industry, Adopted at the December 8–9, 1998 meeting of the Poultry Industry Environmental Dialogue (U.S. Poultry and Egg Association).

President Clinton and Vice President Gore announced the Clean Water Action Plan (CWAP) on February 19, 1998. The CWAP describes the key water quality problems our nation faces today and suggests both a broad plan and specific actions for addressing these problems. The CWAP indicated that polluted runoff is the greatest source of water quality problems in the United States today and that stronger polluted runoff controls are needed. The CWAP goes on to state that one important aspect of such controls is the expansion of CWA permit controls, including those applicable to large facilities such as CAFOs.

The CWAP included two key action items that address animal feeding operations (AFOs). First, it stated that EPA should publish and, upon considering public comments, implement an AFO strategy for important and necessary EPA actions on standards and permits. EPA published a Draft Strategy for Addressing Environmental and Public Health Impacts from Animal Feeding Operations in March 1998 (draft AFO Strategy). In accordance with EPA's draft AFO Strategy, EPA's Office of Enforcement and Compliance Assurance (OECA) also issued the Compliance Assurance Implementation Plan for Animal Feeding Operations in March 1998. This plan describes compliance and enforcement efforts being undertaken to ensure that CAFOs comply with existing CWA regulations. Second, the CWAP stated that EPA and USDA should jointly develop a unified national strategy to minimize the water quality and public health impacts of AFOs. EPA and USDA jointly published a draft Unified National Strategy for Animal Feeding Operations (hereinafter Unified National AFO Strategy) on September 21, 1998 and, after sponsoring and participating in 11 public listening sessions and considering public comments on the draft strategy, published a final Unified National AFO Strategy on March 9, 1999. This joint strategy was generally consistent with and superceded EPA's draft AFO Strategy.

The Unified National AFO Strategy establishes national goals and performance expectations for all AFOs. The general goal is for AFO owners and operators to take actions to minimize water pollution from confinement facilities and land where manure is applied. To accomplish this goal, the AFO Strategy established a national performance expectation that all AFOs should develop and implement technically sound, economically feasible, and site-specific comprehensive nutrient management plans (CNMPs) to minimize impacts on water quality and public health.

The Unified National AFO Strategy identified seven strategic issues that should be addressed to better resolve concerns associated with AFOs. These include: (1) fostering CNMP development and implementation; (2) accelerating voluntary, incentive-based programs; (3) implementing and improving the existing regulatory program; (4) coordinating research, technical innovation, compliance assistance, and technology transfer; (5) encouraging industry leadership; (6) increasing data coordination; and (7) establishing better performance measures and greater accountability. Today's proposed rule primarily addresses strategic issue three: implementing and improving the existing AFO regulatory program.

The Unified National AFO Strategy observed that, for the majority of AFOs (estimated in the AFO Strategy as 95 percent), voluntary efforts founded on locally led conservation, education, and technical and financial assistance would be the principal approach for assisting owners and operators in developing and implementing site-specific CNMPs and reducing water pollution and public health risks. Future regulatory programs would focus permitting and enforcement priorities on high risk operations, which were expected to constitute the remaining 5 percent. EPA estimates that today's proposal would result in permit coverage for approximately 7 percent of AFOs under the two-tier structure, and between 4.5 percent and 8.5 percent of AFOs under the three-tier structure.

Following publication of the Unified National AFO Strategy, EPA issued on August 6, 1999 the Draft Guidance Manual and Example NPDES Permit for CAFOs for a 90-day public comment period. EPA undertook development of this new guidance manual in order to provide permit writers with improved guidance on applying the existing regulations to a changing industry. While the guidance manual has not been finalized, many of the issues discussed in the draft guidance manual are also addresses in today's preamble. EPA expects to issue final, revised permitting guidance to reflect the revised CAFO regulations when they are published in final form.

C. What Requirements Apply to CAFOs?

The discussion below provides an overview of the scope and requirements imposed under the existing NPDES CAFO regulations and feedlot effluent limitations guidelines. It also explains the relationship of these two regulations, and summarizes other federal and State regulations that potentially affect AFOs.

1. What are the Scope and Requirements of the Existing NPDES Regulations for CAFOs?

Under existing 40 CFR 122.23, an operation must be defined as an animal feeding operation (AFO) before it can be defined as a concentrated animal feeding operation (CAFO). The term ''animal feeding operation'' is defined in EPA regulations as a ''lot or facility'' where animals ''have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12 month period and crops, vegetation[,] forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility.'' This definition is intended to enable the NPDES authorized permitting authority to regulate facilities where animals are stabled or confined and waste is generated.

Once a facility meets the AFO definition, its size, based upon the total numbers of animals confined, is a key factor in determining whether it is a CAFO. To define these various livestock sectors, EPA established the concept of an ''animal unit'' (AU), which varies according to animal type. Each livestock type, except poultry, is assigned a multiplication factor to facilitate determining the total number of AU at a facility with more than one animal type. These multiplication factors are as follows: Slaughter and feeder cattle—1.0, Mature dairy cattle—1.4, Swine weighing over 25 kilograms (approximately 55 pounds)—0.4, Sheep—0.1, Horses—2.0. There are currently no animal unit conversions for poultry operations. The regulations, however, define the total number of animals (subject to waste handling technology restrictions) for specific poultry types that make these operations subject to the regulation. (40 CFR Part 122, Appendix B).

Under the existing regulations, an animal feeding operation is a concentrated animal feeding operation if it meets the regulatory CAFO definition or if it is designated as a CAFO. The regulations automatically define an AFO to be a CAFO if either more than 1,000 AU are confined at the facility, or more than 300 AU are confined at the facility and: (1) pollutants are discharged into navigable waters through a manmade ditch, flushing system, or other similar man-made device; or (2) pollutants are discharged directly into waters that originate outside of and pass over, across, or through the facility or come into direct contact with the confined animals. However, no animal feeding operation is defined as a CAFO if it discharges only in the event of a 25-year, 24-hour storm event (although it sill may be designated as a CAFO). Although they are not automatically defined as a CAFO, facilities still may be designated as a CAFO even if they discharge only in a 25-year, 24-hour storm event.

An AFO can also become a CAFO through designation. The NPDES permitting authority may, on a case-by-case basis, after conducting an on-site inspection, designate any AFO as a CAFO based on a finding that the facility ''is a significant contributor of pollution to the waters of the United States.'' (40 CFR 122.23(c)). Pursuant to 40 CFR 122.23(c)(1)(i)-(v) the permitting authority shall consider several factors making this determination, including: (1) the size of the operation, and amount of waste reaching waters of the U.S.; (2) the location of the operation relative to waters of the U.S.; (3) the means of conveyance of animal waste and process waste waters into waters of the U.S.; and (4) the slope, vegetation, rainfall and other factors affecting frequency of discharge. A facility with 300 animal units or less, however, may not be designated as a CAFO unless pollutants are discharged into waters of the U.S. through a man-made ditch, flushing system, or other similar man-made device, or are discharged directly into waters of the U.S. 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.

Once defined or designated as a CAFO, the operation is subject to NPDES permitting. As described above, a permit contains the specific technology-based effluent limitations (whether based on the effluent guidelines or BPJ); water quality-based limits if applicable; specific best management practices; monitoring and reporting requirements; and other standard NPDES conditions.

2. What are the Scope and Requirements of the Existing Feedlot Effluent Guidelines?

In 1974, EPA promulgated effluent limitations guidelines applicable to CAFOs (40 CFR Part 412) and established in those regulations the technology-based effluent discharge standards for the facilities covered by the guidelines. The effluent guidelines for the feedlots point source category have two subparts: Subpart B for ducks, and Subpart A for all other feedlot animals. Under the existing regulation, Subpart A covers: beef cattle; dairy cattle; swine; poultry; sheep; and horses. Further, the effluent guidelines apply only to facilities with 1,000 AU or greater. Today's revisions to the effluent guidelines affect only the guidelines for the beef, dairy, swine, poultry and veal subcategories, while the NPDES revisions are applicable to all confined animal types.

The current feedlot effluent guidelines based on BAT prohibit discharges of process wastewater pollutants to waters of the U.S. except when chronic or catastrophic storm events cause an overflow from a facility designed, constructed, and operated to hold process-generated wastewater plus runoff from a 25-year, 24-hours storm event. Animal wastes and other wastewater that must be controlled include: (1) spillage or overflow from animal or poultry watering systems, washing, cleaning, or flushing pens, barns, manure pits, or other feedlot facilities, direct contact swimming, washing, or spray cooling of animals, and dust control; and (2) precipitation (rain or snow) which comes into contact with any manure, litter, or bedding, or any other raw material or intermediate or final material or product used in or resulting from the production of animals or poultry or direct products (e.g., milk or eggs). 40 CFR 412.11.

As described above, in those cases where the feedlot effluent guidelines do not apply to a CAFO (i.e., the operation confines fewer than 1,000 animal units), the permit writer must develop, for inclusion in the NPDES permit, technology-based limitations based on best professional judgement (BPJ).

3. What Requirements May be Imposed on AFOs Under the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA)?

In the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), Congress required States with federally-approved coastal zone management programs to develop and implement coastal nonpoint pollution control programs. Thirty-three (33) States and Territories currently have federally approved Coastal Zone Management programs. Section 6217(g) of CZARA called for EPA, in consultation with other federal agencies, to develop guidance on ''management measures'' for sources of nonpoint source pollution in coastal waters. In January 1993, EPA issued its Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters which addresses five major source categories of nonpoint pollution: urban runoff, agriculture runoff, forestry runoff, marinas and recreational boating, and hydromodification.

Within the agriculture runoff nonpoint source category, the EPA guidance specifically included management measures applicable to all new and existing ''confined animal facilities.'' The guidance identifies which facilities constitute large and small confined animal facilities based solely on the number of animals or animal units confined (the manner of discharge is not considered). Under the CZARA guidance: a large beef feedlot contains 300 head or more, a small feedlot between 50–299 head; a large dairy contains 70 head or more, a small dairy between 20–69 head; a large layer or broiler contains 15,000 head or more, a small layer or broiler between 5,000–14,999 head; a large turkey facility contains 13,750 head or more, a small turkey facility between 5,000–13,749 head; and a large swine facility contains 200 head or more, a small swine facility between 100–199 head.

The thresholds in the CZARA guidance for identifying large and small confined animal facilities are lower than those established for defining CAFOs under the current NPDES regulations. Thus, in coastal States the CZARA management measures potentially apply to a greater number of small facilities than the existing CAFO definition. Despite the fact that both the CZARA management measures for confined animal facilities and the NPDES CAFO regulations address similar operations, these programs do not overlap or conflict with each other. Any CAFO facility, defined by 40 CFR Part 122, Appendix B, that has a NPDES CAFO permit is exempt from the CZARA program. If a facility subject to CZARA management measures is later designated a CAFO by a NPDES permitting authority, the facility is no longer subject to CZARA. Thus, an AFO cannot be subject to CZARA and NPDES permit requirements at the same time.

EPA's CZARA guidance provides that new confined animal facilities and existing large confined animal facilities should limit the discharge of facility wastewater and runoff to surface waters by storing such wastewater and runoff during storms up to and including discharge caused by a 25-year, 24-hour frequency storm. Storage structures should have an earthen or plastic lining, be constructed with concrete, or constitute a tank. All existing small facilities should design and implement systems that will collect solids, reduce contaminant concentrations, and reduce runoff to minimize the discharge of contaminants in both facility wastewater and in runoff caused by storms up to and including a 25-year, 24-hour frequency storm. Existing small facilities should substantially reduce pollutant loadings to ground water. Both large and small facilities should also manage accumulated solids in an appropriate waste utilization system. Approved State CZARA programs have management measures in conformity with this guidance and enforceable policies and mechanisms as necessary to assure their implementation.

In addition to the confined animal facility management measures, the CZARA guidance also includes a nutrient management measure that is intended to be applied by States to activities associated with the application of nutrients to agricultural lands (including the application of manure). The goal of this management measure is to minimize edge of field delivery of nutrients and minimize the leaching of nutrients from the root zone.

The nutrient management measures provide for the development, implementation, and periodic updating of a nutrient management plan. Such plans should address: application of nutrients at rates necessary to achieve realistic crop yields; improved timing of nutrient application; and the use of agronomic crop production technology to increase nutrient use efficiency. Under this management measure, nutrient management plans include the following core components: farm and field maps showing acreage, crops, and soils; realistic yield expectations for the crops to be grown; a summary of the nutrient resources available to the producer; an evaluation of field limitations based on environmental hazards or concerns; use of the limiting nutrient concept to establish the mix of nutrient sources and requirements for the crop based on realistic crop expectations; identification of timing and application methods for nutrients; and provisions for proper calibration and operation of nutrient application equipment.

4. How Are CAFOs Regulated By States?

NPDES permits may be issued by EPA or a State authorized by EPA to implement the NPDES program. Currently, 43 States and the Virgin Islands are authorized to administer the NPDES program. Oklahoma, however, has not been authorized to administer the NPDES program for CAFOs.

To become an authorized NPDES state, the State's requirements must, at a minimum, be as stringent as the requirements imposed under the federal NPDES program. States, however, may impose requirements that are broader in scope or more stringent than the requirements imposed at the federal level. In States not authorized to implement the NPDES program, the appropriate EPA Regional office is responsible for implementing the program.

State efforts to control pollution from CAFOs have been inconsistent to date for a variety of reasons. Many States have only recently focused attention on the environmental challenges posed by the emergence of increasing consolidation of CAFOs into larger and larger operations. Others have traditionally viewed AFOs as agriculture, and the reluctance to regulate agriculture has prevented programs from keeping pace with a changing industry. Many states have limited resources for identifying which facilities are CAFOs, or which may be inappropriately claiming the 25-year, 24-hour storm permit exclusion. Some states with a large number of broiler and laying operations do not aggressively try to permit these facilities under NPDES because the technology requirements for these operations in the existing regulation are outdated.

Another reason States may not have issued NPDES permits to CAFOs is the concern over potentially causing operations to lose cost-share money available under EPA's Section 319 Nonpoint Source Program and other assistance under USDA's Environmental Quality Incentive Program (EQIP). Once a facility is considered a point source under NPDES, the operation is not eligible for cost sharing under the Section 319 nonpoint source program. The USDA EQIP program, however, is available to most facilities, and being a permitted CAFO is not a reason for exclusion from the EQIP program. Although EQIP funds may not be used to pay for construction of storage facilities at operations with greater than 1,000 USDA animal units (USDA uses a different definition of animal units than EPA); EQIP is available to these facilities for technical assistance and financial assistance for other practices.

To gather information on State activities concerning AFOs, EPA assembled information into a report entitled, ''State Compendium: Programs and Regulatory Activities Related to Animal Feeding Operations, Final Report,'' dated December 1999, and continues to update information concerning state operations (see ''Profile of NPDES Permits and CNMP Permit Requirements for CAFOs,'' updated periodically). The following discussion draws on information from these reports.

EPA estimates that, under the existing EPA regulations, approximately 9,000 operations with more than 1,000 AU are CAFOs and should be permitted, and

approximately 4,000 operations with 300 AU to 1,000 AU should be permitted. However, only an estimated 2,520 CAFOs are currently covered under either a general permit or an individual permit. The 43 states authorized to implement the NPDES program for CAFOs have issued coverage for approximately 2,270 facilities, of which about 1,150 facilities are under general permits and about 1,120 facilities are under individual permits. Of these states, 32 states administer their NPDES CAFO program in combination with some other State permit, license, or authorization program. Often, this additional State authorization is a construction or operating permit. Eight of the states regulate CAFOs exclusively under their State NPDES authority, while three others have chosen to regulate CAFOs solely under State non-NPDES programs. EPA information indicates that, as of December, 1999, seventeen of the 43 states authorized to administer the NPDES program for CAFOs have never issued an NPDES permit to a CAFO.

Of the seven states not authorized to administer the NPDES program, four rely solely on federal NPDES permits to address CAFOs. As of December 1998, EPA has issued coverage for approximately 250 facilities under general NPDES permits.

Virtually all NPDES authorized states use the federal CAFO definition in their State NPDES CAFO program. Most states also use the federal definition for State non-NPDES CAFO programs. Five States, however, have developed unique definitions for their non-NPDES livestock regulatory programs that do not follow the federal definition. These five States typically base their definition on the number of animals confined, weight of animals and design capacity of waste control system, or gross income of agricultural operation. For example, Alabama's new general State NPDES permit covers all operations with at least 250 animal units. Similarly, Minnesota issues State (non-NPDES) feedlot permits to facilities with more than 10 animal units. Minnesota also issues individual NPDES permits to CAFOs as defined under the existing federal regulations.

The regulation of CAFOs is challenging, in part, because of the large number of facilities across the country. There are approximately 376,000 AFOs. Regulating, for example, 5 percent of AFOs would result in some 18,800 permittees. One way of reducing the administrative burden associated with permitting such large numbers of facilities is through the use of general permits. NPDES regulations provide that general permits may be issued to cover a category of dischargers that involves similar operations with similar wastes. Operations subject to the same effluent limitations and operating conditions, and requiring similar monitoring are the types of facilities most appropriately regulated under a general permit. EPA and some authorized States are using general permits to regulate CAFOs, and this trend appears to be increasing.

As mentioned, seventeen of the 43 States authorized to issue NPDES CAFO permits have never issued an NPDES permit to a CAFO, although many regulate CAFOs under non-NPDES programs. Under current regulations, an animal feeding operation that discharges only in the event of a 25-year, 24-hour storm event is not considered to meet the definition of a CAFO (although it may still be designated as a CAFO). EPA believes that many of these facilities have in fact discharged in circumstance other than the 25-year/24-hour storm and should be required to obtain a permit.

The number of non-NPDES permits issued to AFOs greatly exceeds the number of NPDES permits issued. Although the information may be incomplete on the number of state permits issued, more than 45,000 non-NPDES permits or formal authorizations are known to have been issued through state AFO programs. The non-NPDES State authorizations often are only operating permits or approvals required for construction of waste disposal systems. While some impose terms and conditions on discharges from the CAFO, EPA believes that many would not meet the standards for approval as NPDES permits. Because these are not NPDES permits, none meet the requirement for federal enforceability.

Minnesota alone has issued nearly 25,000 State feedlot permits. Kansas has issued more than 2,400 State permits, of which 1,500 have been to facilities with more than 300 animal units. Indiana has issued more than 4,000 letters of approval to AFOs within the State. South Carolina has issued 2,000 construction permits.

With regard to the discharge standards included in permits, 28 NPDES authorized States have adopted the federal feedlot effluent guidelines, while five authorized States use a more stringent limit. These more stringent limits partially or totally prohibit discharges related to storm events. For example, Arkansas regulations prohibit discharges from liquid waste management systems, including those resulting from periods of precipitation greater than the 25-year, 24-hour storm event. In addition, California and North Carolina rules provide for no discharge from new waste control structures even during 100 year storms. Numerous State CAFO permit programs also impose requirements that are broader in scope than the existing federal CAFO regulations.

Twenty-two States have adopted laws that their environmental regulations cannot be more restrictive than the specific requirements in the federal regulations. Should any of these states experience environmental problems with CAFOs, they must rely on appropriate state regulations no more stringent than the federal rules.

Thirty-four States explicitly impose at least some requirements that address land application of manure and wastewater as part of either their NPDES or non-NPDES program. The most common requirements among these States is that CAFO manure and wastewater, when managed through land application, be land applied in accordance with agronomic rates and that the operator develop and use a waste management plan. Although some States do not address how agronomic rates should be determined, many base it on the nitrogen needs of crops, while some require consideration of phosphorus as well. The complexity of waste management plans also varies between states. Some states have very detailed requirements for content of waste management plans, while others do not. Generally, CAFO operators are asked to address estimates of annual nutrient value of waste, schedules for emptying and applying wastes, rates and locations for applying wastes, provisions for determining agronomic rates, and provisions for conducting required monitoring and reporting.

Although data was not available for all States, State agency staff dedicated to AFOs has increased over the last five years. In general, State staff dedicated to AFOs is relatively small, with average staff numbers being below four full-time employees. Several States do not have any staff specifically assigned to manage water quality impacts from AFOs. However, States such as Arkansas, Minnesota, Wisconsin, and Nebraska doubled their staff commitment to AFOs within the last five years. The most notable increases in State staff assigned to address AFOs were in Iowa and North Carolina. Kansas, Minnesota, and North Carolina have the largest AFO staffs in the country, with each having more than 20 full time employees.

One indication that States have an increasing interest in expanding their efforts to control water quality impacts from AFOs is the promulgation of new

State AFO regulations and program initiatives. At least twelve states have developed new regulations related to AFOs since 1996. (AL, IN, KS, KY, MD, MS, NC, OK, PA, VT, WA, WY). Kansas, Kentucky, North Carolina, and Wyoming passed legislation regarding swine facilities, with Kentucky and North Carolina imposing moratoriums on the expansion of hog AFOs until State management/regulatory plans could be developed. Similarly, Mississippi also has imposed a 2-year moratorium on any new CAFOs. Alabama's recent efforts include developing an NPDES general permitting rule and a Memorandum of Agreement with EPA outlining State agency responsibilities as they relate to CAFOs. Washington's Dairy Law subjects all dairy farms with more than 300 animal units to permitting and requires each facility to develop nutrient management plans approved by the National Conservation Resource Service. Indiana's Confined Feeding Control Law also requires AFOs to develop waste management plans and receive State approval for operating AFOs.

In conclusion, the implementation of CAFO programs varies from state-to-state, as does the implementation of NPDES programs for CAFOs by NPDES authorized states. As animal production continues to become more industrialized nationwide, a coherent and systematic approach to implementing minimum standards is needed to ensure consistent protection of water quality. Today's proposal will continue to promote a systematic approach to establishing industry standards that are protective of human health and the environment.

D. How Do Today's Proposed Revisions Compare to the Unified National AFO Strategy?

As described in section III.B, on March 9, 1999, EPA and the U.S. Department of Agriculture jointly issued the Unified National Strategy for Animal Feeding Operations (Unified AFO Strategy), which outlined USDA and EPA's plans for achieving better control of pollution from animal agriculture under existing regulations. The following is a comparison chart that illustrates how the proposed rule compares to the Unified AFO Strategy. Table 3–1 compares the proposed CAFO rule requirements with the Unified AFO Strategy and identifies whether the proposed requirements are consistent with or not addressed by the Unified AFO Strategy. The table further shows that, overall, the proposed rule meets the intent of the Unified AFO Strategy.

TABLE 3–1.—PROPOSED RULE/UNIFIED NATIONAL AFO STRATEGY COMPARISON

Summary of proposed rule	Consistent with Unified AFO Strategy	Not addressed in Unified AFO Strategy	Comment
Proposed Revisions to NPDES Regulations			
Definition of AFO (122.23(a)(2))—AFO includes land application area; Clarifies crop language.	✔	✔	The Unified AFO Strategy states CNMPs should address land application of manure. (Sec. 3.1 and 3.2) Crop language not explicitly addressed in Unified AFO Strategy.
Definition of CAFO (122.23(a)(3))—Change 1,000 animal unit threshold to 500.	.....	✔	Alternative thresholds not explicitly addressed in Unified AFO Strategy, although Strategy does state EPA will explore alternative ways of defining CAFOs. (Sec. 5, Issue 3, Item 2.B.). The Unified AFO Strategy states that regulatory revisions will consider risk, burden, statutory requirements, enforceability, and ease of implementation (i.e., clarity of requirements). (Sec. 5, Issue 3, Item 2). The Unified AFO Strategy states that 5 percent of the AFOs will be subject to the regulatory program, however, this estimate is provided for the *existing* regulatory program (see Figure 2). No specific percentage is specified in the Strategy for the revised regulations.
Definition of CAFO (122.23(a)(3))—Include dry poultry operations.	✔	.....	The Unified AFO Strategy states that in revising regulations EPA intends to consider defining ''...large poultry operations, consistent with the size for other animal sectors, as CAFOs, regardless of the type of watering or manure handling system.'' (Sec. 5, Issue 3, Item 2.B.).
Definition of CAFO (122.23(a)(3))—Include immature animals.	.....	✔	Immature animals not explicitly addressed in Unified AFO Strategy.
Definition of CAFO (122.23)—Removes 25 year/24-hour storm provision from definition of CAFO.	✔	.....	The Unified AFO Strategy states EPA will consider ''requiring CAFOs to have an NPDES permit even if they only discharge during a 25-year, 24-hour or larger storm event.'' (Sec. 5, Issue 3, Item 2.B.).
Definition of Operation (122.23(a)(5))—Includes a person who exercises substantial operational control over a CAFO.	✔	.....	The Unified AFO Strategy states EPA will ''explore alternative approaches to ensuring that corporate entities support the efforts of individual CAFOs to comply with permits and develop and implement CNMPs.'' (Sec. 5, Issue 3, Item 2.B.).
Designation as a CAFO (122.23(b))—In authorized States EPA may designate an AFO as a CAFO. No inspection required a designate facility that was previously defined or designated as a CAFO.	✔	.....	The Unified AFO Strategy states EPA will consider ''who may designate and the criteria for designating certain AFOs as CAFOs.'' (Sec. 5, Issue 3, Item 2.B.).
Who must apply for an NPDES permit (122.23(c))—CAFOs must either apply for a permit or seek a determination of no potential to discharge.	✔	.....	The Unified AFO Strategy states ''the NPDES authority will issue a permit unless it determines that the facility does not have a potential to discharge. (Sec. 4.2).

TABLE 3–1.—PROPOSED RULE/UNIFIED NATIONAL AFO STRATEGY COMPARISON—Continued

Summary of proposed rule	Consistent with Unified AFO Strategy	Not addressed in Unified AFO Strategy	Comment
Co-Permitting (122.23(c)(3))—Operators, including any person who exercises substantial operational control over a CAFO, must either apply for a permit or seek a determination of no potential to discharge.	✔	.....	The Unified AFO Strategy states EPA will ''explore alternative approaches to ensuring that corporate entities support the efforts of individual CAFOs to comply with permits and develop and implement CNMPs.'' (Sec. 5, Issue 3, Item 2.B.).
Issuance of permit (122.23(d))—Director must issue permit unless s/he determines no potential to discharge.	✔	.....	The Unified AFO Strategy states ''the NPDES authority will issue a permit unless it determines that the facility does not have a potential to discharge. (Sec. 4.2.).
No potential to discharge (122.23(e))—Determination must consider discharge from production area, land application area, and via ground waters that have a direct hydrologic connection to surface waters.	✔	.....	The Unified AFO Strategy establishes a national performance expectation that all AFOs should develop and implement CNMPs, and that such CNMPs should address land application of manure. (Sec. 3.1 and 3.2). The Unified AFO Strategy states ''EPA believes that pollution of groundwater may be a concern around CAFOs. EPA has noted in other documents that a discharge via hydrologically connected groundwater to surface waters may be subject to NPDES requirements.'' (Sec. 4.2.). The Unified AFO Strategy states EPA will consider protecting ''sensitive or highly valuable water bodies such as Outstanding Natural Resources, sole source aquifers, wetlands, ground water recharge areas, zones of significant ground/surface water interaction, and other areas.'' (Sec. 5, Issue 3, Item 2.B.).
AFOs not defined or designated (122.23(g))—AFOs subject to NPDES permitting requirements if they have a discrete conveyance (i.e., point source) discharge from production or land application that is not entirely storm water.	.....	✔	The Unified AFO Strategy states EPA will consider ''clarifying whether and under what conditions AFOs may be subject to NPDES requirements.'' (Sec. 5, Issue 3, Item 2.B.).
Non-AFO land application (122.23(h))—Land application inconsistent with practices in 412.31(b) and that result in point source discharge of pollutants to Waters of the US may be designated under 122.26(a)(1)(v).	✔	.....	The Unified AFO Strategy states EPA will consider ''clarifying requirements for effective management of manure and wastewater from CAFOs whether they are handled on-site or off-site.'' (Sec. 5, Issue 3, Item 2. B.).
Agricultural Storm Water Exemption—Discharges from land application area if manure is not applied in quantities that exceed the land application rates calculated using one of the methods specified in 40 CFR 412.31(b)(1)(iv).	✔	.....	The Unified AFO Strategy states EPA has in the past and will in the future assume that discharges from the majority of agricultural operations are exempt, but that the agricultural storm water exemption would not apply where the discharge is associated with the land disposal of manure or wastewater from a CAFO and the discharge is not the result of proper agricultural practices. (Sec. 4.4).
CAFO permit requirement (122.23(i)(2))—CAFOs subject to effluent guidelines if applicable.	✔	.....	The Unified AFO Strategy states the effluent guidelines revisions will be closely coordinated with any charges to the NPDES permitting regulations. (Sec. 5, Issue 3, Item 2. A.).
CAFO permit requirement (122.23(j))—Prohibits land application of manure that would not serve agricultural purpose and would likely result in pollutant discharge to waters of the U.S.	✔	.....	The Unified AFO Strategy provides that all AFOs should develop and implement CNMPs, and that such CNMPs should address land application of manure to minimize impacts on water quality and public health. (Sec. 3.1 and 3.2).
CAFO permit requirement (122.23(j)(4))—Permittee must either provide information to recipient or, under one co-proposal option, obtain certification that recipient will land apply per Permit Nutrient Plan (PNP), obtain permit, use for other purpose, or transfer to 3rd party.	.....	✔	The Unified AFO Strategy states EPA will consider ''clarifying requirements for effective management of manure and wastewater from CAFOs whether they are handled on-site or off-site.'' (Sec. 5, Issue 3, Item 2. B.).
CAFO permit requirement (122.23(j)(5))—Permit must require specified recordkeeping.	.....	✔	The Unified AFO Strategy states EPA will consider ''establishing specific monitoring and reporting requirements for permitted facilities.'' (Sec. 5, Issue 3, Item 2. B.). The Unified AFO Strategy provides records should be kept when manure leaves the CAFO. (Sec.3.3).
Closure (122.23(i)(3))—AFO must maintain permit until it no longer has wastes generated while it was a CAFO.	.....	✔	Not explicitly addressed in Unified AFO Strategy.

TABLE 3–1.—PROPOSED RULE/UNIFIED NATIONAL AFO STRATEGY COMPARISON—Continued

Summary of proposed rule	Consistent with Unified AFO Strategy	Not addressed in Unified AFO Strategy	Comment
Public access (122.23(l)—Requires public access to list of NOIs, list of CAFOs that have prepared PNPs, and access to executive summary of PNP upon request.	.....	✔	Not explicitly addressed in Unified AFO Strategy.
General Permits (122.28)—Notice of Intent must include topographic map and statement re PNP; additional criteria specified for when individual permits may be required.	✔	✔	NOI requirements not explicitly addressed in Unified AFO Strategy. The Unified AFO Strategy states EPA will consider ''requiring individual permits for CAFOs in some situations.'' (Sec. 5, Issue 3, Item 2. B.).
Proposed Revisions to Feedlot Effluent Guidelines Regulations			
Production Area—Beef/Dairy (412.33(a): No discharge except when designed for 25 year, 24-hour storm, also inspect/ correct/ pump-out, manage mortalities. Swine/Poultry (412.43(a)): No discharge.	✔	✔	The Unified AFO Strategy indicates the existing effluent guidelines is no discharge when designed for 25 year, 24-hour storm. (Sec. 5, Issue 3, Item 2. A). Strategy states that in developing the revised effluent guidelines EPA is to assess different management practices that minimize the discharge of pollutants. (Sec. 5, Issue 3, Item 2. A).
Land Application (412.33(b) and 412.43(b))—Develop and Implement PNP covering the land application areas under the control of the CAFO. Also include Best Management Practices.	✔	.....	PNP has been identified as a specific subset of a CNMP applicable to AFOs subject to the regulation. In this manner it is consistent with the Strategy. It also reinforces that the CNMP is applicable to all AFOs (regulatory/voluntary) while the PNP is only applicable to those that fall under the regulatory program. It makes a clear distinction between the regulatory and voluntary programs addressed in the Strategy.
Land Application (412.31(b)(1)(ii))—PNP Approved by Certified Specialist.	✔	.....	The PNP is a subset of the CNMP. The Strategy identified that CNMPs ''developed to meet the requirements of the NPDES program in general must be developed by a certified specialist, ...''. (Sec. 4.6).
New Source Performance Standards (412.35/45): Various additional requirements.	✔	.....	Strategy states that in developing the revised effluent guidelines EPA is to evaluate the need for different requirements for new or expanding operations. (Sec. 5, Issue 3, Item 2. A).
Additional Measures (412.37)—Inspect/ correct/ pump-out, manage mortalities; Land application BMPs, sampling, training, recordkeeping.	✔	.....	Strategy states that in developing the revised effluent guidelines EPA is to assess different management practices that minimize the discharge of pollutants. (Sec. 5, Issue 3, Item 2. A). Strategy states that the regulatory revision process will include the establishment of specific monitoring and reporting requirements for permitted facilities.

IV. Why is EPA Changing the Effluent Guidelines for Feedlots and the NPDES CAFO Regulations?

A. Main Reasons For Revising the Existing Regulations

Despite more than twenty years of regulation, there are persistent reports of discharge and runoff of manure and manure nutrients from livestock and poultry operations. While this is partly due to inadequate compliance with existing regulations, EPA believes that the regulations themselves also need revision. Today's proposed revisions to the existing effluent guidelines and NPDES regulations for CAFOs are expected to mitigate future water quality impairment and the associated human health and ecological risks by reducing pollutant discharges from the animal production industry.

EPA's proposed revisions also address the changes that have occurred in the animal production industries in the United States since the development of the existing regulations. The continued trend toward fewer but larger operations, coupled with greater emphasis on more intensive production methods and specialization, is concentrating more manure nutrients and other animal waste constituents within some geographic areas. This trend has coincided with increased reports of large-scale discharges from these facilities, and continued runoff that is contributing to the significant increase in nutrients and resulting impairment of many U.S. waterways.

EPA's proposed revisions of the existing regulations will make the regulations more effective for the purpose of protecting or restoring water quality. The revisions will also make the regulations easier to understand and better clarify the conditions under which an AFO is a CAFO and, therefore, subject to the regulatory requirements of today's proposed regulations.

B. Water Quality Impairment Associated with Manure Discharge and Runoff

EPA has made significant progress in implementing CWA programs and in reducing water pollution. Despite such progress, however, serious water quality problems persist throughout the country. Agricultural operations, including CAFOs, are considered a significant source of water pollution in the United States. The recently released National Water Quality Inventory: 1998 Report to Congress was prepared under Section 305(b) of the Clean Water Act. Under this section of the Act, States report their impaired water bodies to EPA, including the suspected sources of those impairments. The most recent report indicates that the agricultural sector (including crop production, pasture and range grazing, concentrated and confined animal feeding operations, and aquaculture) is the leading contributor to identified water quality impairments in the nation's rivers and

streams, and also the leading contributor in the nation's lakes, ponds, and reservoirs. Agriculture is also identified as the fifth leading contributor to identified water quality impairments in the nation's estuaries. 1998 National Water Quality Inventory results are illustrated in table 4–1 below.

TABLE 4–1.—FIVE LEADING SOURCES OF WATER QUALITY IMPAIRMENT IN THE UNITED STATES

Rank	Rivers	Lakes	Estuaries
1	Agriculture (59%)	Agriculture (31%)	Municipal Point Sources (28%)
2	Hydro modification (20%)	Hydro modification (15%)	Urban Runoff / Storm Sewers (28%)
3	Urban Runoff / Storm Sewers (11%)	Urban Runoff/Storm Sewers (12%)	Atmospheric Deposition (23%)
4	Municipal Point Sources (10%)	Municipal Point Sources (11%)	Industrial Discharges (15%)
5	Resource Extraction (9%)	Atmospheric Deposition (8%)	Agriculture (15%)

Source: National Water Quality Inventory: 1998 Report to Congress, USEPA, 2000. Percentage of impairment attributed to each source is shown in parentheses. For example, agriculture is listed as a source of impairment in 59 percent of impaired river miles. The portion of 'agricultural'' impairment attributable to animal waste (as compared to crop production, pasture grazing, range grazing, and aquaculture) is not specified in this value. Figure totals exceed 100 percent because water bodies may be impaired by more than one source.

Table 4–2 presents additional summary statistics of the 1998 National Water Quality Inventory. These figures indicate that the agricultural sector contributes to the impairment of at least 170,000 river miles, 2.4 million lake acres, and almost 2,000 estuarine square miles. Twenty-eight states and tribes identified specific agricultural sector activities contributing to water quality impacts on rivers and streams, and 16 states and tribes identified specific agricultural sector activities contributing to water quality impacts on lakes, ponds, and reservoirs. CAFOs are a subset of the agriculture category. For rivers and streams, estimates from these states indicate that 16 percent of the total reported agricultural sector impairment is from the animal feeding operation industry (including feedlots, animal holding areas, and other animal operations), and 17 percent of the agricultural sector impairment is from both range and pasture grazing. For lakes, ponds, and reservoirs, estimates from these states indicate that 4 percent of the total reported agricultural sector impairment is from the animal feeding operation industry, and 39 percent of the agricultural sector impairment is from both range and pasture grazing. Impairment due specifically to land application of manure was not reported.

TABLE 4–2.—SUMMARY OF U.S. WATER QUALITY IMPAIRMENT SURVEY

Total quantity in U.S.	Waters assessed	Quantity impaired by all sources	Quantity impaired by agriculture [a]
Rivers 3,662,255 miles	23% of total 840,402 miles	35% of assessed 291,263 miles	59% of impaired. 170,750 miles.
Lakes, Ponds, and Reservoirs 41.6 million acres	42% of total 17.4 million acres	45% of assessed 7.9 million acres	31% of impaired. 2,417,801 acres.
Estuaries 90,465 square miles	32% of total 28,687 square miles	44% of assessed 12,482 square miles	15% of impaired. 1,827 square miles.

Source: National Water Quality Inventory: 1998 Report to Congress, USEPA, 2000.
[a]CAFOs are a subset of the agriculture category.

Table 4–3 below lists the leading pollutants impairing surface water quality in the United States as identified in the 1998 National Water Quality Inventory. The animal production industry is a potential source of all of these, but is most commonly associated with nutrients, pathogens, oxygen-depleting substances, and solids (siltation). Animal production facilities are also a potential source of the other leading causes of water quality impairment, such as metals and pesticides, and can contribute to the growth of noxious aquatic plants due to the discharge of excess nutrients. Animal production facilities may also contribute loadings of priority toxic organic chemicals and oil and grease, but to a lesser extent than other pollutants.

TABLE 4–3.—FIVE LEADING CAUSES OF WATER QUALITY IMPAIRMENT IN THE UNITED STATES

Rank	Rivers	Lakes	Estuaries
1	Siltation (38%)	Nutrients (44%)	Pathogens (47%)
2	Pathogens (36%)	Metals (27%)	Oxygen-Depleting Substances (42%)
3	Nutrients (29%)	Siltation (15%)	Metals (27%)
4	Oxygen-Depleting Substances (23%)	Oxygen-Depleting Substances (14%)	Nutrients (23%)
5	Metals (21%)	Suspended Solids (10%)	Thermal Modifications (18%)

Source: National Water Quality Inventory: 1998 Report to Congress, USEPA, 2000. Percent impairment attributed to each pollutant is shown in parentheses. For example, siltation is listed as a cause of impairment in 51 percent of impaired river miles. All of these pollutants except thermal modifications are commonly associated with animal feeding operations to varying degrees, though they are also attributable to other sources. Figure totals exceed 100 percent because water bodies may be impaired by more than one source.

Pollutants associated with animal production can also originate from a variety of other sources, such as cropland, municipal and industrial wastewater discharges, urban runoff, and septic systems. The national analyses described in Section V of this preamble are useful in assessing the significance of animal waste as a potential or actual contributor to water quality degradation across the United States. Section V also discusses the environmental impacts and human health effects associated with the pollutants found in animal manure.

C. Recent Changes in the Livestock and Poultry Industry

EPA's proposed revisions of the existing effluent guidelines and NPDES regulations take into account the major structural changes that have occurred in the livestock and poultry industries since the 1970s when the regulatory controls for CAFOs were first instituted. These changes include:

- Increased number of animals produced annually;
- Fewer animal feeding operations and an increase in the share of larger operations that concentrate more animals, manure and wastewater in a single location;
- Geographical shifts in where animals are produced; and
- Increased coordination between animal feeding operations and processing firms.

1. Increased Livestock and Poultry Production

Since the 1970s, total consumer demand for meat, eggs, milk and dairy products has continued to increase. To meet this demand, U.S. livestock and poultry production have risen sharply, resulting in an increase in the number of animals produced and the amount of manure and wastewater generated annually.

Increased sales from U.S. farms is particularly dramatic in the poultry sectors, as reported in the Census of Agriculture (various years). In 1997, turkey sales totaled 299 million birds. In comparison, 141 million turkeys were sold for slaughter in 1978. Broiler sales totaled 6.4 billion chickens in 1997, up from 2.5 billion chickens sold in 1974. The existing CAFO regulations effectively do not cover broiler operations because they exclude operations that use dry manure management systems. Red meat production also rose during the 1974–1997 period. The number of hogs and pigs sold increased from 79.9 million hogs in 1974 to 142.6 million hogs in 1997. Sales data for fed cattle (i.e., USDA's data category on ''cattle fattened on grain and concentrates'') for 1975 show that 20.5 million head were marketed. By 1997, fed cattle marketings totaled 22.8 million head. The total number of egg laying hens rose from 0.3 million birds in 1974 to 0.4 million birds in 1997. The number of dairy cows on U.S. farms, however, dropped from more than 10.7 million cows to 9.1 million cows over the same period.

Not only are more animals produced and sold each year, but the animals are also larger in size. Efficiency gains have raised animal yields in terms of higher average slaughter weight. Likewise, production efficiency gains at egg laying and dairy operations have resulted in higher per-animal yields of eggs and milk. USDA reports that the average number of eggs produced per egg laying hen was 218 eggs per bird in 1970 compared to 255 eggs per bird in 1997. The National Milk Producers Federation reports that average annual milk production rose from under 10,000 pounds per cow in 1970 to more than 16,000 pounds per cow in 1997. In the case of milk production, these efficiency gains have allowed farmers to maintain or increase production levels with fewer animals. Although animal inventories at dairy farms may be lower, however, this may not necessarily translate to reduced manure volumes generated because higher yields are largely attributable to improved and often more intensive feeding strategies that may exceed the animal's ability for uptake. This excess is not always incorporated by the animal and may be excreted.

2. Increasing Share of Larger, More Industrialized Operations

The number of U.S. livestock and poultry operations is declining due to ongoing consolidation in the animal production industry. Increasingly, larger, more industrialized, highly specialized operations account for a greater share of all animal production. This has the effect of concentrating more animals, and thus more manure and wastewater, in a single location, and raising the potential for significant environmental damages unless manure is properly stored and handled.

USDA reports that there were 1.1 million livestock and poultry farms in the United States in 1997, about 40 percent fewer than the 1.7 million farms reported in 1974. Farms are closing, especially smaller operations that cannot compete with large-scale, highly specialized, often lower cost, producers. Consequently, the livestock and poultry industries are increasingly dominated by larger operations. At the same time, cost and efficiency considerations are pushing farms to become more specialized and intensive. Steep gains in production efficiency have allowed farmers to produce more with fewer animals because of higher per-animal yields and quicker turnover of animals between farm production and consumer market. As a result, annual production and sales have increased, even though the number of animals on farms at any one time has declined (i.e., an increase in the number of marketing cycles over the course of the year allows operators to maintain production levels with fewer animals at any given time, although the total number of animals produced by the facility over the year may be greater).

The increase in animal densities at operations is evident by comparing the average number of animals per operation between 1974 and 1997, as derived from Census of Agriculture data. In the poultry sectors, the average number of birds across all operations is four to five times greater in 1997 than in 1974. In 1997, the number of broilers per operation averaged 281,700 birds, up from 73,300 birds in 1974. Over the same period, the average number of egg laying hens per operation rose from 1,100 layers to 5,100 layers per farm, and the average number of turkeys per operation rose from 2,100 turkeys to 8,600 turkeys. The average number of hogs raised per operation rose from under 100 hogs to more than 500 hogs between 1974 and 1997. The average number of fed cattle and dairy cows per operation more than doubled during the period, rising to nearly 250 fed cattle and 80 milking cows by 1997.

This trend toward fewer, larger, and more industrialized operations has contributed to large amounts of manure being produced at a single geographic location. The greatest potential risk is from the largest operations with the most animals given the sheer volume of manure generated at these facilities. Larger, specialized facilities often do not have an adequate land base for manure disposal through land application. A USDA analysis of 1997 Census data shows that animal operations with more than 1,000 AU account for more than 42 percent of all confined animals but only 3 percent of cropland held by livestock and poultry operations. As a result, large facilities need to store significant volumes of manure and wastewater which have the potential, if not properly handled, to cause significant water quality impacts. By comparison, smaller operations manage fewer animals and tend to concentrate less manure at a single farming location. Smaller operations also tend to be more diversified, engaging in both animal and

crop production. These operations often have sufficient cropland and fertilizer needs to land apply manure generated by the farm's livestock or poultry business, without exceeding that land's nutrient requirements.

Another recent analysis from USDA confirms that as animal production operations have become larger and more specialized operations, the opportunity to jointly manage animal waste and crop nutrients has decreased. Larger operations typically have inadequate land available for utilizing manure nutrients. USDA estimates that the amount of nitrogen from manure produced by confinement operations increased about 20 percent between 1982 and 1997, while average acreage on livestock and poultry farms declined. Overall, USDA estimates that cropland controlled by operations with confined animals has the assimilative capacity to absorb about 40 percent of the calculated manure nitrogen generated by these operations. EPA expects this excess will need to be transported offsite.

3. Geographic Shifts in Where Animals are Raised

During the 1970s, the majority of farming operations were concentrated in rural, agricultural areas and manure nutrients generated by animal feeding operations were readily incorporated as a fertilizer for crop production. In an effort to reduce transportation costs and streamline distribution between the animal production and food processing sectors, livestock and poultry operations have tended to cluster near slaughtering and manufacturing plants as well as near end-consumer markets. Ongoing structural and technological change in these industries also influences where facilities operate and contributes to locational shifts from the more traditional farm production regions to the more emergent regions.

Operations in more traditional producing states tend to grow both livestock and crops and tend to have adequate cropland for land application of manure. Operations in these regions also tend to be smaller in size. In contrast, confinement operations in more emergent areas, such as hog operations in North Carolina or dairy operations in the Southwest, tend to be larger in size and more intensive types of operations. These operations tend to be more specialized and often do not have adequate land for application of manure nutrients. Production is growing rapidly in these regions due to competitive pressures from more specialized producers who face lower per-unit costs of production. This may be shifting the flow of manure nutrients away from more traditional agricultural areas, often to areas where these nutrients cannot be easily absorbed.

As reported by Census data, shifts in where animals are grown is especially pronounced in the pork sector. Traditionally, Iowa has been the top ranked pork producing state. Between 1982 and 1997, however, the number of hogs raised in that state remained relatively constant with a year-end inventory average of about 14.2 million pigs. In comparison, year-end hog inventories in North Carolina increased from 2.0 million pigs in 1982 to 9.6 million pigs in 1997. This locational shift has coincided with reported nutrient enrichment of the waters of the Pamlico Sound in North Carolina. Growth in hog production also occurred in other emergent areas, including South Dakota, Oklahoma, Wyoming, Colorado, Arizona, and Utah. Meanwhile, production dropped in Illinois, Indiana, Wisconsin, and Ohio.

The dairy industry has seen similar shifts in where milk is produced, moving from the more traditional Midwest and Northeast states to the Pacific and Southwestern states. Between 1982 and 1997, the number of milk cows in Wisconsin dropped from 1.9 million to 1.3 million. Milk cow inventories have also declined in other traditional states, including Illinois, Indiana, Iowa, Minnesota, Missouri, New York, Pennsylvania, Ohio, Connecticut, Maryland, and Vermont. During the same period, milk cow inventories in California rose from 0.9 million in 1982 to 1.4 million in 1997. In 1994, California replaced Wisconsin as the top milk producing state. Milk cow inventories have also increased in Texas, Idaho, Washington, Oregon, Colorado, Arizona, Nevada, and Utah. These locational shifts have coincided with reported nutrient enrichment of waters, including the Puget Sound and Tillamook Bay in the northwest, the Everglades in Florida, and Erath County in Texas, and also elevated salinity levels due to excess manure near milk production areas in southern California's Chino Basin.

4. Increased Linkages between Animal Production Facility and Food Processors

Over the past few decades, closer ties have been forged between growers and various industry middlemen, including packers, processors, and cooperatives. Increased integration and coordination is being driven by the competitive nature of agricultural production and the dynamics of the food marketing system, in general, as well as seasonal fluctuations of production, perishability of farm products, and the inability to store and handle raw farm output. Closer ties between the animal production facility and processing firms—either through contractual agreement or through corporate ownership of CAFOs—raises questions of who is responsible for ensuring proper manure disposal and management at the animal feeding site. This is especially true given the current trend toward larger animal confinement operations and the resultant need for increased animal waste management. As operations become larger and more specialized, they may contract out some phases of the production process.

Farmers and ranchers have long used contracts to market agricultural commodities. However, increased use of production contracts is changing the organizational structure of the individual industries. Under a production contract, a business other than the feedlot where the animals are raised and housed, such as a processing firm, feed mill, or animal feeding operation, may own the animals and may exercise further substantial operational control over the operations of the feedlot. In some cases, the processor may specify in detail the production inputs used, including the genetic material of the animals, the types of feed used, and the production facilities where the animals are raised. The processor may also influence the number of animals produced at a site. In general, these contracts do not deal with management of manure and waste disposal. Recently, however, some processors have become increasingly involved in how manure and waste is managed at the animal production site.

The use of production contracts in the livestock and poultry industries varies by commodity group. Information from USDA indicates that production contracts are widely used in the poultry industry and dominate broiler production. Production contracting is becoming increasingly common in the hog sector, particularly for the finishing stage of production in regions outside the Corn Belt.

Production contracting has played a critical role in the growth of integrators in the poultry sectors. Vertical integration has progressed to the point where large, multifunction producer-packer-processor-distributor firms are the dominant force in poultry and egg production and marketing. Data from USDA on animal ownership at U.S. farms illustrates the use of production contracts in these sectors. In 1997, USDA reported that 97 percent of all broilers raised on U.S. farms were not owned by the farmer. In the turkey and

egg laying sectors, use of production contracts is less extensive since 70 percent and 43 percent of all birds in these sectors, respectively, were not owned by the farmer. In the hog sector, data from USDA indicate that production contracting may account for 66 percent of hog production among larger producers in the Southern and Mid-Atlantic states. This differs from the Midwest, where production contracting accounted for 18 percent of hog production in 1997.

By comparison, production contracts are not widely used in the beef and dairy sectors. Data from USDA indicate that less than 4 percent of all beef cattle and 1 percent of all milking cows were not owned by the farmer in 1997. However, production contracts are used in these industries that specialize in a single stage of livestock production, such as to ''finish'' cattle prior to slaughter or to produce replacement breeding stock. However, this use constitutes a small share of overall production across all producers.

To further examine the linkages between the animal production facility and the food processing firms, and to evaluate the geographical implications of this affiliation, EPA conducted an analysis that shows a relationship between areas of the country with an excess of manure nutrients from animal production operations and areas with a large number of meat packing and poultry slaughtering facilities. This manure—if land applied—would be in excess of crop uptake needs and result in over application and enrichment of nutrients. Across the pork and poultry sectors, this relationship is strongest in northwest Arkansas, where EPA estimates a high concentration of excess manure nutrients and a large number of poultry and hog processing facilities. By sector, EPA's analysis shows that there is excess poultry manure nutrients and a large number of poultry processing plants in the Delmarva Peninsula in the mid-Atlantic, North Carolina, northern Alabama, and also northern Georgia. In the hog sector, the analysis shows excess manure nutrients and a large number of meat packing plants in Iowa, Nebraska and Alabama. The analysis also shows excess manure nutrients from hogs in North Carolina, but relatively fewer meat packing facilities, which is likely explained by continuing processing plant closure and consolidation in that state. More information on this analysis is provided in the rulemaking record.

D. Improve Effectiveness of Regulations

As noted in Section IV.B, reports of continued discharges and runoff from animal production facilities have persisted in spite of regulatory controls that were first instituted in the 1970s. EPA is proposing to revise the effluent guidelines and NPDES regulations to improve their effectiveness by making the regulations simpler and easier to understand and implement. Another change intended to improve the effectiveness of the regulations is clarification of the conditions under which an AFO is a CAFO and is, therefore, subject to the NPDES regulatory requirements. In addition, EPA is revising the existing regulation to remove certain provisions that are no longer appropriate.

The existing regulations were designed to prohibit the release of wastewater from the feedlot site, but did not specifically address discharges that may occur when wastewater or solid manure mixtures are applied to crop, pasture, or hayland. The proposed regulations address the environmental risks associated with manure management. The proposed revisions also are more reflective of current farm production practices and waste management controls.

Today's proposed revised regulations also seek to improve the effectiveness of the existing regulations by focusing on those operations that produce the majority of the animal manure and wastewater generated annually. EPA estimates that the proposed regulations will regulate, as CAFOs, about 7 to 10 percent of all animal confinement operations nationwide, and will capture between 64 percent and 70 percent of the total amount of manure generated at CAFOs annually, depending on the proposed regulatory alternative (discussed in more detail in Section VI.A). Under the existing regulations, few operations have obtained NPDES permits. Presently, EPA and authorized States have issued approximately 2,500 NPDES permits. This is less than 1 percent of the estimated 376,000 animal confinement operations in the United States. EPA's proposed revisions are intended to ensure that all CAFOs, as defined under the proposed regulations, will apply for and obtain a permit.

V. What Environmental and Human Health Impacts Are Potentially Caused by CAFOs?

The 1998 National Water Quality Inventory, prepared under Section 305(b) of the Clean Water Act, presents information on impaired water bodies based on reports from the States. This recent report indicates that the agricultural sector (which includes concentrated and confined animal feeding operations, along with aquaculture, crop production, pasture grazing, and range grazing) is the leading contributor to identified water quality impairments in the nation's rivers and lakes, and the fifth leading contributor in the nation's estuaries. The leading pollutants or stressors of rivers and streams include (in order of rank) siltation, pathogens (bacteria), nutrients, and oxygen depleting substances. For lakes, ponds, and reservoirs, the leading pollutants or stressors include nutrients (ranked first), siltation (ranked third), oxygen depleting substances (ranked fourth), and suspended solids (ranked fifth). For estuaries, the leading pollutants or stressors include pathogens (bacteria) as the leading cause, oxygen depleting substances (ranked second), and nutrients (ranked fourth).

The sections which follow present the pollutants associated with livestock and poultry operators, of which CAFOs are a subset, the pathways by which the pollutants reach surface water, and their impacts on the environment and human health. Detailed information can be found in the Environmental Assessment of the Proposed Revisions to the National Pollutant Discharge Elimination System Regulation and Effluent Guidelines for Concentrated Animal Feeding Operations. The Environmental Assessment and the supporting references mentioned here are included in Section 8.1 of the Record for this proposal.

A. Which Pollutants Do CAFOs Have the Potential to Discharge and Why Are They of Concern?

The primary pollutants associated with animal waste are nutrients (particularly nitrogen and phosphorus), organic matter, solids, pathogens, and odorous/volatile compounds. Animal waste is also a source of salts and trace elements, and to a lesser extent, antibiotics, pesticides, and hormones. Each of these types of pollutants is discussed in the sections which follow. The actual composition of manure depends on the animal species, size, maturity, and health, as well as on the composition (*e.g.,* protein content) of animal feed.

1. Nutrients (Nitrogen, Phosphorus, and Potassium)

The 1998 National Water Quality Inventory indicates that nutrients are the leading stressor in impaired lakes, ponds, and reservoirs. They are the third most frequent stressor in impaired rivers and streams, and the fourth greatest stressor in impaired estuaries. The three primary nutrients in manure are nitrogen, phosphorus, and

potassium. (Potassium also contributes to salinity.)

Nitrogen in fresh manure exists in both organic forms (including urea) and inorganic forms (including ammonium, ammonia, nitrate, and nitrite). In fresh manure, 60 to 90 percent of total nitrogen is present in organic forms. Organic nitrogen is transformed via microbial processes to inorganic forms, which are bioavailable and therefore have fertilizer value. As an example of the quantities of nutrients discharged from AFOs, EPA estimates that hog operations in eastern North Carolina generated 135 million pounds of nitrogen per year as of 1995.

Phosphorus exists in solid and dissolved phases, in both organic and inorganic forms. Over 70 percent of the phosphorus in animal manure is in the organic form. As the waste ages, phosphorus mineralizes to inorganic phosphate compounds which are available to plants. Organic phosphorus compounds are generally water soluble and may leach through soil to groundwater and run off into surface waters. Inorganic phosphorus tends to adhere to soils and is less likely to leach into groundwater. Animal wastes typically have lower nitrogen:phosphorus ratios than crop requirements. The application of manure at a nitrogen-based agronomic rate can, therefore, result in application of phosphorus at several times the agronomic rate. Soil test data in the United States confirm that many soils in areas dominated by animal-based agriculture have elevated levels of phosphorus.

Potassium contributes to the salinity of animal manure which may in turn contribute salinity to surface water polluted by manure. Actual or anticipated levels of potassium in surface water and groundwater are unlikely to pose hazards to human health or aquatic life. However, applications of high salinity manure are likely to decrease the fertility of the soil.

In 1998, USDA studied the amount of manure nitrogen and phosphorus production for confined animals relative to crop uptake potential. USDA evaluated the quantity of nutrients available from recoverable livestock manure relative to crop growth requirements, by county, based on data from the 1997 Census of Agriculture. The analyses were intended to determine the amount of manure that can be recovered and used. The analyses did not consider manure from grazing animals in pasture, excluded manure lost to the environment, and also excluded manure lost in dry storage and treatment. It is not currently possible to completely recover all manure.

Losses to the environment can occur through runoff, erosion, leaching to groundwater, and volatilization (especially for nitrogen in the form of ammonia). These losses can be significant. Considering typical management systems, the 1998 USDA study reported that average manure nitrogen losses range from 31 to 50 percent for poultry, 60 to 70 percent for cattle (including the beef and dairy categories), and 75 percent for swine. The typical phosphorus loss is 15 percent.

The USDA study also looked at the potential for available manure nitrogen and phosphorus generated in a county to meet or exceed plant uptake and removal in each of the 3,141 mainland counties. Based on this analysis of 1992 conditions, available manure nitrogen exceeds crop system needs in 266 counties, and available manure phosphorus exceeds crop system needs in 485 counties. The relative excess of phosphorus compared to nitrogen is not surprising, since manure is typically nitrogen-deficient relative to crop needs. Therefore, when manure is applied to meet a crop's nitrogen requirement, phosphorus is typically over-applied.

USDA's analyses do not evaluate environmental transport of applied manure nutrients. Therefore, an excess of nutrients in a particular county does not necessarily indicate that a water quality problem exists. Likewise, a lack of excess nutrients does not imply the absence of water quality problems. Nevertheless, the analyses provide a general indicator of excess nutrients on a broad basis.

2. Organic Matter

Livestock manures contain many carbon-based, biodegradable compounds. Once these compounds reach surface water, they are decomposed by aquatic bacteria and other microorganisms. During this process dissolved oxygen is consumed, which in turn reduces the amount of oxygen available for aquatic animals. The 1998 National Water Quality Inventory indicates that oxygen-depleting substances are the second leading stressor in estuaries. They are the fourth greatest stressor both in impaired rivers and streams, and in impaired lakes, ponds, and reservoirs. Biochemical oxygen demand (BOD) is an indirect measure of the concentration of biodegradable substances present in an aqueous solution.

3. Solids

The 1998 National Water Quality Inventory indicates that suspended solids are the fifth leading stressor in lakes, ponds, and reservoirs. Solids are measured as total suspended solids, or TSS. (Solids can also be measured as total dissolved solids, or TDS.) Solids from animal manure include the manure itself and any other elements that have been mixed with it. These elements can include spilled feed, bedding and litter materials, hair, feathers, and corpses. In general, the impacts of solids include increasing the turbidity of surface waters, physically hindering the functioning of aquatic plants and animals, and providing a protected environment for pathogens.

4. Pathogens

Pathogens are disease-causing organisms including bacteria, viruses, protozoa, fungi, and algae. The 1998 National Water Quality Inventory indicates that pathogens (specifically bacteria) are the leading stressor in impaired estuaries and the second most prevalent stressor in impaired rivers and streams. Livestock manure contains countless microorganisms, including bacteria, viruses, protozoa, and parasites. Multiple species of pathogens may be transmitted directly from a host animal's manure to surface water, and pathogens already in surface water may increase in number due to loadings of animal manure nutrients and organic matter. In 1998, the Centers for Disease Control and Prevention reported on an Iowa investigation of chemical and microbial contamination near large scale swine operations. The investigation demonstrated the presence of pathogens not only in manure lagoons used to store swine waste before it is land applied, but also in drainage ditches, agricultural drainage wells, tile line inlets and outlets, and an adjacent river.

Over 150 pathogens found in livestock manure are associated with risks to humans. The protozoa *Cryptosporidium parvum* and *Giardia species* are frequently found in animal manure and relatively low doses can cause infection in humans. Bacteria such as *Escherichia coli* O157:H7 and *Salmonella species* are also often found in livestock manure and have also been associated with waterborne disease. A recent study by USDA revealed that about half the cattle at the nation's feedlots carry *E. coli.* The bacteria *Listeria monocytogenes* is ubiquitous in nature, and is commonly found in the intestines of wild and domestic animals without causing illness. *L. monocytogenes* is commonly associated

with foodborne disease. The pathogens *C. parvum, Giardia, E. coli* O157:H7, and *L. monocytogenes* are able to survive and remain infectious in the environment for long periods of time.

Although the pathogen *Pfiesteria piscicida* is not found in manure, researchers have documented stimulation of *Pfiesteria* growth by swine effluent discharges, and have strong field evidence that the same is true for poultry waste. Research has also shown that this organism's growth can be highly stimulated by both inorganic and organic nitrogen and phosphorus enrichments. Discussions of *Pfiesteria* impacts on the environment and on human health are presented later in this section.

5. Salts

The salinity of animal manure is directly related to the presence of dissolved mineral salts. In particular, significant concentrations of soluble salts containing sodium and potassium remain from undigested feed that passes unabsorbed through animals. Other major cations contributing to manure salinity are calcium and magnesium; the major anions are chloride, sulfate, bicarbonate, carbonate, and nitrate. Salinity tends to increase as the volume of manure decreases during decomposition and evaporation. Salt buildup deteriorates soil structure, reduces permeability, contaminates groundwater, and reduces crop yields.

In fresh waters, increasing salinity can disrupt the balance of the ecosystem, making it difficult for resident species to remain. In laboratory settings, drinking water high in salt content has inhibited growth and slowed molting of mallard ducklings. Salts also contribute to degradation of drinking water supplies.

6. Trace Elements

The 1998 National Water Quality Inventory indicates that metals are the fifth leading stressor in impaired rivers, the second leading stressor in impaired lakes, and the third leading stressor in impaired estuaries. Trace elements in manure that are of environmental concern include arsenic, copper, selenium, zinc, cadmium, molybdenum, nickel, lead, iron, manganese, aluminum, and boron. Of these, arsenic, copper, selenium, and zinc are often added to animal feed as growth stimulants or biocides. Trace elements may also end up in manure through use of pesticides, which are applied to livestock to suppress houseflies and other pests. Trace elements have been found in manure lagoons used to store swine waste before it is land applied, and in drainage ditches, agricultural drainage wells, and tile line inlets and outlets. They have also been found in rivers adjacent to hog and cattle operations.

Several of the trace elements in manure are regulated in treated municipal sewage sludge (but not manure) by the Standards for the Use or Disposal of Sewage Sludge, promulgated under the Clean Water Act and published in 40 C.F.R. Part 503. These include arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc. Total concentrations of trace elements in animal manures have been reported as comparable to those in some municipal sludges, with typical values well below the maximum concentrations allowed by Part 503 for land-applied sewage sludge. Based on this information, trace elements in agronomically applied manures should pose little risk to human health and the environment. However, repeated application of manures above agronomic rates could result in exceedances of the cumulative metal loading rates established in Part 503, thereby potentially impacting human health and the environment. There is some evidence that this is happening. For example, in 1995, zinc and copper were found building to potentially harmful levels on the fields of a hog farm in North Carolina.

7. Odorous/Volatile Compounds

Sources of odor and volatile compounds include animal confinement buildings, manure piles, waste lagoons, and land application sites. As animal wastes are degraded by microorganisms, a variety of gases are produced. The four main gases generated are carbon dioxide, methane, hydrogen sulfide, and ammonia. Over 150 other odorous compounds have also been identified with animal manure. Aerobic conditions yield mainly carbon dioxide, while anaerobic conditions generate both methane (60 percent to 70 percent) and carbon dioxide (30 percent). Anaerobic conditions, which dominate in typical, unaerated animal waste lagoons, are also associated with the generation of hydrogen sulfide and about 40 other odorous compounds, including volatile fatty acids, phenols, mercaptans, aromatics, sulfides, and various esters, carbonyls, and amines. Once airborne, these volatile pollutants have the potential to be deposited onto nearby streams, rivers, and lakes.

Up to 50 percent or more of the nitrogen in fresh manure may be in ammonia form or converted to ammonia relatively quickly once manure is excreted. Ammonia is volatile and ammonia losses from animal feeding operations can be considerable. A study of atmospheric nitrogen published in 1998 reported that, in North Carolina, animal agriculture is responsible for over 90 percent of all ammonia emissions. Ammonia from manure comprises more than 40 percent of the total estimated nitrogen emissions from all sources.

8. Antibiotics

Antibiotics are used in animal feeding operations and can be expected to appear in animal wastes. The practice of feeding antibiotics to poultry, swine, and cattle evolved from the 1949 discovery that very low levels usually improved growth. Antibiotics are used both to treat illness and as feed additives to promote growth or to improve feed conversion efficiency. In 1991, an estimated 19 million pounds of antibiotics were used for disease prevention and growth promotion in animals. Between 60 and 80 percent of all livestock and poultry receive antibiotics during their productive lifespan. The primary mechanisms of elimination are in urine and bile. Essentially all of an antibiotic administered is eventually excreted, whether unchanged or in metabolite form. Little information is available regarding the concentrations of antibiotics in animal wastes, or on their fate and transport in the environment.

Of greater concern than the presence of antibiotics in animal manure is the development of antibiotic resistant pathogens. Use of antibiotics in raising animals, especially broad spectrum antibiotics, is increasing. As a result, more strains of antibiotic resistant pathogens are emerging, along with strains that are growing more resistant. Normally, about 2 percent of a bacterial population are resistant to a given antibiotic; however, up to 10 percent of bacterial populations from animals regularly exposed to antibiotics have been found to be resistant. In a study of poultry litter suitable for land application, about 80 to 100 percent of bacterial populations isolated from the litter were found to be resistant to multiple antibiotics. Antibiotic-resistant forms of *Salmonella, Campylobacter, E. coli,* and *Listeria* are known or suspected to exist. An antibiotic-resistant strain of the bacteria *Clostridium perfringens* was detected in the groundwater below plots of land treated with pig manure, while it was nearly absent beneath unmanured plots.

9. Pesticides and Hormones

Pesticides and hormones are compounds which are used in animal feeding operations and can be expected

to appear in animal wastes. Both of these types of pollutants have been linked with endocrine disruption.

Pesticides are applied to livestock to suppress houseflies and other pests. There has been very little research on losses of pesticides in runoff from manured lands. A 1994 study showed that losses of cyromazine (used to control flies in poultry litter) in runoff increased with the rate of poultry manure applied and the intensity of rainfall.

Specific hormones are used to increase productivity in the beef and dairy industries. Several studies have shown hormones are present in animal manures. Poultry manure has been shown to contain both estrogen and testosterone. Runoff from fields with land-applied manure has been reported to contain estrogens, estradiol, progesterone, and testosterone, as well as their synthetic counterparts. In 1995, an irrigation pond and three streams in the Conestoga River watershed near the Chesapeake Bay had both estrogen and testosterone present. All of these sites were affected by fields receiving poultry litter.

B. How Do These Pollutants Reach Surface Waters?

Pollutants found in animal manures can reach surface water by several mechanisms. These can be categorized as either surface discharges or other discharges. Surface discharges can occur as the result of runoff, erosion, spills, and dry-weather discharges. In surface discharges, the pollutant travels overland or through drain tiles with surface inlets to a nearby stream, river, or lake. Direct contact between confined animals and surface waters is another means of surface discharge. For other types of discharges, the pollutant travels via another environmental medium (groundwater or air) to surface water.

1. Surface Discharges

a. *Runoff.* Water that falls on man-made surfaces or soil and fails to be absorbed will flow across the surface and is called runoff. Surface discharges of manure pollutants can originate from feedlots and from overland runoff at land application sites. Runoff is especially likely at open-air feedlots if rainfall occurs soon after application, or if manure is over-applied, or misapplied. For example, experiments by Edwards and Daniels in the early 1990s show that, for all animal wastes, the application rate had a significant effect on the runoff concentration. In addition, manure applied to water-saturated or frozen soils is more likely to run off the soil surface. Other factors that promote runoff to surface waters are steep land slope, high rainfall, low soil porosity or permeability, and close proximity to surface waters. Runoff of pollutants dissolved into rainwater is a significant transport mechanism for water soluble pollutants, which includes nitrate, nitrite, and organic forms of phosphorus.

Runoff of manure pollutants has been identified by states, citizen's groups, and the media as a factor in a number of documented impacts from AFOs, including hog, cattle, and chicken operations. For example, in 1994, multiple runoff problems were cited for a hog operation in Minnesota, and in 1996 runoff from manure spread on land was identified at hog and chicken operations in Ohio. In 1997, runoff problems were identified for several cattle operations in numerous counties in Minnesota. More discussion of runoff and its impacts on the environment and human health is provided later in this section.

b. *Erosion.* In addition to runoff, surface discharges can occur by erosion, in which the soil surface is worn away by the action of water or wind. Erosion is a significant transport mechanism for land-applied pollutants that are strongly sorbed to soils, of which phosphorus is one example. A 1999 report by the Agricultural Research Service (ARS) noted that phosphorus bound to eroded sediment particles makes up 60 to 90 percent of phosphorus transported in surface runoff from cultivated land. For this reason, most agricultural phosphorus control measures have focused on soil erosion control to limit transport of particulate phosphorus. However, soils do not have infinite adsorption capacity for phosphate or any other adsorbing pollutant, and dissolved pollutants including phosphates can still enter waterways via runoff and leachate even if soil erosion is controlled.

In 1998, the USDA Natural Resources Conservation Service (NRCS) reviewed the manure production of a watershed in South Carolina. Agricultural activities in the project area are a major influence on the streams and ponds in the watershed, and contribute to nutrient-related water quality problems in the headwaters of Lake Murray. NRCS found that bacteria, nutrients, and sediment from soil erosion are the primary contaminants affecting these resources. The NRCS has calculated that soil erosion, occurring on over 13,000 acres of cropland in the watershed, ranges from 9.6 to 41.5 tons per acre per year.

c. *Spills and Dry-Weather Discharges.* Surface discharges can occur through spills or other discharges from lagoons. Some causes of spills include malfunctions such as pump failures, manure irrigation gun malfunctions, and pipes or retaining walls breaking. Manure entering tile drains has a direct route to surface water. (Tile drains are a network of pipes buried in fields below the root zone of plants to remove subsurface drainage water from the root zone to a stream, drainage ditch, or evaporation pond. EPA does not regulate most tile fields.) In 1997, the Ohio Department of Natural Resources documented chicken manure traveling through tile drains into a nearby stream. In addition, spills can occur as a result of lagoon overflows and washouts from floodwaters when lagoons are sited on floodplains. There are also indications that discharges from siphoning lagoons occur deliberately as a means to reduce the volume in overfull lagoons. Acute discharges of this kind frequently result in dramatic fish kills. In 1997, an independent review of Indiana Department of Environmental Management records indicated that the most common causes of waste releases in that state were intentional discharge and lack of operator knowledge, rather than spills due to severe rainfall conditions.

Numerous such dry-weather discharges have been identified. For example, in 1995, two separate discharges of 25 million gallons of manure from hog farms in North Carolina were documented, and both resulted in fish kills. Subsequent discharges of hundreds of thousands of gallons of manure were documented from hog operations in Iowa (1996), Illinois (1997), and Minnesota (1997). Fish kills were also reported as a result of two of these discharges. Discharges of over 8 million gallons of manure from a poultry operation in North Carolina in 1995 likewise resulted in a fish kill. Between 1994 and 1996, half a dozen discharges from poultry operations in Ohio resulted when manure entered field tiles. In 1998, 125,000 gallons of manure were discharged from a dairy feedlot in Minnesota.

d. *Direct Contact between Confined Animals and Surface Water.* Finally, surface discharges can occur as a result of direct contact between confined animals and the rivers or ponds that are located within their reach. Historically, farms were located near waterways for both water access for animals and discharge of wastes. This practice is now restricted for CAFOs; however, despite this restriction, enforcement actions are the primary means for reducing direct access.

In the more traditional farm production regions of the Midwest and Northeast, dairy barns and feedlots are often in close proximity to streams or other water sources. This close proximity to streams was necessary in order to provide drinking water for the dairy cows, direct access to cool the animals in hot weather, and to cool the milk prior to the wide-spread use of refrigeration. For CAFO-size facilities this practice is now replaced with more efficient means of providing drinking water for the dairy herd. In addition, the use of freestall barns and modern milking centers minimizes the exposure of dairy cows to the environment. For example, in New York direct access is more of a problem for the smaller traditional dairy farms that use older methods of housing animals.

In the arid west, feedlots are typically located near waterbodies to allow for cheap and easy stock watering. Many existing lots were configured to allow the animals direct access to the water. Certain animals, particularly cattle, will wade into the water, linger to drink, and will often urinate and defecate there as well. This direct deposition of manure and urine contributes greatly to water quality problems. Environmental problems associated with allowing farm animals access to waters that are adjacent to the production area are well documented in the literature. EPA Region X staff have documented dramatically elevated levels of Escherichia coli in rivers downstream of AFOs (including CAFOs) with direct access to surface water. Recent enforcement actions against direct access facilities have resulted in the assessment of tens of thousands of dollars in civil penalties.

2. Other Discharges to Surface Waters

a. *Leaching to Groundwater.* Leaching of land-applied pollutants such as nitrate dissolved into rainwater is a significant transport mechanism for water soluble pollutants. In addition, leaking lagoons are a source of manure pollutants to ground water. Although manure solids purportedly ''self-seal'' lagoons to prevent groundwater contamination, some studies have shown otherwise. A study for the Iowa legislature published in 1999 indicates that leaking is part of design standards for earthen lagoons and that all lagoons should be expected to leak. A 1995 survey of hog and poultry lagoons in the Carolinas found that nearly two-thirds of the 36 lagoons sampled had leaked into the groundwater. Even clay-lined lagoons have the potential to leak, since they can crack or break as they age, and can be susceptible to burrowing worms. In a three-year study (1988–1990) of clay-lined swine lagoons on the Delmarva Peninsula, researchers found that leachate from lagoons located in well-drained loamy sand had a severe impact on groundwater quality.

Pollutant transport to groundwater is also greater in areas with high soil permeability and shallow water tables. Percolating water can transport pollutants to groundwater, as well as to surface waters via interflow. Contaminated groundwater can deliver pollutants to surface waters through hydrologic connections. Nationally, about 40 percent of the average annual stream flow is from groundwater. In the Chesapeake Bay watershed, the U.S. Geological Survey (USGS) estimates that about half of the nitrogen loads from all sources to nontidal streams and rivers originate from groundwater.

b. *Discharge to the Air and Subsequent Deposition.* Discharges to air can occur as a result of volatilization of both pollutants already present in the manure and pollutants generated as the manure decomposes. Ammonia is very volatile, and can have significant impacts on water quality through atmospheric deposition. Other ways that manure pollutants can enter the air is from spray application methods for land applying manure and as particulates wind-borne in dust. Once airborne, these pollutants can find their way into nearby streams, rivers, and lakes. The 1998 National Water Quality Inventory indicates that atmospheric deposition is the third greatest cause of water quality impairment for estuaries, and the fifth greatest cause of water quality impairment for lakes, ponds, and reservoirs.

The degree of volatilization of manure pollutants is dependent on the manure management system. For example, losses are greater when manure remains on the land surface rather than being incorporated into the soil, and are particularly high when spray application is performed. Environmental conditions such as soil acidity and moisture content also affect the extent of volatilization. Losses are reduced by the presence of growing plants. Ammonia also readily volatilizes from lagoons.

Particulate emissions from AFOs may include dried manure, feed, epithelial cells, hair, and feathers. The airborne particles make up an organic dust, which includes endotoxin (the toxic protoplasm liberated when a microorganism dies and disintegrates), adsorbed gases, and possibly steroids. At least 50 percent of dust emissions from swine operations are believed to be respirable (small enough to be inhaled deeply into the lungs).

3. A National Study of Nitrogen Sources to Watersheds

In 1994, the USGS analyzed nitrogen sources to 107 watersheds. Potential sources included manure (both point and nonpoint sources), fertilizers, point sources, and atmospheric deposition. The ''manure'' source estimates include waste from both confined and unconfined animals. As may be expected, the USGS found that proportions of nitrogen originating from various sources differ according to climate, hydrologic conditions, land use, population, and physical geography. Results of the analysis for selected watersheds for the 1987 base year show that in some instances, manure nitrogen is a large portion of the total nitrogen added to the watershed. The study showed that, for following nine watersheds, more than 25 percent of nitrogen originates from manure: Trinity River, Texas; White River, Arkansas; Apalachicola River, Florida; Altamaha River, Georgia; Potomac River, Washington, D.C.; Susquehanna River, Pennsylvania; Platte River, Nebraska; Snake River, Idaho; and San Joaquin River, California. Of these, California, Texas, Florida, Arkansas, and Idaho have large populations of confined animals.

4. State Level Studies of Feedlot Pollutants Reaching Surface Waters

There are many studies demonstrating surface water impacts from animal feeding operations. These impacts have been documented for at least the past decade. For example, in 1991, the U.S. Fish and Wildlife Service (FWS) reported on suspected impacts from a large number of cattle feedlots on Tierra Blanca Creek, upstream of the Buffalo Lake National Wildlife Refuge in the Texas Panhandle. FWS found elevated aqueous concentrations of ammonia, chemical oxygen demand, coliform bacteria, chloride, nitrogen, and volatile suspended solids; they also found elevated concentrations of the feed additives copper and zinc in the creek sediment.

According to Arkansas' 1996 Water Quality Inventory Report, a publication of the Arkansas Department of Environmental Protection, water in the Grand Neosho basin only partially supports aquatic life. Land uses there, primarily confined animal feeding operations including poultry production and pasture management, are major sources of nutrients and chronic high turbidity. Pathogens sampled in the Muddy Fork Hydrologic Unit Area, in

the Arkansas River basin, also exceed acceptable limits for primary contact recreation (swimming). This problem was reported in the 1994 water quality inventory, and it, too, was traced to extensive poultry, swine, and dairy operations in the Moore's Creek basin. Essentially, all parts of the subwatershed are impacted by these activities. Currently, the Muddy Fork Hydrologic Unit Area Project is a USDA agricultural assistance, technology transfer, and demonstration project. A section 319 water quality monitoring operation is also ongoing in the hydrologic unit area.

In 1997, the Hoosier Environmental Council documented the reduction in biodiversity due to AFOs in a study of three Indiana stream systems. That study found that waters downstream of animal feedlots (mainly hog and dairy operations) contained fewer fish and a limited number of species of fish in comparison with reference sites. It also found excessive algal growth, altered oxygen content, and increased levels of ammonia, turbidity, pH, and total dissolved solids.

C. What Are the Potential and Observed Impacts?

Pollutants in animal manures can impair surface waters. Such impairments have resulted in fish kills; eutrophication and algal blooms; contamination of shellfish, and subsequent toxin and pathogen transmission up the food chain; increased turbidity and negative impacts to benthic organisms; and reduced biodiversity when rivers and streams become uninhabitable by resident species. These manure pollutants can also deteriorate soil quality and make it toxic to plants. In addition to these ecological impacts, pollutants in animal manures can present a range of risks to human health when they contaminate drinking water or shellfish, and when they are present in recreational waters.

1. Ecological Impacts

a. *Fish Kills and Other Fishery Impacts.* Fish kills are one of the most dramatic impacts associated with manure reaching surface water. Spills, dry-weather discharges, and runoff can carry pollutants in manure to rivers and streams and can result in serious fish kills. During the years 1987 through 1997, at least 47 incidents of fish kills have been associated with hog manure. Another 8 fish kills were attributed to poultry waste, and 2 with beef/dairy manure. An additional 20 fish kills were associated with animal manure for which one specific animal type was not identified. These incidents were reported by the Iowa Department of Natural Resources, the Maryland Department of the Environment, the Natural Resources Defense Council, several citizen's groups, and numerous newspapers. These incidents are not reflective of all states. In Illinois alone, records indicate that 171 fish kills attributable to manure discharges were investigated by Illinois Environmental Protection Agency personnel between 1979 and 1998. Thousands of fish are typically killed by one of these events.

Ammonia is highly toxic to aquatic life and is a leading cause of fish kills. In a May 1997 incident in Wabasha County, Minnesota, ammonia in a dairy cattle manure discharge killed 16,500 minnows and white suckers. Ammonia and other pollutants in manure exert a direct biochemical oxygen demand (BOD) on the receiving water. As ammonia is oxidized, dissolved oxygen is consumed. Moderate depressions of dissolved oxygen are associated with reduced species diversity, while more severe depressions can produce fish kills.

Nitrites pose additional risks to aquatic life: if sediments are enriched with nutrients, the concentrations of nitrites on the overlying water may be raised enough to cause nitrite poisoning or ''brown blood disease'' in fish.

Excess nutrients result in eutrophication (see section V.C.1.b, which follows). Eutrophication is associated with blooms of a variety of organisms that are toxic to both fish and humans. This includes the estuarine dinoflagellate Pfiesteria piscicida, which is implicated in several fish kills and fish disease events. Pfiesteria has been implicated as the primary causative agent of many major fish kills and fish disease events in North Carolina estuaries and coastal areas, as well as in Maryland and Virginia tributaries to the Chesapeake Bay. In 1997, hog operations were identified as a potential cause of a Pfiesteria outbreak in North Carolina rivers that resulted in 450,000 fish killed. Also that same year, poultry operations were linked to Pfiesteria outbreaks in the Pokomoke River and Kings Creek (both in Maryland) and in the Chesapeake Bay, in which tens of thousands of fish were killed.

The presence of estrogen and estrogen-like compounds in surface water has caused much concern. These hormones have been found in animal manures and runoff from fields where manure has been applied. The ultimate fate of hormones in the environment is unknown, although early studies indicate that common soil or fecal bacteria cannot metabolize estrogen. When present in high enough concentrations in the environment, hormones and other endocrine disruptors including pesticides are linked to reduced fertility, mutations, and the death of fish. Estrogen hormones have been implicated in widespread reproductive disorders in a variety of wildlife. There is evidence that fish in some streams are experiencing endocrine disruption and that contaminants including pesticides may be the cause, though there is no evidence linking these effects to CAFOs.

b. *Eutrophication and Algal Growth.* Eutrophication is the process in which phosphorus and nitrogen over-enrich water bodies and disrupt the balance of life in that water body. As a result, the excess nutrients cause fast-growing algae blooms. The 1998 National Water Quality Inventory indicates that excess algal growth is the seventh leading stressor in lakes, ponds, and reservoirs. Rapid growth of algae can lower the dissolved oxygen content of a water body to levels insufficient to support fish and invertebrates. Eutrophication can also affect phytoplankton and zooplankton population diversity, abundance, and biomass, and increase the mortality rates of aquatic species. Floating algal mats can reduce the penetration of sunlight in the water column and thereby limit growth of seagrass beds and other submerged vegetation. This in turn reduces fish and shellfish habitat. This reduction in submerged aquatic vegetation adversely affects both fish and shellfish populations.

Increased algal growth can also raise the pH of waterbodies, as algae consume dissolved carbon dioxide to support photosynthesis. This elevated pH can harm the gill epithelium of aquatic organisms. The pH may then drop rapidly at night, when algal photosynthesis stops. In extreme cases, such pH fluctuations can severely stress aquatic organisms.

Eutrophication is also a factor in the growth of toxic microorganisms, such as cyanobacteria (a toxic algae) and Pfiesteria piscicida, which can affect human health as well. Decay of algal blooms and night-time respiration can further depress dissolved oxygen levels, potentially leading to fish kills and reduced biodiversity. In addition, toxic algae such as cyanobacteria release toxins as they die, which can severely impact wildlife as well as humans. Researchers have documented stimulation of Pfiesteria growth by swine effluent discharges, and have shown that the organism's growth can be highly stimulated by both inorganic

and organic nitrogen and phosphorus enrichments.

c. *Wildlife Impacts.* As noted earlier, reduction in submerged aquatic vegetation due to algal blooms is the leading cause of biological decline in Chesapeake Bay, adversely affecting both fish and shellfish populations. In marine ecosystems, blooms known as red or brown tides have caused significant mortality in marine mammals. In freshwater, cyanobacterial toxins have caused many incidents of poisoning of wild and domestic animals that have consumed impacted waters.

Even with no visible signs of the algae blooms, shellfish such as oysters, clams and mussels can carry the toxins produced by some types of algae in their tissue. Shellfish are filter feeders which pass large volumes of water over their gills. As a result, they can concentrate a broad range of microorganisms in their tissues. Concentration of toxins in shellfish provides a pathway for pathogen transmission to higher trophic organisms. Information is becoming available to assess the health effects of contaminated shellfish on wildlife receptors. Earlier this year, the death of over 400 California sea lions was linked to ingestion of mussels contaminated by a bloom of toxic algae. Previous incidents associated the deaths of manatees and whales with toxic and harmful algae blooms.

In August 1997, the National Oceanic and Atmospheric Administration (NOAA) released The 1995 National Shellfish Register of Classified Growing Waters. The register characterizes the status of 4,230 shellfish-growing water areas in 21 coastal states, reflecting an assessment of nearly 25 million acres of estuarine and non-estuarine waters. NOAA found that 3,404 shellfish areas had some level of impairment. Of these, 110 (3 percent) were impaired to varying degrees by feedlots, and 280 (8 percent) were impaired by ''other agriculture'' which could include land where manure is applied.

Avian botulism and avian cholera have killed hundreds of thousands of migratory waterfowl in the past. Although outbreaks of avian botulism have occurred since the beginning of the century, most occurrences have been reported in the past twenty years, which coincides with the trend toward fewer and larger AFOs. The connection between nutrient runoff, fish kills, and subsequent outbreaks of avian botulism was made in 1999 at California's Salton Sea, when almost 8 million fish died in one day. The fish kill was associated with runoff from surrounding farms, which carried nutrients and salts into the Salton Sea. Those nutrients caused algae blooms which in turn lead to large and sudden fish kills. Since the 1999 die off, the number of endangered brown pelicans infected with avian botulism increased to about 35 birds a day. In addition, bottom feeding birds can be quite susceptible to metal toxicity, because they are attracted to shallow feedlot wastewater ponds and waters adjacent to feedlots. Metals can remain in aquatic ecosystems for long periods of time because of adsorption to suspended or bed sediments or uptake by aquatic biota.

Reduction in biodiversity due to AFOs has been documented in a 1997 study of three Indiana stream systems. That study shows that waters downstream of animal feedlots (mainly hog and dairy operations) contained fewer fish and a limited number of species of fish in comparison with reference sites. The study also found excessive algal growth, altered oxygen content, and increased levels of ammonia, turbidity, pH, and total dissolved solids. Multi-generation animal studies have found decreases in birth weight, post-natal growth, and organ weights among mammals prenatally exposed to nitrite. Finally, hormones and pesticides have been implicated in widespread reproductive disorders in a variety of wildlife.

d. *Other Aquatic Ecosystem Imbalances.* Changes to the pH balance of surface water also threaten the survival of the fish and other aquatic organisms. Data from Sampson County, North Carolina show that ''ammonia rain'' has increased as the hog industry has grown, with ammonia levels in rain more than doubling between 1985 and 1995. In addition, excess nitrogen can contribute to water quality decline by increasing the acidity of surface waters.

In fresh waters, increasing salinity can also disrupt the balance of the ecosystem, making it difficult for resident species to remain. Salts also contribute to the degradation of drinking water supplies.

Trace elements (e.g., arsenic, copper, selenium, and zinc) may also present ecological risks. Antibiotics, pesticides, and hormones may have low-level, long-term ecosystem effects.

2. Drinking Water Impacts

Nitrogen in manure is easily transformed into nitrate form, which can be transported to drinking water sources and present a range of health risks. In 1990, PA found that nitrate is the most widespread agricultural contaminant in drinking water wells, and estimated that 4.5 million people are exposed to elevated nitrate levels from wells. In 1995, several private wells in North Carolina were found to be contaminated with nitrates at levels 10 times higher than the State's health standard; this contamination was linked with a nearby hog operation. The national primary drinking water standard (Maximum Contaminant Level, or MCL) for nitrogen (nitrate, nitrite) is 10 milligrams per liter (mg/L). In 1982, nitrate levels greater than 10 mg/L were found in 32 percent of the wells in Sussex County, Delaware; these levels were associated with local poultry operations. In southeastern Delaware and the Eastern Shore of Maryland, where poultry production is prominent, over 20 percent of wells were found to have nitrate levels exceeding 10 mg/L. Nitrate is not removed by conventional drinking water treatment processes. Its removal requires additional, relatively expensive treatment units.

Algae blooms triggered by nutrient pollution can affect drinking water by clogging treatment plant intakes, producing objectionable tastes and odors, and increasing production of harmful chlorinated byproducts (e.g., trihalomethanes) by reacting with chlorine used to disinfect drinking water. As aquatic bacteria and other microorganisms degrade the organic matter in manure, they consume dissolved oxygen. This can lead to foul odors and reduce the water's value as a source of drinking water. Increased organic matter in drinking water sources can also lead to excessive production of harmful chlorinated byproducts, resulting in higher drinking water treatment costs.

Pathogens can also threaten drinking water sources. Surface waters are typically expected to be more prone than groundwater to contamination by pathogens such as Escherichia coli and Cryptosporidium parvum. However, groundwater in areas of sandy soils, limestone formations, or sinkholes are particularly vulnerable. In a 1997 survey of drinking water standard violations in six states over a four-year period, the U.S. General Accounting Office noted in its 1997 report Drinking Water: Information on the Quality of Water Found at Community Water Systems and Private Wells that bacterial standard violations occurred in up to 6 percent of community water systems each year and in up to 42 percent of private wells. (Private wells are more prone than public wells to contamination, since they tend to be shallower and therefore more susceptible to contaminants leaching from the surface.) In cow pasture areas of Door County, Wisconsin, where a thin topsoil layer is underlain by fractured limestone bedrock, groundwater wells have

commonly been shut down due to high bacteria levels.

Each of these impacts can result in increased drinking water treatment costs. For example, California's Chino Basin estimates a cost of over $1 million per year to remove the nitrates from drinking water due to loadings from local dairies. Salt load into the Chino Basin from local dairies is over 1,500 tons per year, and the cost to remove that salt by the drinking water treatment system ranges from $320 to $690 for every ton. In Iowa, Des Moines Water Works planned to spend approximately $5 million in the early 1990's to install a treatment system to remove nitrates from their main sources of drinking water, the Raccoon and Des Moines Rivers. Agriculture was cited as a major source of the nitrate contamination, although the portion attributable to animal waste is unknown. In Wisconsin, the City of Oshkosh has spent an extra $30,000 per year on copper sulfate to kill the algae in the water it draws from Lake Winnebago. The thick mats of algae in the lake have been attributed to excess nutrients from manure, commercial fertilizers, and soil. In Tulsa, Oklahoma, excessive algal growth in Lake Eucha is associated with poultry farming. The city spends $100,000 per year to address taste and odor problems in the drinking water.

3. Human Health Impacts

Human and animal health impacts are primarily associated with drinking contaminated water, contact with contaminated water, and consuming contaminated shellfish.

a. *Nutrients.* The main hazard to human health from nutrients is elevated nitrate levels in drinking water. In particular, infants are at risk from nitrate poisoning (also referred to as methemoglobinemia or ''blue baby syndrome''), which results in oxygen starvation and is potentially fatal. Nitrate toxicity is due to its metabolite nitrite, which is formed in the environment, in foods, and in the human digestive system. In addition to blue baby syndrome, low blood oxygen due to methemoglobinemia has also been linked to birth defects, miscarriages, and poor health in humans and animals. These effects are exacerbated by concurrent exposure to many species of bacteria in water.

Studies in Australia compiled in a 1993 review by Bruning-Fann and Kaneene showed an increased risk of congenital malformations with consumption of high-nitrate groundwater. Multi-generation animal studies have found decreases in birth weight and post-natal growth and organ weights associated with nitrite exposure among prenatally exposed mammals. Nitrate-and nitrite-containing compounds also have the ability to cause hypotension or circulatory collapse. Nitrate metabolites such as N-nitroso compounds (especially nitrosamines) have been linked to severe human health effects such as gastric cancer.

Eutrophication can also affect human health by enhancing growth of harmful algal blooms that release toxins as they die. In marine ecosystems, harmful algal blooms such as red tides can result in human health impacts via shellfish poisoning and recreational contact. In freshwater, blooms of cyanobacteria (blue-green algae) may pose a serious health hazard to humans via water consumption. When cyanobacterial blooms die or are ingested, they release water-soluble compounds that are toxic to the nervous system and liver. Algal blooms can also increase production of harmful chlorinated byproducts (e.g., trihalomethanes) by reacting with chlorine used to disinfect drinking water. These substances can result in increased health risks.

b. Pathogens. Livestock manure has been identified as a potential source of pathogens by public health officials. Humans may be exposed to pathogens via consumption of contaminated drinking water and shellfish, or by contact and incidental ingestion during recreation in contaminated waters. Relatively few microbial agents are responsible for the majority of human disease outbreaks from water-based exposure routes. Intestinal infections are the most common type of waterborne infection, and affect the most people. A May, 2000 outbreak of Escherichia coli O157:H7 in Walkerton, Ontario resulted in at least seven deaths and 1,000 cases of intestinal problems; public health officials theorize that flood waters washed manure contaminated with E. coli into the town's drinking water well.

A study for the period 1989 to 1996 revealed that infections caused by the protozoa Giardia sp. and Cryptosporidium parvum were the leading cause of infectious water-borne disease outbreaks in which an agent was identified. C. parvum is particularly associated with cows, and can produce gastrointestinal illness, with symptoms such as severe diarrhea. Healthy people typically recover relatively quickly from gastrointestinal illnesses such as cryptosporidiosis, but such diseases can be fatal in people with weakened immune systems. This subpopulation includes children, the elderly, people with HIV infection, chemotherapy patients, and those taking medications that suppress the immune system. In Milwaukee, Wisconsin in 1993, C. parvum contamination of a public water supply caused more than 100 deaths and an estimated 403,000 illnesses. The source was not identified, but possible sources include runoff from cow manure application sites.

In 1999, an E. coli outbreak occurred at the Washington County Fair in New York State. This outbreak, possibly the largest waterborne outbreak of E. coli O157:H7 in U.S. history, took the lives of two fair attendees and sent 71 others to the hospital. An investigation identified 781 persons with confirmed or suspected illness related to this outbreak. The outbreak is thought to have been caused by contamination of the Fair's Well 6 by either a dormitory septic system or manure runoff from the nearby Youth Cattle Barn.

Contact with pathogens during recreational activities in surface water can also result in infections of the skin, eye, ear, nose, and throat. In 1989, ear and skin infections and intestinal illnesses were reported in swimmers as a result of discharges from a dairy operation in Wisconsin.

As discussed in the previous section, excess nutrients result in eutrophication, which is associated with the growth of a variety of organisms that are toxic to humans either through ingestion or contact. This includes the estuarine dinoflagellate Pfiesteria piscicida. While Pfiesteria is primarily associated with fish kills and fish disease events, the organism has also been linked with human health impacts through dermal exposure. Researchers working with dilute toxic cultures of Pfiesteria exhibited symptoms such as skin sores, severe headaches, blurred vision, nausea/vomiting, sustained difficulty breathing, kidney and liver dysfunction, acute short-term memory loss, and severe cognitive impairment. People with heavy environmental exposure have exhibited symptoms as well. In a 1998 study, such environmental exposure was definitively linked with cognitive impairment, and less consistently linked with physical symptoms.

Even with no visible signs of the algae blooms, shellfish such as oysters, clams and mussels can carry the toxins produced by some types of algae in their tissue. These can then affect people who eat the contaminated shellfish. The 1995 National Shellfish Register of Classified Growing Waters published by the National Oceanic and Atmospheric Administration (NOAA) identifies over 100 shellfish bed impairments (shellfish not approved for harvest) due to feedlots.

c. Trace Elements. Some of the trace elements in manure are essential nutrients for human physiology; however, they can induce toxicity at elevated concentrations. These elements include the feed additives zinc, arsenic, copper, and selenium. Although these elements are typically present in relatively low concentrations in manure, they are of concern because of their ability to persist in the environment and to bioconcentrate in plant and animal tissues. These elements could pose a hazard if manure is overapplied to land.

Trace elements are associated with a variety of illnesses. For example, arsenic is carcinogenic to humans, based on evidence from human studies; some of these studies have found increased skin cancer and mortality from multiple internal organ cancers in populations who consumed drinking water with high levels of inorganic arsenic. Arsenic is also linked with noncancer effects, including hyperpigmentation and possible vascular complications. Selenium is associated with liver dysfunction and loss of hair and nails, and zinc can result in changes in copper and iron balances, particularly copper deficiency anemia.

d. Odors. Odor is a significant concern because of its documented effect on moods, such as increased tension, depression, and fatigue. Odor also has the potential for vector attraction, and has been associated with a negative impact on property values. Additionally, many of the odor-causing compounds in manure can cause physical health impacts. For example, hydrogen sulfide is toxic, and ammonia gas is a nasal and respiratory irritant.

4. Recreational Impacts

As discussed above, CAFO pollutants contribute to the increase in turbidity, increase in eutrophication and algal blooms, and reduction of aquatic populations in rivers, lakes, and estuaries. Impaired conditions interfere with recreational activities and aesthetic enjoyment of these water bodies. Recreational activities include fishing, swimming, and boating. Fishing is reduced when fish populations decrease. Swimming is limited by increased risk of infection when pathogens are present. Boating and aesthetic enjoyment decline with the decreased aesthetic appeal caused by loss of water clarity and water surfaces clogged by algae. These impacts are more fully discussed in Section XI of this preamble.

VI. What Are Key Characteristics of the Livestock and Poultry Industries?

A. Introduction and Overview

1. Total Number and Size of Animal Confinement Operations

USDA reports that there were 1.1 million livestock and poultry farms in the United States in 1997. This number includes all operations that raise beef, dairy, pork, broilers, egg layers, and turkeys, and includes both confinement and non-confinement (grazing and rangefed) production. Only operations that raise animals in confinement will be subject to today's proposed regulations.

For many of the animal sectors, it is not possible to precisely determine what proportion of the total livestock operations are confinement operations and what proportion are grazing operations only. Data on the number of beef and hog operations that raise animals in confinement are available from USDA. Since most large dairies have milking parlors, EPA assumes that all dairy operations are potentially confinement operations. In the poultry sectors, there are few small non-confinement operations and EPA assumes that all poultry operations confine animals. EPA's analysis focuses on the largest facilities in these sectors only.

Using available 1997 data from USDA, EPA estimates that there are about 376,000 AFOs that raise or house animals in confinement, as defined by the existing regulations (Table 6–1). Table 6–1 presents the estimated number of AFOs and the corresponding animal inventories for 1997 across select size groupings. These estimates are based on the number of ''animal units'' (AU) as defined in the existing regulations at 40 CFR 122, with the addition of the revisions that are being proposed for immature animals and chickens. Data shown in Table 6–1 are grouped by operations with more than 1,000 AU and operations with fewer than 300 AU.

As shown in Table 6–1, there were an estimated 12,660 AFOs with more that 1,000 AU in 1997 that accounted for about 3 percent of all confinement operation. In most sectors, these larger-sized operations account for the majority of animal production. For example, in the beef, turkey and egg laying sectors, operations with more than 1,000 AU accounted for more than 70 percent of all animal inventories in 1997; operations with more than 1,000 AU accounted for more than 50 percent of all hog, broiler, and heifer operations (Table 6–1). In contrast, operations with fewer than 300 AU accounted for 90 percent of all operations, but a relatively smaller share of animal production.

USDA personnel have reviewed the data and assumptions used to derive EPA's estimates of the number of confinement operations. Detailed information on how EPA estimated the number of AFOs that may be subject to today's proposed regulations can be found in the Development Document for the Proposed Revisions to the National Pollutant Discharge Elimination System Regulation and the Effluent Guidelines for Concentrated Animal Feeding Operations (referred to as the ''Development Document'').

TABLE 6–1.—NUMBER OF AFOS AND ANIMAL ON-SITE, BY SIZE GROUP, 1997

Sector/Size category	Total AFOs	>1000 AU [1]	<300 AU	Total	>1000 AU	<300 AU
	(Number of operations)			(Number of animals, 1000's)		
Cattle	106,080	2,080	102,000	26,840	22,790	2,420
Veal	850	10	640	270	10	210
Heifers	1,250	300	200	850	450	80
Dairy	116,870	1,450	109,740	9,100	2.050	5,000
Hogs: GF [2]	53,620	1,670	48,700	18,000	9,500	2,700
Hogs: FF [2]	64,260	2,420	54,810	38,740	21,460	5,810
Broilers	34,860	3,940	20,720	1,905,070	1,143,040	476,270
Layers: wet [3]	3,110	50	2,750	392,940	275,060	58,940
Layers: dry [3]	72,060	590	70,370	392,940	275,060	58,940
Turkeys	13,720	370	12,020	112,800	95,880	2,260

TABLE 6–1.—NUMBER OF AFOS AND ANIMAL ON-SITE, BY SIZE GROUP, 1997—Continued

Sector/Size category	Total AFOs	>1000 AU [1]	<300 AU	Total	>1000 AU	<300 AU
Total [4]	375,700	12,660	336,590	NA	NA	NA

Source: Derived by USDA from published USDA/NASS data, including 1997 Census of Agriculture. In some cases, available data are used to interpolate data for some AU size categories (see EPA's Development Document). Data for veal and heifer operations are estimated by USDA. Totals may not add due to rounding.

[1] As defined for the proposed CAFO regulations, one AU is equivalent to: one slaughter or feeder cattle, calf or heifer; 0.7 mature dairy cattle; 2.5 hogs (over 55 pounds) or 5 nursery pigs; 55 turkeys; and 100 chickens regardless of the animal waste system used.

[2] ''Hogs: FF'' are farrow-finish (includes breeder and nursery pigs); ''Hogs: GF'' are grower-finish only.

[3] ''Layers: wet'' are operations with liquid manure systems; ''Layers: dry'' are operations with dry systems.

[4] ''Total AFOs'' eliminates double counting of operations with mixed animal types. Based on survey level Census data for 1992, operations with mixed animal types account for roughly 25 percent of total AFOs.

2. Total Number of CAFOs Subject to the Proposed Regulations

Table 6–2 presents the estimated number of operations that would be defined as a CAFO under each of the two regulatory alternatives being proposed. The ''two-tier structure'' would define as CAFOs all animal feeding operations with more than 500 AU. The ''three-tier structure'' would define as CAFOs all animal feeding operations with more than 1,000 AU and any operation with more than 300 AU, if they meet certain ''risk-based'' conditions, as defined in Section VII. Table 6–2 presents the estimated number of CAFOs in terms of number of operations with more than 1,000 AU and operations for each co-proposed middle category (operations with between 500 and 1,000 AU and between 300 and 1,000 AU, respectively).

Based on available USDA data for 1997, EPA estimates that both proposed alternative structures would regulate about 12,660 operations with more than 1,000 AU. This estimate adjusts for operations with more than a single animal type. The two alternatives differ in the manner in which operations with less than 1,000 AU would be defined as CAFOs and, therefore, subject to regulation, as described in Section VII. As shown in Table 6–2, in addition to the 12,660 facilities with more than 1,000 AU, the two-tier structure at 500 AU threshold would regulate an additional 12,880 operations with between 500 and 1,000 AU. Including operations with more than 1,000 AU, the two-tier structure regulates a total of 25,540 AFOs that would be subject to the proposed regulations (7 percent of all AFOs).

Under the three-tier structure, an estimated 39,330 operations would be subject to the proposed regulations (10 percent of all AFOs), estimated as the total number of animal confinement operations with more than 300 AU. See Table 6–1. Of these, EPA estimates that a total of 31,930 AFOs would be defined as CAFOs (9 percent of all AFOs) and would need to obtain a permit (Table 6–2), while an estimated 7,400 operations would certify that they do not need to obtain a permit. Among those operations needing a permit, an estimated 19,270 operations have between 300 to 1,000 AU. For more information, see the Economic Analysis.

TABLE 6–2. NUMBER OF POTENTIAL CAFOS BY SELECT REGULATORY ALTERNATIVE, 1997

Sector/Size category	''Two-tier''						''Three-Tier''	
	>300 AU	>500 AU	>750 AU	>300 AU	>500 AU	>750AU	>300 AU	
	(#Operations)			(%Total)			(#)	(%Total)
Cattle	4,080	3,080	2,480	4	3	2	3,210	3
Veal	210	90	40	25	10	4	140	16
Heifers	1,050	800	420	84	64	34	980	78
Dairy	7,140	3,760	2,260	6	3	2	6,480	6
Hogs: GF [1]	4,920	2,690	2,300	9	5	4	2,650	5
Hogs: FF [1]	9,450	5,860	3,460	15	9	5	5,700	9
Broilers	14,140	9,780	7,780	41	28	22	13,740	39
Layers: wet [2]	360	360	210	12	12	7	360	12
Layers: dry [2]	1,690	1,280	1,250	2	2	2	1,650	2
Turkeys	2,100	1,280	740	15	9	5	2,060	15
Total [3]	39,320	25,540	19,100	10.5	6.8	5.1	31,930	8.5

Source: See Table 6–1.

[1] FF =farrow-finish (includes breeder and nursery pigs); GF=grower finish.

[2] ''Layers: wet'' are operations with liquid manure systems. ''Layers: dry'' are operations with dry systems.

[3] ''Total'' eliminates double counting of operations with mixed animal types (see Table 6–1).

EPA estimated the number of operations that may be defined as CAFOs under the three-tier structure using available information and compiled data from USDA, State Extension experts, and agricultural professionals. These estimates rely on information about the percentage of operations in each sector that would be impacted by the ''risk-based'' criteria described in Section VII. In some cases, this information is available on a state or regional basis only and is extrapolated to all operations nationwide. EPA's estimates reflect information from a majority of professional experts in the field. Greater weight is given to information obtained by State Extension agents, since they have broader knowledge of the industry in their state. More detailed information on how EPA estimated the number of operations that may be affected by the proposed regulations under the three-

tier structure is available in the rulemaking record and in the Development Document.

EPA is also requesting comment on two additional options for the scope of the rule. One of these is an alternative two-tier structure with a threshold of 750 AU. Under this option, an estimated 19,100 operations, adjusting for operations with more than a single animal type, would be defined as CAFOs. This represents about 5 percent of all CAFOs, and would affect an estimated 2,930 beef, veal, and heifer operations, 2,260 dairies, and 5,750 swine and 9,980 poultry operations (including mixed operations). Under the other alternative, a variation of the three-tier structure being co-proposed today, the same 39,320 operations with 300 AU or greater would potentially be defined as CAFOs. However, the certification conditions for being defined as a CAFO would be different for operations with 300 to 1,000 AU (as described later in Section VII). EPA has not estimated how many operations would be defined as CAFOs under this alternative three-tier approach, although EPA expects that it would be fewer than the 31,930 estimated for the three-tier approach being proposed today. If after considering comments, EPA decides to further explore this approach, it will conduct a full analysis of the number of potentially affected operations.

EPA does not anticipate that many AFOs with less than 500 AU (two-tier structure) or 300 AU (three-tier structure) will be subject to the proposed requirements. In the past 20 years, EPA is aware of very few AFOs that have been designated as CAFOs. Based on available USDA analyses that measure excessive nutrient application on cropland in some production areas and other farm level data by sector, facility size and region, EPA estimates that designation may bring an additional 50 operations under the proposed two-tier structure each year nationwide. EPA assumed this estimate to be cumulative such that over a 10-year period approximately 500 AFOs may become designated as CAFOs and therefore subject to the proposed regulations. EPA expects these operations to consist of beef, dairy, farrow-finish hog, broiler and egg laying operations that are determined to be significant contributors to water quality impairment. Under the three-tier structure, EPA estimates that fewer operations would be designated as CAFOs, with 10 dairy and hog operations may be designated each year, or 100 operations over a 10-year period. Additional information is provided in the Economic Analysis.

EPA expects that today's proposed regulations would mainly affect livestock and poultry operations that confine animals. In addition to CAFOs, however, the proposed regulations would also affect businesses that contract out the raising or finishing production phase to a CAFO but exercise ''substantial operational control'' over the CAFO (as described in Section VII.C.6).

EPA expects that affected businesses may include packing plants and slaughtering facilities that enter into a production contract with a CAFO. Under a production contract, a contractor (such as a processing firm, feed mill, or other animal feeding operation) may either own the animals and/or may maintain control over the type of production practices used by the CAFO. Processor firms that enter into a marketing contract with a CAFO are not expected to be subject to co-permitting requirements since the mechanism for ''substantial operational control'' generally do not exist. Given the types of contract arrangements that are common in the hog and poultry industries, EPA expects that packers/slaughterers in these sectors may be subject to the proposed co-permitting requirements.

As discussed later in Sections VI.D.1 and VI.E.1, EPA estimates that 94 meat packing plants that slaughter hogs and 270 poultry processing facilities may be subject to the proposed co-permitting requirements. Other types of processing firms, such as further processors, food manufacturers, dairy cooperatives, and renderers, are not expected to be affected by the co-permitting requirements since these operations are further up the marketing chain and do not likely contract with CAFOs to raise animals. Fully vertically integrated companies (e.g., where the packer owns the CAFO) are not expected to require a co-permit since the firm as the owner of the CAFO would require only a single permit. EPA solicits comment on these assumptions as part of today's rulemaking proposal. EPA also expects that non-CAFO, crop farmers who receive manure from CAFOs would be affected under one of the two co-proposed options relating to offsite management of manure (see Section VII).

Additional information is provided in the Economic Impact Analysis of Proposed Effluent Limitations Guidelines and National Pollutant Discharge Elimination System for Concentrated Animal Feeding Operations (referred to as ''Economic Impact Analysis'').

3. Manure and Manure Nutrients Generated Annually at AFOs

USDA's National Resources Conservation Service (NRCS) estimates that 128.2 billion pounds of manure are ''available for land application from confined AU'' from the major livestock and poultry sectors. EPA believes these estimates equate to the amount of manure that is generated at animal feeding operations since USDA's methodology accounts for all manure generated at confinement facilities. USDA reports that manure nutrients available for land application totaled 2.6 billion pounds of nitrogen and 1.4 billion pounds of phosphorus in 1997 (Table 6–3). USDA's estimates do not include manure generated from other animal agricultural operations, such as sheep and lamb, goats, horses, and other farm animal species.

TABLE 6–3. MANURE AND MANURE NUTRIENTS ''AVAILABLE FOR LAND APPLICATION'', 1997

Sector	USDA estimates: ''available for application'' from confined AU'' [a]			EPA estimates: Percentage share by facility size group [b]			
	Total manure	Total nitrogen	Total phos-phorus	>1000 AU	>750 AU	>500 AU	>300AU
	(bill. lbs)	(Million pounds)		(Percent of total manure nutrients applied)			
Cattle [c]	32.9	521	362	83	85	86	90
Dairy	45.5	636	244	23	31	37	43
Hogs	16.3	274	277	55	63	69	78
All Poultry	33.5	1,153	554	49	66	77	90

TABLE 6–3. MANURE AND MANURE NUTRIENTS ''AVAILABLE FOR LAND APPLICATION'', 1997—Continued

Sector	USDA estimates: ''available for application'' from confined AU'' [a]			EPA estimates: Percentage share by facility size group [b]			
	Total manure	Total nitrogen	Total phos-phorus	>1000 AU	>750 AU	>500 AU	>300AU
Total	128.2	2,583	1,437	49	58	64	72

Source:

[a] Manure and nutrients are from USDA/NRCS using 1997 Census of Agriculture and procedures documented developed by USDA. Numbers are ''dry state'' and reflect the amount of manure nutrient ''available for application from confined AU'' and are assumed by EPA to coincide with manure generated at confined operations.

[b] Percentage shares are based on the share of animals within each facility size group for each sector (shown in Table 6–1) across three facility size groups.

[c] ''Cattle'' is the sum of USDA's estimate for livestock operations ''with fattened cattle'' and ''with cattle other than fattened cattle and milk cows.''

The contribution of manure and manure nutrients varies by animal type. Table 6–3 shows that the poultry industry was the largest producer of manure nutrients in 1997, accounting for 45 percent (1.2 billion pounds) of all nitrogen and 39 percent (0.6 billion pounds) of all phosphorus available for land application that year. Among the poultry sectors, EPA estimates that approximately 55 percent of all poultry manure was generated by broilers, while layers generated 20 percent and turkeys generated 25 percent. The dairy industry was the second largest producer of manure nutrients, generating 25 percent (0.6 billion pounds) of all nitrogen and 17 percent (0.2 billion pounds) of all phosphorus (Table 6–3). Together, the hog and beef sectors accounted for about one-fourth of all nitrogen and nearly 40 percent of all phosphorus from manure.

Table 6–3 shows EPA's estimate of the relative contribution of manure generated by select major facility size groupings, including coverage for all operations with more than 1,000 AU, all operations with more than 750 AU or 500 AU (two-tier structure), and all operations with more than 300 AU (three-tier structure). EPA estimated these shares based on the share of animals within each facility size group for each sector, as shown in Table 6–1. Given the number of AFOs that may be defined as CAFOs and subject to the proposed regulations (Table 6–1), EPA estimates that the proposed effluent guidelines and NPDES regulations will regulate 5 to 7 percent (two-tier structure) to 10 percent (three-tier structure) percent of AFOs nationwide. Coverage in terms of manure nutrients generated will vary by the proposed regulatory approach. As shown in Table 6–3, under the 500 AU two-tier structure, EPA estimates that the proposed requirements will capture 64 percent of all CAFO manure; under the 750 AU two-tier structure, EPA estimates that the proposed requirements will capture 58 percent of all CAFO manure. Under the three-tier structure, EPA estimates that the proposed requirements will capture 72 percent of all CAFO manure generated annually (Table 6–3). The majority of this coverage (49 percent) is attributable to regulation of operations with more than 1,000 AU.

Additional information on the constituents found in livestock and poultry manure and wastewater is described in Section V. Information on USDA's estimates of nutrients available for land application and on the relative consistency of manure for the main animal types is provided in the Development Document.

B. Beef Subcategory

1. General Industry Characteristics

Cattle feedlots are identified under NAICS 112112 (SIC 0211, beef cattle feedlots) and NAICS 112111, beef cattle ranching and farming (SIC 0212, beef cattle, except feedlots). This sector comprises establishments primarily engaged in feeding cattle and calves for fattening, including beef cattle feedlots and feed yards (except stockyards for transportation).

The beef cattle industry can be divided into four separate producer segments:

- *Feedlot operations* fatten or ''finish'' feeder cattle prior to slaughter and constitute the final phase of fed cattle production. Calves usually begin the finishing stage after 6 months of age or after reaching at least 400 pounds. Cattle are typically held for 150 to 180 days and weigh between 1,150 to 1,250 pounds (for steers) or 1,050 to 1,150 pounds (for heifers) at slaughter.
- *Veal operations* raise male dairy calves for slaughter. The majority of calves are ''special fed'' or raised on a low-fiber diet until about 16 to 20 weeks of age, when they weigh about 450 pounds.
- *Stocker or backgrounding operations* coordinate the flow of animals from breeding operations to feedlots by feeding calves after weaning and before they enter a feedlot. Calves are kept between 60 days to 6 months or until they reach a weight of about 400 pounds.
- *Cow-calf producers* typically maintain a herd of mature cows, some replacement heifers, and a few bulls, and breed and raise calves to prepare them for fattening at a feedlot. Calves typically reach maturity on pasture and hay and are usually sold at weaning. Cow-calf operators may also retain the calves and continue to raise them on pasture until they reach 600 to 800 pounds and are ready for the feedlot.

Animal feeding operations in this sector that may be affected by today's proposed regulations include facilities that confine animals. Information on the types of facilities in this sector that may be covered by the proposed regulations is provided in Section VII.

USDA reports that there were more than 106,000 beef feedlots in 1997, with a total inventory of 26.8 million cattle (Table 6.1). Due to ongoing consolidation in the beef sector, the total number of operations has dropped by more than one-half since 1982, when there were 240,000 operations raising fed cattle. EPA also estimates that there were 850 veal operations raising 0.3 million head and 1,250 stand-alone heifer operations raising 0.9 million head in 1997. Only a portion of these operations would be subject to the proposed regulations.

As shown in Table 6–2, under the two-tier structure, EPA estimates that there are 3,080 beef feedlots with more than 500 head (500 AU of beef cattle). EPA also estimates that there are about 90 veal operations and 800 heifer operations that may be subject to the proposed regulations. Under the three-tier structure, EPA estimates that 3,210 beef feedlots, 140 veal and 980 heifer

operations with more than 300 head (300 AU) would meet the ''risk-based'' conditions described in Section VII and thus require a permit.

EPA expects that few operations that confine fewer than 500 AU of beef, veal, or heifers, would be designated by the permit authority. For the purpose of estimating costs, EPA assumes that no beef, veal, or heifer operations would be designated as CAFOs and subject to the proposed regulations under the three-tier structure. Under the two-tier structure, EPA assumes that about four beef feedlots located in the Midwest would be designated annually, or 40 beef feedlots projected over a 10-year period.

The cattle feeding industry is concentrated in the Great Plains and Midwestern states. The majority of feedlots are located in the Midwest. However, the majority of large feedlots (*i.e.,* operations with more than 1,000 head) are located in four Great Plains states—Texas, Kansas, Nebraska, and Colorado—accounting for nearly 80 percent of annual fed cattle marketings. Table 6–1 shows that, although the majority of beef feedlots (over 98 percent) have capacity below 1,000 head, larger feedlots with more than 1,000 head accounted for the majority of animal production. In 1997, feedlots with more than 1,000 head accounted for 85 percent of the nation's fed cattle inventory and sales. Cattle feeding has become increasingly concentrated over the last few decades. Feedlots have decreased in number, but increased in capacity. The decline in the number of operations is mostly among feedlots with less than 1,000 head.

The majority of cattle and calves are sold through private arrangements and spot market agreements. Production contracting is not common in the beef sector. Most beef sector contracts are marketing based where operations agree to sell packers a certain amount of cattle on a predetermined schedule. Production contracts are uncommon, but may be used to specialize in a single stage of livestock production. For example, custom feeding operations provide finish feeding under contract. Backgrounding or stocker operations raise cattle under contract from the time the calves are weaned until they are on a finishing ration in a feedlot. As shown by 1997 USDA data of animal ownership, production contracts account for a relatively small share (4 percent) of beef production. These same data show that production contracts are used to grow replacement breeding stock.

Despite the limited use of contracts for the finishing and raising phase of production, EPA expects that no businesses, other than the CAFO where the animals are raised, will be subject to the proposed co-permitting requirements. Reasons for this assumption are based on data from USDA on the use of production contracts and on animal ownership at operations in this sector. Additional information is provided in Section 2 of the Economic Analysis. EPA is seeking comment on this assumption as part of today's notice.

2. Farm Production and Waste Management Practices

Beef cattle may be kept on unpaved, partly paved, or totally paved lots. The majority of beef feedlots use unpaved open feedlots. In open feedlots, protection from the weather is often limited to a windbreak near the fence in the winter and/or sunshade in the summer; however, treatment facilities for the cattle and the hospital area are usually covered. Confinement feeding barns with concrete floors are also sometimes used at feedlots in cold or high rainfall areas, but account for only 1 to 2 percent of all operations. Smaller beef feedlots with less than 1,000 head, especially in areas with severe winter weather and high rainfall, may use open-front barns, slotted floor housing, or housing with sloped gutters.

Wastes produced from beef operations include manure, bedding, and contaminated runoff. Paved lots generally produce more runoff than unpaved lots. Unroofed confinement areas typically have a system for collecting and confining contaminated runoff. Excessively wet lots result in decreased animal mobility and performance. For this reason, manure is often stacked into mounds for improved drainage and drying, as well as providing dry areas for the animals. If the barn has slotted floors, the manure is collected beneath slotted floors, and is scraped or flushed to the end of the barn where it flows or is pumped to a storage area for later application via irrigation or transported in a tank wagon. Waste may also be collected using flushing systems.

Waste from a beef feedlot may be handled as a solid or liquid. Solid manure storage can range from simply constructed mounds within the pens to large stockpiles. In some areas, beef feedlot operations may use a settling basin to remove bulk solids from the pen runoff, reducing the volume of solids prior to entering a storage pond, therefore increasing storage capacity. A storage pond is typically designed to hold the volume of manure and wastewater accumulated during the storage period, including additional storage volume for normal precipitation, minus evaporation, and storage volume to contain a 25-year, 24-hour storm event. An additional safety volume termed ''freeboard'' is also typically built into the storage pond design.

Veal are raised almost exclusively in confinement housing, generally using individual stalls or pens. Veal calves are raised on a liquid diet and their manure is highly liquid. Manure is typically removed from housing facilities by scraping or flushing from collection channels and then flushing or pumping into liquid waste storage structures, ponds, or lagoons.

Waste collected from the feedlot may be transported within the site to storage, treatment, and use or disposal areas. Solids and semisolids are typically transported using mechanical conveyance equipment, pushing the waste down alleys, and transporting the waste in solid manure spreaders. Flail-type spreaders, dump trucks, or earth movers may also be used to transport these wastes. Liquids and slurries are transferred through open channels, pipes, or in a portable liquid tank. The most common form of utilization is land application. However, the amount of cropland and pastureland that is available for manure application varies at each operation. Cattle waste may also be used as a bedding for livestock, marketed as compost, or used as an energy source.

Additional information on the types of farm production and waste management practices is provided in the Development Document.

C. Dairy Subcategory

1. General Industry Characteristics

Operations that produce milk are identified under NAICS 11212, dairy cattle and milk production (SIC 0241, dairy farms).

A dairy operation may have several types of animal groups present, including:

- *Calves* (0–5 months);
- *Heifers* (6–24 months);
- *Lactating dairy cows* (*i.e.,* currently producing milk); and;
- *Cows close to calving and dry cows* (*i.e.,* not currently producing milk); and
- *Bulls.*

Animal feeding operations in this sector that may be affected by today's proposed regulations include facilities that confine animals. Information on the types of facilities in this sector that may be covered by the proposed regulations is provided in Section VII.

In 1997, there were 116,900 dairy operations with a year-end inventory of

9.1 million milk cows that produced 156.1 billion pounds of milk (Table 6.1). Only a portion of these operations would be subject to the proposed regulations. As shown in Table 6.2, under the two-tier structure, EPA estimates that there are 3,760 dairy operations that confine more than 350 milk cows (*i.e.,* 500 AU equivalent). Under the three-tier structure, EPA estimates that 6,480 dairy operations with more than 200 head (*i.e.,* 300 AU equivalent) would meet the ''risk-based'' conditions described in Section VII and thus require a permit.

Table 6–1 shows that dairies with fewer than 200 head account for the majority (95 percent) of milking operations and account for 55 percent of the nation's milk cow herd. EPA expects that under the two-tier structure designation of dairies with fewer than 350 milk cows would be limited to about 22 operations annually, or 220 dairies projected over a 10-year time period. Under the three-tier structure, EPA expects annual designation of dairies with fewer than 200 milk cows would be limited to about 5 operations, or 50 operations over a 10-year period. EPA expects that designated facilities will be located in more traditional farming regions.

More than one-half of all milk produced nationally is concentrated among the top five producing states: California, Wisconsin, New York, Pennsylvania, and Minnesota. Other major producing states include Texas, Michigan, Washington, Idaho, and Ohio. Combined, these ten states accounted for nearly 70 percent of milk production in 1997. Milk production has been shifting from traditional to nontraditional milk producing states. Operations in the more traditional milk producing regions of the Midwest and Mid-Atlantic tend to be smaller and less industrialized. Milk production at larger operations using newer technologies and production methods is emerging in California, Texas, Arizona, New Mexico, and Idaho. Milk production in these states is among the fastest-growing in the nation, relying on economies of scale and a specialization in milk production to lower per-unit production costs. (Additional data on these trends are provided in Section IV.C).

Over the past few decades, the number of dairy operations and milk cow inventories has dropped, while overall milk production has been increasing. USDA reports that while the number of dairy operations dropped by more than one-half from 277,800 in 1982 to 116,900 in 1997, the amount of milk produced annually at these operations rose from 135.5 billion pounds to 156.1 billion pounds. These figures signal trends toward increased consolidation, large gains in per-cow output, and increases in average herd size per facility. From 1982 to 1997, the average number of dairy cows per facility doubled from 40 cows to 80 cows per facility.

Although milk and dairy food production has become increasingly specialized, it has not experienced vertical integration in the same way as other livestock industries. The use of production contracts is uncommon in milk production. In part, this is attributable to the large role of farmer-owned, farmer-controlled dairy cooperatives, which handle about 80 percent of the milk delivered to plants and dealers. Milk is generally produced under marketing-type contracts through verbal agreement with their buyer or cooperative. Data from USDA indicate that little more than 1 percent of milk was produced under a production contract in 1997. Use of production contracts in the dairy sector is mostly limited to contracts between two animal feeding operations to raise replacement heifers.

Despite the limited use of contracts between operations to raise replacement herd, EPA expects that no businesses other than the CAFO where the animals are raised will be subject to the proposed co-permitting requirements. Reasons for this assumption are based on data from USDA on the use of production contracts and on animal ownership at operations in this sector. Additional information is provided in Section 2 of the Economic Analysis. EPA is seeking comment on this assumption as part of today's notice of the proposed rulemaking.

2. Farm Production and Waste Management Practices

Animals at dairy operations may be confined in free-stalls, drylots, tie-stalls, or loose housing. Some may be allowed access to exercise yards or open pasture. The holding area confines cows that are ready for milking. Usually, this area is enclosed and is part of the milking center, which in turn may be connected to the barn or located in the immediate vicinity of the cow housing. Milking parlors are separate facilities where the cows are milked and are typically cleaned several times each day to remove manure and dirt. Large dairies tend to have automatic flush systems, while smaller dairies simply hose down the area. Larger dairies in the northern states, however, may be more likely to use continuous mechanical scraping of alleys in barns. Cows that are kept in tie-stalls may be milked directly from their stalls.

Waste associated with dairy production includes manure, contaminated runoff, milking house waste, bedding, spilled feed and cooling water. Dairies may either scrape or flush manure, depending on the solids content in manure and wastewater. Scraping systems utilize manual, mechanical, or tractor-mounted equipment to collect and transport manure from the production area. Flushing systems use fresh or recycled lagoon water to move manure. Dairy manure as excreted has a solids content of about 12 percent and tends to act as a slurry; however, it can be handled as a semisolid or a solid if bedding is added. Semisolid manure has a solids content ranging from 10 to 16 percent. Dilution water may be added to the manure to create a slurry with a solids content of 4 to 10 percent. If enough dilution water is added to the manure to reduce the solids content below 4 percent, the waste is considered to be a liquid.

Manure in a solid or semisolid state minimizes the volume of manure that is handled. In a dry system, the manure is collected on a regular basis and covered to prevent exposure to rain and runoff; sources of liquid waste, such as milking center waste, are typically handled separately. In a liquid or slurry system, the manure is typically mixed with flushing system water from lagoons; the milking center effluent is usually mixed in with the animal manure in the lagoon or in the manure transfer system to ease pumping. Liquid systems are usually favored by large dairies because they have lower labor cost and because the dairies tend to use automatic flushing systems.

Methods used at dairy operations to collect waste include mechanical/tractor scraper, flushing systems, gutter cleaner/gravity gutters, and slotted floors. Manure is typically stored as a slurry or liquid in a waste storage pond or in structural tanks. Milking house waste and contaminated runoff must be stored as liquid in a waste storage pond or structure. One common practice for the treatment of waste at dairies includes solids separation. Another common practice for the treatment of liquid waste at dairies includes anaerobic lagoons. The transfer of dairy waste depends on its consistency: liquid and slurry wastes can be transferred through open channels, pumps, pipes, or in a portable tank; solid and semi-solid waste can be transferred by mechanical conveyance, solid manure spreaders, or by being pushed down curbed concrete alleys. The majority of

dairy operations dispose of their waste through land application. The amount of crop and pastureland available for land application of manure varies by operation.

Additional information on the types of farm production and waste management practices is provided in the Development Document.

D. Hog Subcategory

1. General Industry Characteristics

Hog operations that raise or feed hogs and pigs either independently or on a contract basis are identified under NAICS 11221, hog and pig farming (SIC 0213, hogs).

Hog operations may be categorized by six facility types based on the life stage of the animal in which they specialize:

- *Farrow-to-wean* operations that breed pigs and ship 10- to 15-pound pigs to nursery operations.
- *Farrowing-nursery* operations that breed pigs and ship 40- to 60-pound ''feeder'' pigs to growing-finishing operations.
- *Nursery* operations that manage weaned pigs (more than 10 to 15 pounds) and ship 40- to 60-pound ''feeder'' pigs to growing-finishing operations.
- *Growing-finishing or feeder-to-finish* operations that handle 40- to 60-pound pigs and ''finish'' these to market weights of about 255 pounds.
- *Farrow-to-finish* operations that handle all stages of production from breeding through finishing.
- *Wean-to-finish* operations that handle all stages of production, except breeding, from weaning (10- to 15-pound pigs) through finishing.

Animal feeding operations in this sector that may be affected by today's proposed regulations include facilities that confine animals. Information on the types of facilities in this sector that may be covered by the proposed regulations is provided in Section VII.

In 1997, USDA reports that there were 117,880 hog operations with 56.7 million market and breeding hogs (Table 6–1). Not all of these operations would be subject to the proposed regulations. As shown in Table 6–2, under the two-tier structure, EPA estimates that there are 5,860 farrow-finish feedlots (including breeder and nursery operations) and 2,690 grower-finish feedlots with more than 1,250 head (*i.e.,* 500 AU equivalent). Under the three-tier structure, EPA estimates that 5,700 farrow-finish feedlots (including breeder and nursery operations) and 2,650 grower-finish feedlots with more than 750 head (*i.e.,* 300 AU equivalent) would meet the ''risk-based'' conditions described in Section VII and thus require a permit.

Table 6–1 shows that the majority of hog operations (93 percent) have fewer than 1,250 head, accounting for about one-third of overall inventories. Nearly half the inventories are concentrated among the 3 percent of operations with more than 2,500 head. Under the two-tier structure EPA expects that designation of hog operations with fewer than 1,250 head will be limited to about 20 confinement operations annually, or 200 operations over a 10-year time period. Under the three-tier structure, EPA expects that about 5 hog operations with fewer than 750 head would be designated annually, or 50 operations over a 10-year time period. EPA expects that designated facilities will be located in more traditional farming regions.

Hog production is concentrated among the top five producing states, including Iowa, North Carolina, Minnesota, Illinois, and Missouri. Together these states supply 60 percent of annual pork supplies. The majority of operations are located in the Midwest; however, the Southeast has seen rapid growth in hog production in the past decade. Recent growth in this region is due to increased vertical integration, proximity to growing consumer markets, and the mild climate, which offers lower energy costs and improved feed efficiency. (Additional data on these trends are provided in Section IV.C).

The hog sector is undergoing rapid consolidation and becoming increasingly specialized. USDA reports that while the number of hog operations dropped by nearly two-thirds between 1982 and 1997 (from 329,800 to 109,800 operations), the number of feeder pigs sold has risen from 20.0 million to 35.0 million marketed head over the same period. As in other livestock sectors, increasing production from fewer operations is attributable to expansion at remaining operations. Data from USDA indicate that the average number of hogs per facility increased from 170 pigs in 1982 to 560 pigs in 1997. Increasing production is also attributable to substantial gains in production efficiency and more rapid turnover, which has allowed hog farmers to produce as much output with fewer animals.

The hog sector is rapidly evolving from an industry of small, independent firms linked by spot markets to an industry of larger firms that are specialized and vertically coordinated through production contracting. This is particularly true of large-scale hog production in rapidly growing hog production states such as North Carolina. Production contracting is less common in the Midwest where coordination efforts are more diversified.

Information from USDA on animal ownership at U.S. farms provides an indication of the potential degree of processor control in this sector. Data from USDA indicate the use of production contracts accounted for 66 percent of hog production in the Southern and Mid-Atlantic states in 1997, especially among the larger producers. This indicates that a large share of hog production may be under the ownership or control of processing firms that are affiliated with hog operations in this region. This compares to the Midwest, where production contracting accounted for 18 percent of hog production. Production contracting in the hog sector differs from that in the beef and dairy sectors since it is becoming increasingly focused on the finishing stage of production, with the farmer (''grower'') entering into an agreement with a meat packing or processing firm (''integrator''). Production contracts are also used between two independent animal feeding operations to raise immature hogs.

Businesses that contract out the growing or finishing phase of production to an AFO may also be affected by the proposed co-permitting requirements. Affected businesses may include other animal feeding operations as well as processing sector firms. By NAICS code, meat packing plants are classified as NAICS 311611, animal slaughtering (SIC 2011, meat packing plants). The Department of Commerce reports that there were a total of 1,393 red meat slaughtering facilities that slaughter hogs as well as other animals, including cattle and calves, sheep, and lamb. Of these, Department of Commerce's 1997 product class specialization identifies 83 establishments that process fresh and frozen pork and 11 establishments that process or cure pork. These data generally account for larger processing facilities that have more than 20 employees. EPA believes that processing firms that may be affected by the proposed co-permitting requirements will mostly be larger facilities that have the administrative and production capacity to take advantage of various contract mechanisms. This assumption is supported by information from USDA that indicates that production contracts in the hog sector are generally associated with the largest producers and processors. Section 2 of the Economic Analysis provides additional information on the basis for EPA's

estimate of potential co-permittees. EPA is seeking comment on this assumption as part of today's notice of the proposed rulemaking.

Using these Department of Commerce data, EPA estimates that 94 companies engaged in pork processing may be subject to the proposed co-permitting requirements. This estimate does not include other processors under NAICS 311611, including sausage makers and facilities that ''further process'' hog hides and other by-products because these operations are considered to be further up the marketing chain and likely do not contract out to CAFOs.

2. Farm Production and Waste Management Practices

Many operations continue to have the traditional full range of pork production phases at one facility, known as farrow-to-finish operations. More frequently at new facilities, operations are specialized and linked into a chain of production and marketing. The evolution in farm structures has resulted in three distinct production systems to create pork products: (1) farrow-to-finish; (2) farrowing, nursery, and grow-finish operations; and (3) farrow-to-wean and wean-finish operations. Most nursery and farrowing operations, as well as practically all large operations of any type, raise pigs in pens or stalls in environmentally controlled confinement housing. These houses commonly use slatted floors to separate manure and wastes from the animal. Open buildings with or without outside access are relatively uncommon at large operations, but can be used in all phases of pork production. Smaller operations, particularly in the Midwest, may utilize open lots or pasture to raise pigs.

Hog waste includes manure and contaminated runoff. Most confinement hog operations use one of three waste handling systems: flush under slats, pit recharge, or deep underhouse pits. Flush housing uses fresh water or recycled lagoon water to remove manure from sloped floor gutters or shallow pits. The flushed manure is stored in lagoons or tanks along with any precipitation or runoff that may come into contact with the manure. Flushing occurs several times a day. Pit recharge systems are shallow pits under slatted floors with 6 to 8 inches of pre-charge water. The liquid manure is pumped or gravity fed to a lagoon approximately once a week. Deep pit systems start with several inches of water, and the manure is stored under the house until it is pumped out for field application on the order of twice a year. Most large operations have 90 to 365 days storage. The deep pit system uses less water, creating a slurry that has higher nutrient concentrations than the liquid manure systems. Slurry systems are more common in the Midwest and the cooler climates.

Dry manure handling systems include those used at open buildings and lots, scraped lots, hoop houses, deep bedded systems, and high rise hog houses. These systems produce a more solid manure material that is readily handled with a tractor or front end loader. The solids are stored in stacks or covered until used as fertilizer. In some cases, solids are composted.

Storage lagoons are used to provide anaerobic bacterial decomposition of organic materials. When only the top liquid is removed for irrigation or some other use, a limited amount of phosphorus-rich sludge accumulates in the lagoon, which requires periodic removal. Vigorous lagoon mixing with an agitator or a chopper prior to irrigation is sometimes done to minimize the sludge accumulation. In certain climates, a settling and evaporation pond is used to remove solids, which are dried in a separate storage area. Some lagoons and tanks are covered with a synthetic material that reduces ammonia volatilization. Covers also prevent rainfall from entering the system and, therefore, reduce disposal costs.

Land application is the most common form of utilization. To mitigate odor problems and volatization of ammonia, liquid waste can be injected below the soil surface. Waste may also be distributed through an irrigation process. Waste management systems for hogs often incorporate odor control measures, where possible.

Additional information on the types of farm production and waste management practices is provided in the Development Document.

E. Poultry Subcategory

1. General Industry Characteristics

Poultry operations can be classified into three individual sectors based on the type of commodity in which they specialize. These sectors include operations that breed and/or raise:

- *Broilers* or young meat chickens that are raised to a live weight of 4 to 4.5 pounds and other meat-type chickens, including roasters that are raised to 8 to 9 pounds. Classification: NAICS 11232, broilers and other meat-type chickens (SIC 0251, broiler, fryer and roaster chickens).
- *Turkeys and turkey hens,* including whole turkey hens that range from 8 to 15 pounds at slaughter, depending on market, and also turkey ''canners and cut-ups'' that range from 22 to 40 pounds. Classification: NAICS 11233, turkey production (SIC 0253, turkey and turkey eggs).
- *Hens that lay shell eggs,* including eggs that are sold for human consumption and eggs that are produced for hatching purposes. Classification: NAICS 11231, Chicken egg production (SIC 0252, chicken eggs) and NAICS 11234, poultry hatcheries (SIC 0254, poultry hatcheries).

Animal feeding operations in this sector that may be affected by today's proposed regulations include facilities that confine animals. Information on the types of facilities in this sector that may be covered by the proposed regulations is provided in Section VII.

In 1997, the USDA reports that there were 34,860 broiler operations that raised a total of 1.9 billion broilers during the year. There were also 13,720 turkey operations raising a total 112.8 million turkeys. Operations with egg layers and pullets totaled 75,170 with an average annual inventory of 393 million egg layers on-site. (See Table 6–1). Not all of these operations would be subject to the proposed regulations.

Under the two-tier structure, EPA estimates that there are 9,780 broiler operations, 1,280 turkey operations and 1,640 egg laying and pullet operations that have more than 500 AU (i.e., operations with more than 50,000 chickens and more than 27,500 turkeys). Under the three-tier structure, EPA estimates that 13,740 broiler operations, 2,060 turkey operations and 2,010 egg laying operations with more than 300 AU (i.e., operations with more than 30,000 chickens and more than 16,500 turkeys) would meet the ''risk-based'' conditions described in Section VII and thus require a permit.

EPA expects few, if any, poultry AFOs with fewer than 500 AU will be subject to the revised requirements. As shown in Table 6–1, most poultry operations have fewer than 500 AU. Under the two-tier structure, EPA expects that designation of broiler operations with fewer than 50,000 chickens will be limited to two broiler and two egg operations being designated annually, or a total of 40 poultry operations over a 10-year period. EPA expects that no turkey operations would be designated as CAFOs and subject to the proposed regulations. EPA expects that no confinement poultry operations will be designated as CAFOs under the proposed requirements under the three-tier structure.

Overall, most poultry production is concentrated in the Southeast and in key Midwestern states. As in the pork sector, the Southeast offers advantages

such as lower labor, land, and energy costs; proximity to end markets; and milder weather, which contributes to greater feed efficiency. Nearly 60 percent of all broiler production is concentrated among the top five producing states, including Georgia, Arkansas, Alabama, Mississippi, and North Carolina. The top five turkey producing states also account for about 60 percent of all turkeys sold commercially. These include North Carolina, Minnesota, Virginia, Arkansas, and California. Missouri and Texas are also major broiler and turkey producing states. The top five states for egg production account for more than 40 percent of all egg production, including Ohio, California, Pennsylvania, Indiana, and Iowa. Other major egg producing states include Georgia, Texas, Arkansas, and North Carolina.

The number of operations in each of the poultry sectors has been declining while production has continued to rise. USDA reports that while the number of both turkey and broiler operations decreased by about 10,000 operations between 1982 and 1997, the number of animals sold for slaughter rose nearly twofold: the number of broilers sold rose from 3.5 billion to 6.7 billion and the number of turkeys sold rose from 167.5 million to 299.5 million. During the same period, the number of egg operations dropped nearly two-thirds (from 215,800 operations in 1982), while the number of eggs produced annually has increased from 5.8 billion dozen to 6.2 billion dozen. Increased production from fewer operations is due to expanded production from the remaining operations. This is attributable to increases in the average number of animals raised at these operations as well as substantial gains in production efficiency and more rapid turnover, which has allowed operators to produce more with fewer animals. Data from USDA indicate that average inventory size on poultry operations increased twofold on broiler operations and rose threefold at layer and turkey operations between 1982 and 1997. (Additional data on these trends are provided in Section IV.C). As in other sectors, larger operations control most animal inventories and sales.

The poultry industry is characterized by increasing integration and coordination between the animal production facility and the processing sector. Vertical integration has progressed to the point where large multifunction producer-packer-processor-distributor firms are the dominant force in poultry meat and egg production and marketing. Coordination through production contracting now dominates the poultry industry. Today's integrators are subsidiaries of feed companies, independent processors, cooperatives, meat packers, or retailers, or affiliates of conglomerate corporations. These firms may own and/or direct the entire process from the production of hatching eggs to the merchandising of ready-to-eat-sized poultry portions to restaurants.

Production contracting in the poultry sector differs from that in the other livestock sectors since it is dominated by near vertical integration between a farmer (''grower'') and a processing firm (''integrator''). Information from USDA on animal ownership at U.S. farms provides an indication of the potential degree of processor control in this sector. Data from USDA indicate production contracting accounted for virtually all (98 percent) of U.S. broiler production in 1997. This indicates that nearly all broiler production may be under the ownership or control of processing firms that are affiliated with broiler operations. Production contracting accounts for a relatively smaller share of turkey and egg production, accounting for 70 percent and 37 percent, respectively.

Businesses that contract out the growing or finishing phase of production to an AFO may also be affected by the proposed co-permitting requirements. Affected businesses may include other animal feeding operations as well as processing sector firms. Poultry processing facilities are classified under NAICS 311615, poultry processing, and NAICS 311999, all other miscellaneous (SIC 2015, poultry slaughtering facilities). The Department of Commerce reports that there were a total of 558 poultry and egg slaughtering and processing facilities in 1997. Of these, Department of Commerce's 1997 product class specialization for poultry identifies 212 establishments that process young chickens, 15 that process hens or fowl, and 39 that process turkeys (rounded to the nearest ten). These data generally account for larger processing facilities that have more than 20 employees. EPA believes that processing firms that may be affected by the proposed co-permitting requirements will mostly be larger facilities that have the administrative and production capacity to take advantage of various contract mechanisms. Section 2 of the Economic Analysis provides additional information on the basis for EPA's estimate of potential co-permittees. EPA is seeking comment on this assumption as part of today's notice of the proposed rulemaking.

Using these Department of Commerce data, EPA estimates that about 270 companies engaged in poultry slaughtering may be subject to the proposed co-permitting requirements. This estimate does not include egg processors under NAICS 311999 because these operations are considered to be further up the marketing chain and likely do not contract out to CAFOs.

2. Farm Production and Waste Management Practices

There are two types of basic poultry confinement facilities—those that are used to raise turkeys and broilers for meat and those that are used to house layers. Broilers and young turkeys are grown on floors on beds of litter shavings, sawdust, or peanut hulls; layers are confined to cages. Broilers are reared in houses where an absorbent bedding material such as wood shavings or peanut hulls are placed on the floor at a depth of several inches. Breeder houses contain additional rows of slats for birds to roost. Broilers may also be provided supplementary heat during the early phases of growth. Turkeys as well as some pullets and layers are produced in a similar fashion. Pullets or chickens that are not yet of egg laying age are raised in houses on litter, or in cages. Most commercial layer facilities employ cages to house the birds, although smaller laying facilities and facilities dedicated to specialty eggs such as brown eggs or free range eggs may use pastures or houses with bedded floors. Layer cages are suspended over a bottom story in a high-rise house, or over a belt or scrape gutter. The gutter may be a shallow sloped pit, in which case water is used to flush the wastes to a lagoon. Flush systems are more likely to be found at smaller facilities in the South.

Poultry waste includes manure, poultry mortalities, litter, spilt water, waste feed, egg wash water, and also flush water at operations with liquid manure systems. Manure from broiler, breeder, some pullet operations, and turkey operations is allowed to accumulate on the floor where it is mixed with the litter. In the chicken houses, litter close to drinking water access forms a cake that is removed between flocks. The rest of the litter pack generally has low moisture content and is removed every 6 months to 2 years, or between flocks to prevent disease. This whole house clean-out may also require storage, depending on the time of year it occurs. The litter is stored in temporary field stacks, in covered piles, or in stacks within a roofed facility to help keep it dry. Commonly, treatment of broiler and

turkey litter includes composting which stabilizes the litter into a relatively odorless material and which increases the market value of the litter. Proper composting raises the temperature within the litter such that pathogens are reduced, allowing reuse of the litter in the poultry house.

The majority of egg laying operations also use dry manure handling. Laying hens are kept in cages and the manure drops below the cages in both dry and liquid manure handling systems. Most of the dry manure laying operations are constructed as high rise houses where the birds are kept on the second floor and the manure drops to the first floor sometimes referred to as the pit. Ventilation flows through the house from the roof down over the birds and into the pit over the manure before it is forced out through the sides of the house. The ventilation drys the manure as it piles up into cones. Manure can be stored in high rise houses for up to a year before requiring removal. In dry layer houses with belts, the manure that drops below the cage collects on belts and is transported to a separate covered storage area. Layer houses with liquid systems use either a shallow pit or alleyway located beneath the cages for flushing. Flushed wastes are pumped to a lagoon.

Because of the large number of routine mortalities associated with large poultry operations, the disposal of dead birds is occasionally a resource concern. Poultry facilities must have adequate means for disposal of dead birds in a sanitary manner. To prevent the spread of disease, dead birds are usually collected daily. Disposal alternatives include incineration, rendering, composting, and in-ground burial or burial in disposal tanks. Much of the waste from poultry facilities is land applied.

Additional information on the types of farm production and waste management practices is provided in the Development Document.

VII. What Changes to the NPDES CAFO Regulations Are Being Proposed?

A. Summary of Proposed NPDES Regulations

EPA is co-proposing, for public comment, two alternative ways to structure the NPDES regulation for defining which AFOs are CAFOs. Both structures represent significant improvements to the existing regulation and offer increased environmental protection. The first alternative proposal is a ''two-tier structure,'' and the second is a ''three-tier structure.'' Owners or operators of all facilities that are defined as CAFOs in today's proposal, under either alternative, would be required to apply for an NPDES permit.

In the first co-proposed alternative, EPA is proposing to replace the current three-tier structure in 40 CFR 122.23 with a two-tier structure. See proposed § 122.23(a)(3) for the two-tier structure, included at the end of this preamble. All AFOs with 500 or more animal units would be defined as CAFOs, and those with fewer than 500 animal units would be CAFOs only if they are designated as such by EPA or the State NPDES permit authority.

In the second co-proposed alternative, EPA is proposing to retain the current three-tier structure. All AFOs with 1,000 or more animal units would be defined as CAFOs, and those with less than 300 animals units would be CAFOs only if they are designated by EPA or the State NPDES permit authority. Those with 300 to 1,000 animal units would be CAFOs if they meet one or more of several specific conditions, and today's proposal would revise the existing conditions. These facilities could also be designated as CAFOs if they are found to be significant contributors of pollutants to waters of the United States. Further, all AFOs between 300 and 1,000 animal units would be required to certify to the permit authority that they do not meet any of the conditions. Those facilities unable to certify would be required to apply for a permit.

These regulatory alternatives are two of six different approaches that the Agency considered. Two of the approaches are also being seriously considered, but are not being proposed in today's action because they have not been fully analyzed. However, EPA is soliciting public comment on these two alternatives. One of the alternatives is a two-tier structure, similar to what is being proposed today, but would establish a threshold at the equivalent of 750 AU. The other alternative under consideration is a three-tier structure, with different certification and permitting requirements for facilities in the 300 AU to 1,000 AU tier. These alternatives are described in more detail in Section VII.B.5. After reviewing public comment, EPA may decide to pursue either of these alternatives.

In addition, EPA considered two other alternative approaches that are not being proposed. One would retain the existing three-tier structure for determining which AFOs are CAFOs, and would retain the existing conditions for determining which of the middle tier facilities are CAFOs while incorporating all other proposed changes to the CAFO regulations (e.g., the definition of CAFO, the duty to apply, etc.). The sixth approach that was not proposed which is similar to today's second alternative proposal, would retain the three-tiered structure and would revise the conditions for determining which of the middle tier facilities are CAFOs in the same manner as today's proposal. In contrast with today's proposal, it would not require all AFOs in the middle tier to certify they are not CAFOs.

EPA is soliciting comment on all six scenarios for structuring how to determine which facilities are CAFOs.

TABLE 7–1.—PROPOSED REVISION TO THE STRUCTURE OF THE CAFO REGULATION

Proposed revision	Section
Historical Record	B.1
Two-Tier Structure	B.2
Three-Tier Structure	B.3
Comparative Analysis	B.4
Alternative Scenarios Considered but not Proposed	B.5

Besides changing the structure of the regulation, under both of today's proposals, EPA is also proposing changes to clarify, simplify, and strengthen the NPDES regulation, including to: clarify the definition of an AFO; discontinue the use of the term ''animal unit'' and eliminate the mixed animal type multiplier when calculating numbers of animals; eliminate the 25-year, 24-hour storm permit exemption; and impose a clearer and more broad duty to apply for a permit on all operations defined or designated as a CAFO.

EPA is also proposing several changes that determine whether a facility is an AFO or whether it is a CAFO and

therefore must apply for an NPDES permit on that basis. Specifically, EPA is proposing to formally define a CAFO to: include both the animal production area and the land application area; broaden coverage in the poultry sector to include all chicken operations, both wet and dry; add coverage for stand-alone immature swine and heifer operations; lower the NPDES threshold that defines which facilities are CAFOs for other animal sectors, including horses, sheep, lambs and ducks; and require facilities that are no longer active CAFOs to remain permitted until their manure and storage facilities are properly closed and they have no potential to discharge CAFO manure or wastewater. This section also discusses the concept of ''direct hydrologic connection'' between ground water and surface water and its application to CAFOs. Considerations for providing regulatory relief to small businesses are also discussed.

EPA is also proposing changes that clarify the scope of NPDES regulation of CAFO manure and process wastewater. Today's proposal modifies the criteria for designation of AFOs as CAFOs on a case-by-case basis and explicitly describes EPA's authority to designate facilities as CAFOs in States with approved NPDES programs. EPA is also proposing that the permit authority must require entities that have ''substantial operational control'' over a CAFO to be co-permitted, and is requesting comment on an option for States to waive this requirement if they provide another means of ensuring that excess manure transported from CAFOs to off-site recipients is properly land applied. EPA also is clarifying Clean Water Act requirements concerning point source discharges at non-CAFOs.

These changes are summarized in Table 7–2 and described in the noted sections.

TABLE 7–2.—PROPOSED REVISIONS FOR DEFINING CAFOS OTHER POINT SOURCES

Proposed revision	Section
Clarify the vegetation language in the definition of an AFO	C.1
Discontinue use of the term animal unit	C.2.a
Eliminate the mixed animal type multiplier	C.2.b
Remove the 25-year, 24-hour storm event exemption from the definition of a CAFO	C.2.c
Clarify the duty to apply, that all CAFOs must apply for an NPDES permit	C.2.d
Definition of a CAFO includes both production area and land application area	C.2.e
Include dry poultry operations	C.2.f
Include stand-alone immature swine and heifer operations	C.2.g
Coverage of other sectors besides beef, dairy, swine and poultry	C.2.h
Require facilities that are no longer CAFOs to remain permitted until proper closure	C.2.i
Applicability of direct hydrological connection to surface water	C.2.j
Regulatory relief for small businesses	C.2.k
Designation criteria	C.3
Designation of CAFOs by EPA in States with NPDES authorized programs	C.4
Co-permitting of entities that exert substantial operational control over a CAFO	C.5
Point source discharges at AFOs that are not CAFOs	C.6

We also extensively discuss matters associated with the land application of CAFO-generated manure and wastewater, including how the agricultural storm water exemption applies to the application of CAFO-generated manure both on land under the control of the CAFO operator and off-site. EPA is proposing to require CAFO owners or operators to land apply manure in accordance with proper agricultural practices, as defined in today's regulation. EPA is also co-proposing two different means of addressing the off-site transfer of CAFO-generated manure. In one proposal, CAFO owners or operators would be allowed to transfer manure off-site only to recipients who certify to land apply according to proper agricultural practices; to maintain records of all off-site transfers; and to provide adequate information to off-site manure recipients to facilitate proper application. Alternately, the certification would not be required, and CAFOs owners or operators would simply be required to maintain records and provide the required information to recipients. See Table 7–3 for references.

TABLE 7–3.—LAND APPLICATION OF CAFO-GENERATED MANURE AND WASTEWATER

Proposed revision	Section
Why is EPA Regulating Land Application of CAFO Waste?	D.1
How is EPA Interpreting the Agricultural Storm Water Exemption with Respect to Land Application of CAFO-generated Manure?	D.2
How is EPA Proposing to Regulate Discharges from Land Application of CAFO-generated Manure by CAFOs?	D.3
How is EPA Proposing to Regulate Land Application of Manure and Wastewater by non-CAFOs?	D.3

EPA is proposing several revisions to requirements contained in CAFO permits. The requirement that CAFO owners or operators develop and implement a ''Permit Nutrient Plan,'' or ''PNP,'' is discussed extensively, including clarifying that a PNP is the EPA-enforceable subset of a Comprehensive Nutrient Management Plan, or ''CNMP.''

EPA is also proposing to apply revised Effluent Limitation Guidelines and standards (and hereafter referred to as effluent guidelines or ELG) to beef, dairy, swine, poultry and veal operations that are CAFOs by definition in either of the two proposed structures, or that have 300 AU to 1,000 AU in the three-tier structure and are designated. NPDES permits issued to small operations that are CAFOs by designation (those with fewer than 500 AU in the two tier structure, and those with fewer than 300 AU in the three tier structure) would continue to be based on Best Professional Judgment (BPJ) of

the permit authority. Similarly, CAFOs in other sectors (i.e., horse, sheep, lambs, and ducks) that have greater than 1,000 AU will continue to be subject to the existing effluent guidelines and standards (as they are in the existing regulation), while those with 1,000 AU or fewer would be issued permits based on BPJ, as today's proposed effluent guidelines does not include revisions to sectors other than beef, dairy, swine, poultry and veal.

Today's NPDES proposal includes monitoring, reporting and record keeping requirements that are consistent with those required by today's proposed effluent guidelines (discussed in section VIII). In addition, EPA is proposing to require all individual permit applicants, as well as new facilities applying for coverage under general NPDES permits, to submit a copy of the cover sheed and Executive Summary of their draft Permit Nutrient Plan (PNP) to the permit authority along with the permit application or Notice of Intent (NOI). EPA is proposing to require all CAFOs to submit a notification to the permit authority, within three months of obtaining permit coverage, that their Permit Nutrient Plans (PNPs) have been developed, along with a fact sheet summarizing the PNP. Further, EPA is proposing to require permittees to submit a notification to the permit authority whenever the PNP has been modified.

EPA is also proposing to require that the permit authority include certain conditions in its general and individual permits that specify: (1) Requirements for land application of manure and wastewater, including methods for developing the allowable manure application rate; (2) restrictions on timing of land application if determined to be necessary, including restrictions with regard to frozen, saturated or snow covered ground; (3) requirements for the facility to be permitted until manure storage facilities are properly closed and therefore the facility has no potential to discharge; (4) conditions for facilities in certain types of topographical regions to prevent discharges to ground water with a direct hydrological connection to surface water; and (5) under one co-proposed option, requirements that the CAFO owner or operator obtain a signed certification from off-site recipients of more than twelve tons annually, that manure will be land applied according to proper agricultural practices (co-proposed with omitting such a requirement). Comments are also requested on whether EPA should include erosion controls in the NPDES permit, and whether EPA should establish an additional design standard that would address chronic rainfall. Table 7–4 summarizes the proposed revisions that address minimum permit conditions, as well as issues for which comment are being sought.

TABLE 7–4.—PROPOSED REVISIONS FOR PERMIT REQUIREMENTS

Proposed revision	Section
Permit Nutrient Plan	E.1
Effluent Limitations	E.2
Monitoring and reporting	E.3
Record keeping	E.4
Special Conditions and Standard Conditions	E.5
Determining allowable manure application rate	E.5.a
Timing of land application of manure	E.5.b
Maintaining permit until proper closure	E.5.c
Discharge to ground water with a direct hydrological connection to surface water	E.5.d
Obtain certification from off-site recipients of manure of appropriate land application	E.5.e
Erosion control	E.5.f
Solicitation of comment on defining chronic rainfall	E.5.g

Finally, EPA is proposing to amend certain aspects of the general and individual permit process to improve public access and public involvement in permitting CAFOs. While the NPDES regulations already provide a process for public involvement in issuing individual NPDES permits, today EPA is proposing to require the permit authority to issue quarterly public notices of all Notices of Intent (NOIs) received for coverage under general NPDES permits for CAFOs, as well as of notices from CAFOs that their Permit Nutrient Plans have been developed or amended. Today's proposal discusses public availability of NOIs, Permit Nutrient Plans and PNP notifications. EPA is proposing several new criteria for which CAFOs may be ineligible for general permits, and would require the permit authority to conduct a public process for determining, in light of those criteria, when individual permits would be required.

Owners or operators of all facilities that are defined as CAFOs in today's proposed regulation would be required to apply for an NPDES permit. However, EPA also is proposing that they may, instead, seek to obtain from the permit authority a determination of ''no potential to discharge'' in lieu of submitting a permit application. (EPA notes that, because of the stringency of demonstrating that a facility has no potential to discharge, EPA expects that few facilities will receive such determinations.) Finally, EPA is proposing to amend the CAFO individual permit application requirements and corresponding Form 2B. See Table 7–5.

TABLE 7–5.—PROPOSED REVISIONS TO PERMIT PROCESS

Proposed revision	Section
General Permit and NOI provisions	F.1
Individual permits	F.2
Requests not to have a permit issued by demonstrating ''no potential to discharge''	F.3
Amendments to NPDES Permit Application For CAFOs Form 2B	F.4

B. What Size AFOs Would be Considered CAFOs?

EPA is proposing two alternative structures for establishing which AFOs would be regulated as CAFOs. Each proposal reflects the Agency's efforts to balance the goals of ease of implementation and effectively addressing the sources of water quality impairments. The two-tier structure is designed to give both regulators and animal feeding facility operators a clear, straightforward means of determining whether or not an NPDES permit is required for a facility. On the other hand, the three-tier structure, while less straightforward in determining which facilities are required to have NPDES permits, may allow the permit authority to focus its permitting resources on facilities which are more likely to be significant sources of water quality impairments. The Agency believes both the two-tier and three-tier approaches are reasonable and is requesting comment on how best to strike a balance between simplicity and flexibility while achieving the goals of the Clean Water Act. EPA may decide to choose either or both alternatives in the final rule, and requests comments on both. EPA is also requesting comment on a variation of the two-tier structure and a variation of the three-tier structure and, after considering public comment, may decide to pursue either or both of these variations for the final rule.

EPA is not proposing to define animal types on the basis of age, size or species in order to avoid complicating the implementation of this proposal. Throughout today's preamble, each of the subcategories, under today's proposed effluent guidelines, is described as follows:

- ''Cattle, excluding mature dairy or veal'' (referred in today's preamble as the beef sector) includes any age animal confined at a beef operation, including heifers when confined apart from the dairy. This subcategory also includes stand-alone heifer operations, also referred to as heifer operations.
- ''Mature dairy cattle'' (referred in today's preamble as the dairy sector) indicates that only the mature cows, whether milking or dry, are counted to identify whether the dairy is a CAFO.
- ''Veal'' is distinguished by the type of operation. Veal cattle are confined and manure is managed differently than beef cattle. EPA is not proposing to define veal by size or age. Note that the current regulation includes veal under the beef subcategory, but in today's proposal a new veal subcategory would be established.
- ''Swine weighing over 25 kilograms or 55 pounds'' also indicates that only mature swine are counted to determine whether the facility is a CAFO. Once defined as a CAFO, all animals in confinement at the facility would be subject to the proposed requirements.
- ''Immature Swine weighing less than 25 kilograms or 25 pounds'' indicates that immature swine are counted only when confined at a stand-alone nursery. Today's preamble uses the terms ''swine sector'' to indicate both mature and immature swine, but permit provisions are separately applied to them.
- ''Chicken'' and ''Turkeys'' are listed as separate subcategories and are counted separately in order to determine whether the facility is a CAFO. However, they are subject to the same effluent limitations, and are collectively referred to as the ''poultry sector.''
- ''Ducks,'' ''Horses,'' and ''Sheep or Lambs'' are separate subcategories under the existing NPDES and effluent limitation regulations. Part 412 effluent limitations are not being revised in today's proposal; however, some of the proposed revisions to the NPDES program will affect these subcategories.

1. Historical Record

In 1973, when EPA proposed regulations for CAFOs, the Agency determined the thresholds above which AFOs would be subject to NPDES permitting requirements ''on the basis of information and statistics received, pollution potential, and administrative manageability.'' 38 FR 10961, 10961 (May 3, 1973). In 1975, the Agency, after litigation, again proposed regulations for CAFOs which established a threshold number of animals above which an AFO would be determined to be a CAFO. 40 FR 54182 (Nov. 20, 1975). The Agency noted that it might be possible to establish a precise regulatory formula to determine which AFOs are CAFO point sources based on factors such as the proximity of the operation to surface waters, the numbers and types of animals confined, the slope of the land, and other factors relative to the likelihood or frequency of discharge of pollutants into navigable waters. 40 FR at 54183.

The Agency decided, however, that even if such a formula could be constructed, it would be so complex that both permitting authorities and feedlot operators would find it difficult to apply. Then, as now, EPA concluded that the clearest and most efficient means of regulating concentrated animal feeding operations was to establish a definitive threshold number of confined animals above which a facility is defined as a CAFO, below which a permitting authority could designate a facility as a CAFO, after consideration of the various relevant factors. The threshold numbers initially established by the Agency were based generally on a statement by Senator Muskie when the Clean Water Act was enacted. Senator Muskie, floor manager of the legislation, stated that: ''Guidance with respect to the identification of 'point sources' and 'nonpoint sources,' especially with respect to agriculture, will be provided in regulations and guidelines of the Administrator.'' 2 Legislative History of the Water Pollution Control Act Amendments of 1972 at 1299, 93d Cong, 1st Sess. (January 1973). Senator Muskie then identified the existing policy with respect to identification of agricultural point sources was generally that ''runoff from confined livestock and poultry operations are not considered a 'point source' unless the following concentrations of animals are exceeded: 1000 beef cattle; 700 dairy cows; 290,000 broiler chickens; 180,000 laying hens; 55,000 turkeys; 4,500 slaughter hogs; 35,000 feeder pigs; 12,000 sheep or lambs; 145,000 ducks.'' *Id.* In the final rule, the Agency and commenters agreed that while Senator Muskie's statement provided useful general guidance, particularly in support of the idea of defining CAFOs based on specified numbers of animals present, it was not a definitive statement of the criteria for defining a CAFO. 41 FR 11458 (Mar. 18, 1976). The Agency, thus, looked to data with respect to both the amount of manure generated by facilities above the threshold and the number of facilities captured by the regulation.

EPA has again looked to those factors and, with 25 years of regulatory experience, focused particularly on the amount of manure captured by the threshold, ease of implementation for both regulators and the regulated community, as well as on matters of administrative convenience and manageability of the permitting program. Based on these considerations, EPA is proposing two alternative structures. EPA notes that the NPDES threshold is generally synchronized with the effluent guidelines applicability threshold, and information on the cost per pound of pollutants removed, and affordability of the various options is available in Section X.

2. Two-Tier Structure

The first alternative that EPA is proposing is a two-tier structure that establishes which operations are

defined as CAFOs based on size alone. See proposed § 122.23(a)(3). In this alternative, EPA is proposing that the threshold for defining operations as CAFOs be equivalent to 500 animal units (AU). All operations with 500 or more animal units would be defined as CAFOs (§ 122.23(a)(3)(i)). Operations with fewer than 500 animal units would be CAFOs only if designated by EPA or the State permit authority (§ 122.23(a)(3)(ii)). Table 7–6 describes the number of animals that are equivalent to the proposed 500 AU threshold, as well as three other two-tier thresholds that are discussed in this section.

The proposed two-tier structure would eliminate the 300 AU to 1,000 AU tier of the existing regulation, under which facilities were either defined as a CAFO if they met certain conditions or were subject to designation on a case-by-case basis by the permit authority according to the criteria in the regulations. EPA is proposing to eliminate this middle category primarily because it has resulted in general confusion about which facilities should be covered by an NPDES permit, which, in turn, has led to few facilities being permitted under the existing regulation. The two-tier structure offers simplicity and clarity for the regulated community and enforcement authorities for knowing when a facility is a CAFO and when it is not, thereby improving both compliance and enforcement.

TABLE 7–6.—NUMBER OF ANIMALS COVERED BY ALTERNATIVE TWO-TIER APPROACHES

Animal type	Number of animals equivalent to:			
	300 AU	500 AU	750 AU	1,000 AU
Cattle and Heifers	300	500	750	1,000
Veal	300	500	750	1,000
Mature Dairy Cattle	200	350	525	700
Swine weighing over 25 kilograms—or 55 pounds	750	1,250	1,875	2,500
Immature Swine weighing less than 25 kilograms, or 55 pounds	3,000	5,000	7,500	10,000
Chickens	30,000	50,000	75,000	100,000
Turkeys	16,500	27,500	41,250	55,000
Ducks	1,500	2,500	3,750	5,000
Horses	150	250	375	500
Sheep or Lambs	3,000	5,000	7,500	10,000

Operations with fewer animals than the number listed for the selected threshold in Table 7–6 would only become CAFOs through case-by-case designation.

In order to determine the appropriate threshold for this two-tier approach, EPA analyzed information on numbers of operations, including percent of manure generated, potential to reduce nutrient loadings, and administrative burden. EPA considered current industry trends and production practices, including the trend toward fewer numbers of AFOs, and toward larger facilities that tend to be more specialized and industrialized in practice, as compared to more traditional agricultural operations. EPA also considered other thresholds, including 300 AU, 750 AU, or retaining the existing 1,000 AU threshold. After considering each of these alternatives, EPA is proposing 500 AU as the appropriate threshold for a two-tier structure, but is also requesting comment on a threshold of 750 AU.

EPA is proposing 500 AU as the appropriate threshold for a two-tier structure because it regulates larger operations and exempts more traditional—and oftentimes more sustainable—farm production systems where farm operators grow both livestock and crops and land apply manure nutrients. Consistent with the objectives under the USDA–EPA Unified National Strategy for Animal Feeding Operations (March 9, 1999), the proposed regulations cover more of the largest operations since these pose the greatest potential risk to water quality and public health, given the sheer volume of manure generated at these operations. Larger operations that handle larger herds or flocks often do not have an adequate land base for manure disposal through land application. As a result, large facilities need to store large volumes of manure and wastewater, which have the potential, if not properly handled, to cause significant water quality impacts. By comparison, smaller farms manage fewer animals and tend to concentrate less manure nutrients at a single farming location. Smaller farms tend to be less specialized and are more diversified, engaging in both animal and crop production. These farms often have sufficient cropland and fertilizer needs to appropriately land apply manure nutrients generated at a farm's livestock or poultry business. More information on the characteristics of larger-scale animal production practices is provided in sections IV and VI of this document, as well as noted in the analysis of impacts to small businesses (section X.I).

EPA is proposing the 500 AU threshold because operations of this size account for the majority of all manure and manure nutrients produced annually. The proposed two-tier structure would cover an estimated 25,540 animal production operations, or approximately seven percent of all operations, which account for 64 percent of all AFO manure generated annually. The USDA–EPA Unified National Strategy had a goal of regulating roughly five percent of all operations.

EPA is specifically seeking comment on an alternative threshold of 750 AU, which would encompass five percent of AFOs. There are an estimated 19,100 operations with 750 AU or more (13,000 of which have more than 1,000 AU), and account for 58 percent of all manure and manure nutrients produced annually by AFOs. Regulating five percent of AFOs may be viewed by some as being consistent with the USDA–EPA Unified National Strategy.

A 750 AU threshold has the benefits cited for the 500 AU threshold. The two-tier structure is simple and clear, and it would focus regulation on even larger operations, thereby relieving smaller operations from the burden of being automatically regulated, and moderating the administrative burden to permit authorities. Permit authorities could use state programs to focus on operations below 750 AU, and could use the designation process as needed.

In some sectors, a 750 AU threshold may not be sufficiently protective of the environment. For example, in the Pacific Northwest, dairies tend to be smaller, but also tend to be a significant concern. In the mid-Atlantic, where

poultry operations have been shown to be a source of environmental degradation, a 750 AU threshold would exempt many broiler operations from regulatory requirements. EPA is concerned that a 750 AU threshold would disable permit authorities from effectively addressing regional concerns.

EPA also considered adopting the 1,000 AU threshold, which would have regulated three percent of all operations and 49 percent of all manure generated annually. A threshold of 300 AU was also considered, which would have addressed an additional 8 percent of all manure generated annually, but would have brought into regulation 50 percent more operations than the 500 AU threshold (thus regulating a total of 10 percent of all AFOs which account for 72 percent of AFO manure).

Raising the NPDES threshold to 500 AU, 750 AU or 1,000 AU raises a policy question for facilities below the selected threshold but with more than 300 AU. Facilities with 300 to 1,000 AU are currently subject to NPDES regulation under some conditions, though in practice few operations in this size range have actually been permitted to date. To rely entirely on designation for these operations could be viewed by some as deregulatory, because the designation process is a time consuming and resource intensive process that makes it difficult to redress violations. It also results in the inability for permit authorities to take enforcement actions against initial discharges, (unless they are from an independent point source at the facility); instead such discharges could only result in requiring a permit. Unless the designation process can be streamlined in some way to enable permit authorities to more efficiently address those who are significant contributors of pollutants, raising the threshold too high may also not be sufficiently protective of the environment. Please see Section VII.C.3 and VII.C.4 for a discussion of the designation process.

More information on how data for these alternatives were estimated is provided in section VI of this preamble.

EPA is soliciting comment on the two-tier structure, and what the appropriate threshold should be. In addition, EPA is soliciting comment on other measures this rule, when final, might include to ensure that facilities below the regulatory threshold meet environmental requirements, such as by streamlining the designation process or some other means.

3. Three-Tier Structure

The second alternative that EPA is proposing is a three-tier structure that retains the existing tiers but amends the conditions under which AFOs with 300 AU to 1,000 AU, or ''middle tier'' facilities, would be defined as CAFOs. Further, EPA would require all middle tier AFOs to either apply for an NPDES permit or to certify to the permit authority that they do not meet any of the conditions which would require them to obtain a permit.

EPA is proposing this alternative because it presents a ''risk based'' approach to determining which operations pose the greatest concern and have the greatest potential to discharge. The particular conditions being proposed would have the effect of ensuring that manure at *all* facilities with 300 AU or more is properly managed, and thus may be more environmentally protective than the two-tier structure. Further, even though this alternative would impose some degree of burden on all AFOs with 300 AU or more, it would provide a way for facilities to avoid being permitted, and could reduce the administrative burden associated with permitting.

The three-tier alternative would affect all 26,665 facilities between 300 AU and 1,000 AU in addition to the 12,660 facilities with greater than 1,000 AU, and thus would affect 10 percent of all AFOs while addressing 72 percent of all AFO manure. However, because owners or operators of middle tier facilities would be able to certify that their operations are not CAFOs, EPA estimates that between 4,000 to 19,000 mid-size facilities would need to apply for and obtain a permit.

Of the approximately 26,000 AFOs with 300 AU to 1,000 AU, EPA estimates that owners or operations of approximately 7,000 facilities would have to, at a minimum, implement a Permit Nutrient Plan (as discussed further below) and would be able to certify to the permit authority that they are not a CAFO based on existing practices. Operators of some 19,000 facilities of these middle tier facilities would be required to adopt certain practices in addition to implementing a PNP, in order to be able to certify they are not a CAFO to avoid being permitted.

See the EPA NPDES CAFO Rulemaking Support Document, included in the Record, for detailed descriptions of the number of facilities affected by this and the other alternative scenarios considered.

EPA is also proposing the three-tier structure because it provides flexibility for State programs. A State with an effective non-NPDES program could succeed in helping many of their middle tier operations avoid permits by ensuring they do not meet any of the conditions that would define them as CAFOs. This important factor would enable States to tailor their programs while minimizing the changes State programs might need to make to accommodate today's proposed rulemaking.

The three-tier structure would affect the facilities shown in Table 7–7.

TABLE 7–7.—NUMBER OF ANIMALS IN THE THREE-TIER APPROACH

[By sector]

Animal Type	>1000 AU equivalent (Number of animals)	300–1000AU equivalent (Number of animals)	<300 AU equivalent (Number of animals)
Cattle, Excluding Mature Dairy and Veal	1,000	300–1,000	<300
Veal	1,000	300–1,000	<300
Mature Dairy Cattle	700	200–700	<200
Swine, weighing over 25 kilograms or 55 pounds	2,500	750–2,500	<750
*Immature Swine, weighing less than 25 kilograms or 55 pounds	10,000	3,000–10,000	<3,000
*Chickens	100,000	30,000–100,000	<30,000
Turkeys	55,000	16,500–55,000	<16,500
Ducks	5,000	1,500–5,000	<1,500
Horses	500	150–500	<150

TABLE 7–7.—NUMBER OF ANIMALS IN THE THREE-TIER APPROACH—Continued

[By sector]

Animal Type	>1000 AU equivalent (Number of animals)	300–1000AU equivalent (Number of animals)	<300 AU equivalent (Number of animals)
Sheep or Lambs	10,000	3,000–10,000	<3,000

*Immature swine, heifers and dry chicken operations are not included in the existing regulation but are included in today's proposed rulemaking.

Revised Conditions. EPA examined the conditions under the existing regulation and determined that the conditions needed to be modified in order to improve its efficacy. Under the existing regulation, an AFO with 300 AU to 1,000 AU is not defined as a CAFO unless it meets one of the two criteria governing the method of discharge: (1) Pollutants are discharged through a man-made ditch, flushing system, or other similar man-made device; or (2) pollutants are discharged directly into waters of the United States that originate outside of the facility and pass over, across, or through the facility or otherwise come into direct contact with the confined animals. Under the two-tier structure, these conditions would be eliminated because a facility would simply be defined as a CAFO if it had more than 500 AU. Under the three-tier structure, EPA is proposing to eliminate the existing conditions and add several others designed to identify facilities which pose the greatest risk to water quality.

The three-tier proposal would, for the middle tier, eliminate both criteria in the existing regulation because these conditions have proven to be difficult to interpret and implement for AFOs in the 300 AU to 1,000 AU size category, and thus have not facilitated compliance or enforcement, and the scenario does not meet the goal of today's proposal to simplify the NPDES regulation for CAFOs. The two criteria governing method of discharge, e.g., ''man-made device'' and ''stream running through the CAFO,'' are subject to interpretation, and thus difficult for AFO operators in this size range to determine whether or not the permit authority would consider them to be a CAFO. EPA does not believe it is necessary to retain these criteria because all discharges of pollutants from facilities of this size should be considered point source discharges. By replacing these terms with a list of conditions, EPA intends to clarify that all discharges from CAFOs must be covered by an NPDES permit, whether or not they are from a manmade conveyance. EPA notes that under this proposal, the Agency would not eliminate the two conditions as criteria for designation of AFOs with less than 300 AU as CAFOs. See the discussion of designation in Section VII.C.3.

The revised conditions for the middle tier would require the owner or operator to apply for an NPDES permit if the operation meets any of the following conditions and is therefore a CAFO: (1) There is direct contact of animals with waters of the U.S. at the facility; (2) there is insufficient storage and containment at the production area to prevent discharges from reaching waters of the U.S.; (3) there is evidence of a discharge from the production area in the last five years; (4) the production area is located within 100 feet of waters of the U.S.; (5) the operator does not have, or is not implementing, a Permit Nutrient Plan that meets EPA's minimum requirements; or (6) more than twelve tons of manure is transported off-site to a single recipient annually, unless the recipient has complied with the requirements for off-site shipment of manure.

The EPA NPDES CAFO Rulemaking Support Document, dated September 26, 2000 (available in the rulemaking Record), describes the assumptions used to estimate the number of facilities that would be affected by each condition, which EPA developed in consultation with state regulatory agency personnel, representatives of livestock trade associations, and extension specialists.

Each of these proposed conditions is described further below.

Direct contact of animals with waters of the U.S. The condition for ''direct contact of animals with waters of the U.S.'' covers situations such as dairy or beef cattle walking or standing in a stream or other such water that runs through the production area. This condition ensures that facilities which allow such direct contact have NPDES permits to minimize the water quality problems that such contact can cause.

Insufficient Storage. The condition for ''insufficient storage and containment at the production area to prevent discharge to waters of the U.S.'' is intended to address discharges through any means, including sheet runoff from the production area, whereby rain or other waters might come into contact with manure and other raw materials or wastes and then run off to waters of the U.S. or leach to ground water that has a direct hydrologic connection to waters of the U.S. This is to ensure that all mid-sized facilities prevent discharges from inadequate storage and containment of manure, process wastewater, storm water, and other water coming in contact with manure.

Sufficient storage would be defined as facilities that have been designed and constructed to standards equivalent to today's proposed effluent guidelines. Thus, beef and dairy operations would be designed and constructed to prevent discharge in a 25-year, 24-hour storm event, while swine and poultry would be required to meet a zero discharge standard. See Section VIIIC.6.

Past or Current Discharge. Operations that meet the condition for ''evidence of discharge from the production areas within the past five years'' would be considered CAFOs under this proposal. A discharge would include *all* discharges from the production area including, for example, a discharge from a facility designed to contain a 25-year, 24-hour storm. Evidence of discharge would include: citation by the permit authority; discharge verified by the permit authority whether cited or not; or other verifiable evidence that the permit authority determines to be adequate to indicate a discharge has occurred.

Under this approach, there would be no allowance in the certification process for facilities in the beef and dairy sectors designed to contain runoff from a 25-year, 24-hour storm that had a discharge anyway during an extreme storm event. Thus, in this respect, the requirements for certification would be more stringent than those that would apply to a permitted facility. EPA is thus proposing that a facility that chooses not to be covered by an NPDES permit would not get the benefits of NPDES coverage such as the 25-year, 24-hour storm standard for beef and dairy operations, and upset and bypass defense. Alternatively, EPA is soliciting

comment on the definition of a ''past or current discharge,'' including whether to define it as a discharge from a facility that has not been designed and constructed in accordance with today's proposed effluent guidelines. This would make the certification requirements consistent with those for permitted facilities.

Proximity to Waters of the U.S. Operations with production areas that are located within 100 feet of waters of the U.S. are of particular concern to EPA, since their proximity increases the chance of discharge to waters and is a compelling factor that would indicate the potential to discharge. Research has shown that the amount of pollutants in runoff over land can be mitigated by buffers and setbacks. (See Environmental Impact Assessment; Development of Pollutant Loading Reductions from the Implementation of Nutrient Management and Best Management Practices; both available in the rulemaking Record.) Any operation located at a distance less than the minimum setback poses a particular risk that contaminants will discharge to receiving waters. EPA estimates that approximately 4,000 operations between 300 AU and 1,000 AU in size have production areas that are within 100 feet of waters of the U.S.

Permit Nutrient Plan for Land Application of Manure and Wastewater. For facilities that land apply manure, another condition indicative of risk to water impairment is whether or not the facility has developed and is implementing a Permit Nutrient Plan for manure and/or wastewater that is applied to land that is owned or controlled by the AFO operator. Contamination of water from excessive application of manure and wastewater to fields and cropland presents a substantial risk to the environment and public health because nutrients from agriculture are one of the leading sources of water contamination in the United States. While CAFOs are not the only source of contamination, they are a significant source, and CAFO operators should apply manure properly to minimize environmental impacts. Thus, EPA would require any facility with 300 AU to 1,000 AU that does not have a PNP that conforms to today's proposed effluent guidelines for land application to apply for an NPDES permit. (As described in Section VII.E.1, the PNP is the effluent guideline subset of elements in a CNMP. Section VIII.C.6 of today's proposal describes the effluent guideline requirements in a PNP.)

Certification for Off-site Transfer of CAFO-generated Manure. The final condition for avoiding a permit concerns the transfer of CAFO-generated manure and wastewater to off-site recipients. EPA is co-proposing two ways to address manure transferred off-site, which are discussed in detail in Section VII.D.2, as well as in VII.e.5.e. In this condition, a facility would be considered a CAFO if more than 12 tons of manure is transported off-site to a single recipient annually, unless the AFO owner or operator is complying with the requirements for off-site transfer of manure, or is complying with the requirements of a State program that are equivalent to the requirements of 40 CFR part 412.

Under one co-proposed option, the AFO owner or operator would be required to obtain certifications from recipients that the manure will be properly managed; to maintain records of the recipients and the quantities transferred; and to provide information to the recipient on proper manure management and test results on nutrient content of the manure. Under the alternative option, CAFOs would not be required to obtain certifications, but would still maintain the records of transfers and provide the information to the recipients.

Under the first option, the CAFO owner or operator would obtain a certification from recipients (other than waste haulers that do not land apply the waste) that the manure: (1) Will be land applied in accordance with proper agricultural practices as defined in today's proposal; (2) will be applied in accordance with an NPDES permit; or (3) will be used for alternative uses, such as for pelletizing or distribution to other markets. If transferring manure and wastewater to a waste hauler, the CAFO owner or operator would be required to obtain the name and location of the recipients of the waste, if known, and provide the hauler with an analysis of the content of the manure and a brochure describing responsibilities for appropriate manure management, which would be provided, in turn, to the recipient. These provisions are discussed in more detail in Sections VII.D.4 and VII.E.4.

Excess Manure Alternative Considered. As an alternative to the two conditions addressing land application of CAFO-generated manure, EPA also considered a condition that would simply require the CAFO operator to determine whether it generates more manure than the land under his or her control could accommodate at allowable manure application rates, and if so, it would be a CAFO, required to land apply according to a PNP. Further, this condition would create a voluntary option for off-site transfer of CAFO-generated manure whereby, if the manure was transferred to someone certifying they had a certified CNMP and were implementing it, the facility would not be a CAFO on the basis of having excess manure.

EPA considered this criterion to identify which CAFOs were likely to pose a risk of discharge and impacts to human health and the environment based on generation of excess manure (*e.g.,* more manure than can be properly applied to land under his or her operational control). Requiring such CAFOs to apply for an NPDES permit would allow EPA to require these operations to maintain records documenting the fate of the manure (*e.g.,* whether it was land applied on-site or transferred to a third party). EPA is interested in monitoring the fate of the large quantities of manure generated by CAFOs, and in educating recipients regarding proper agricultural practices. CAFO operators able to certify there is sufficient cropland under their operational control to accommodate the proper application of manure generated at their facility would not be defined as CAFOs and thus would not need to apply for an NPDES permit on that basis.

To identify facilities that generate excess manure, EPA considered a screening tool originally developed by USDA, known as Manure Master. The tool allows AFO operators to compare the nutrient content in the animal manure produced by an AFO with the quantity of nutrients used and removed from the field on which that manure is applied. This tool would help assess the relative potential for the nutrients contained in the animal manure to meet or exceed the crop uptake and utilization requirements for those crops that receive applications of manure. The screening tool calculates a balance between the nitrogen, phosphorus, and potassium content in the manure and the quantity of these nutrients used by particular crops. This balance can be calculated based upon recommended fertilizer application rates, when known, or upon estimated plant nutrient content, when recommended fertilizer application rates are not known. For nitrogen, the balance is calculated taking into account expected losses from leaching, denitrification, and volatilization.

The manure screening tool would be available as either an Internet-based program or as a computer software program that allows for direct input of data and generation of reports. AFO operators would enter the average number of confined animals by animal

type, the number of acres for each crop, and the expected yield for each crop for which the operator expects to apply manure. The operator would also specify whether the manure is incorporated into the soil or surface applied. The software also allows, but does not require, entry of soil test or other crop nutrient recommendations. The screening tool produces a report that includes the balance (i.e., pounds needed or pounds excess, per acre) for nitrogen, phosphorus, and potassium for an AFO operator's fields. The balance will advise the operator whether the quantity of nutrients in his or her animal manure exceeds the quantity removed in harvested plants or the quantity of nutrients recommended.

There are many assumptions in this screening tool that make it too general to use for detailed nutrient management planning, although it would be useful as a rough means of determining whether a facility is generating manure in excess of crop needs. The factors used to calculate manure nutrient content are developed from estimates that account for nutrient losses due to collection, storage, treatment, and handling. When manure is not incorporated, an additional nitrogen loss is included for volatilization. When the nutrients exceed nutrient utilization, there is increased potential for nutrients to leach or runoff from fields and become pollutants of ground or surface water. This software is intended to be used as a decision support screening tool to allow AFO operators to make a quick evaluation as to whether the quantity of nutrients applied to the land on which manure is spread exceeds the quantity of nutrients used by crops. EPA believes it could be a valuable tool to determine, at a screening level, whether available nutrients exceed crop needs and, thus, whether a facility has a greater likelihood for generating the runoff of nutrients that could impact water quality. EPA is not proposing this option as there are concerns that simply having enough land may not provide assurance that the manure would be applied in ways that avoided impairing water quality. However, EPA is requesting comment below on an alternative three-tier approach that would include such a screening tool as one of the criteria for certifying that an AFO in the 300 to 1,000 AU size category is not a CAFO.

Certifying That a Middle Tier AFO is not a CAFO. Under the three-tier structure, EPA is proposing to allow AFOs with between 300 AU and 1,000 AU to certify to the permit authority that they do not meet any of the risk-based conditions and thus are not CAFOs. The certification would be a check-off form that would also request some basic information about the facility, including name and address of the owner and operators; facility name and address and contact person; physical location and longitude and latitude information for the production area; type and number of animals at the AFO; and signature of owner, operator or authorized representative. The draft sample certification form is included here for public comment.

Form for Certifying Out of the Concentrated Animal Feeding Operation Provisions of the National Pollutant Discharge Elimination System

This checklist is to assist you in determining whether your animal feeding operation (AFO) is, or is not, a concentrated animal feeding operation (CAFO) subject to certain regulatory provisions. For clarification, please see the attached fact sheet.

Section 1. First Determine Whether or not Your Facility Is an AFO

A facility that houses animals is an animal feeding operation if:

- Animals (other than aquatic animals) have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period.
- Animals are not considered to be stabled or confined when they are in areas such as pastures or rangeland that sustain crops or forage growth during the entire time that animals are present.

Yes, my facility is an AFO. PROCEED TO SECTION 2.

No, my facility is *not* an AFO. STOP. YOU DO NOT NEED TO SUBMIT THIS FORM

Section 2. Determine the Size Range of Your AFO

If your facility is an AFO, and the number of animals is in the size range for any animal type listed below, then you may potentially be a concentrated animal feeding operation.

200–700 mature dairy cattle (whether milked or dry)
300–1000 head of cattle other than mature dairy cattle
750–2,500 swine each weighing over 25 kilograms (55 pounds)
3,000–10,000 swine each weighing under 25 kilograms (55 pounds)
30,000–100,000 chickens
16,500–55,000 turkeys
150–500 horses
3,000–10,000 sheep or lambs
1,500–5,000 ducks

My AFO is within this size range. PROCEED TO SECTION 3.

My AFO has fewer than the lower threshold number for any animal type so I am not a CAFO under this description. STOP.

My AFO has more than the upper threshold number of animals for any animal type. STOP. PLEASE CONTACT YOUR PERMIT AUTHORITY FOR INFORMATION ON HOW TO APPLY FOR AN NPDES PERMIT.

Section 3. Minimum Requirements

Check all boxes that apply to your operation. If *all* of the following boxes are checked, PROCEED TO SECTION 4.

My production area is not located within 100 feet of waters of the U.S.

There is no direct contact of animals with waters of the U.S. in the production area.

I am currently maintaining properly engineered manure and wastewater storage and containment structures designed to prevent discharge in either a 25-year, 24-hour storm (for beef and dairy facilities) or all circumstances (for all other facilities), in accordance with the effluent guidelines (40 CFR Part 412).

There are no discharges from the production area and there have been no discharges in the past 5 years.

I have not been notified by my State permit authority or EPA that my facility needs an NPDES permit

If any box in this section is *not* checked, you may not use this certification and you must apply for an NPDES permit. STOP. PLEASE CONTACT YOUR PERMIT AUTHORITY FOR MORE INFORMATION.

Section 4. Land Application

A. If all of the boxes in Section 3 are checked, you may be able to certify that you are not a CAFO on the basis of ensuring proper agricultural practices for land application of CAFO manure:

I either do not land apply manure or, if land applying manure, I have, and am implementing, a certified Permit Nutrient Plan (PNP). I maintain a copy of my PNP at my facility, including records of implementation and monitoring; and

B. Check One:

My State has a program for excess manure in which I participate. OR

[Alternative 1: I do not transfer more than 12 tons of manure to any off-site recipients unless they have signed a certification form assuring me that they are either 1) applying manure according to proper agricultural practices; 2) obtaining an NPDES permit for discharges; or 3) transferring manure to other non-land application uses; and] [For Alternative 2, this box is not needed]

I maintain records of recipients, receiving greater than 12 tons of manure annually, and the quantity and dates transferred, and I provide recipients an analysis of the content of the manure as well as information describing the recipients responsibilities for appropriate manure management. If I transfer manure or wastewater to a manure hauler, I also obtain the name and location of the recipients of the manure, if known;

If a box is checked in both subsection A and subsection B above, you may certify that you are not a CAFO. PROCEED TO SECTION 5.

If a box is not checked in both subsection A and subsection B above, you may not use this certification form. STOP. YOU MUST APPLY FOR AN NPDES PERMIT.

Section 5. Certification

I certify that I own or operate the animal feeding operation described herein, and have legal authority to make management decisions about said operation. I certify that

the information provided is true and correct to the best of my knowledge.

I understand that in the event of a discharge to waters of the U.S. from my AFO, I must report the discharge to the Permit Authority and apply for a permit. I will report the discharge by phone within 24 hours, submit a written report within 7 calendar days, and make arrangements to correct the conditions that caused the discharge.

In the event any of these conditions can no longer be met, I understand that my facility is a CAFO and I must immediately apply for a permit. I also understand that I am liable for any unpermitted discharges. This certification must be renewed every 5 years.

I certify under penalty of law that this document either was prepared by me or was prepared under my direction or supervision. Based on my inquiry of the person or persons who gathered the information, the information provided is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Facility Name □□□□□□□□□□□□□□□□
Name of Certifier □□□□□□□□□□□□□
Signature □□□□□□□□□□□□□□□□□
Date□□□□□□□□□□□

Check one: □ owner □ operator

Name & Address of other entity that exercises substantial operational control of this CAFO: □□□□□□□□□□□□□□□□□□□□□□□□

Address of animal feeding operation:
County:
State:
Latitude/Longitude:
Phone:
Email:
Name of Closest Waters of the U.S.:
Distance to Waters:
Description of closest waters: (e.g. intermittent stream, perennial stream; ground water aquifer): □□□□□□□□□□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□□□□□

Where an operation in the 300–1000 AU size range has certified that it meets all of the required conditions to be excluded from the CAFO definition, if at any future point the operation fails to meet one or more of these conditions, it would immediately become defined as a CAFO. Any discharges from the operation at that point would be illegal until the operation obtains a permit. For example, if an operation has certified that it meets all of the conditions for being excluded from the CAFO definition, but then has an actual discharge to the waters (which would be inconsistent with the certification that there is no ''current discharge''), that discharge would be considered to be an unpermitted discharge from a CAFO. Similarly, if an operation at any point no longer has sufficient storage and containment to prevent discharges, it would immediately become a CAFO and be required to apply for a permit (regardless of whether it had any actual discharges).

Constructing the regulations in this way would do two things. First, it would make clear that there is no shield from liability for any operation that falsely certified that it met the conditions to be excluded from regulation. Second, it would make clear that even in cases where an operation has certified to all the required conditions in good faith, there is no protection from the regulatory and permitting requirements if at any point the operation no longer meets those conditions. Operations would be on notice that if they had any doubts about their continued ability to meet the conditions for exclusion, they should decline to ''certify out'' and should apply for a permit.

Alternative Three-tier Structure: Simplified Certification. EPA is requesting comment on a variation of the three-tier structure being co-proposed today. Under this alternative, operations with > 1,000 AU would be subject to the same requirements as under both of today's co-proposed options, and operations between 300 and 1,000 animal units would be defined as CAFOs, required to obtain an NPDES permit, unless they can certify that they do not meet the conditions for definition as a CAFO. However, the conditions for making this certification would be different than those under the proposed three-tier approach, and the substantive permit requirements for operations between 300 and 1,000 AU that do not certify would also be different.

Under this approach, operations between 300 and 1,000 AU, that are not likely to be significant contributors of pollutants, could avoid definition as a CAFO by certifying to a more limited range of factors. The check list would indicate, for example, adequate facility design to contain manure and runoff in up to a 25-year, 24-hour storm, use of appropriate BMPs, and application of manure at agronomic rates. Under this variation, the check list would be designed to minimize both the required information and the substantive operational requirements for these middle tier facilities on the grounds that, because they are smaller size operations, they are less likely to be the type of concentrated, industrial operations that Congress intended to include as CAFOs. So, for example, the check list could allow several alternatives for appropriate manure storage, including cost-effective BMPs such as stacking manure in certain locations or in certain ways to avoid discharge, in lieu of expanded structural storage capacity. Similarly, the indication that manure is applied at agronomic rates could be based on a simple ratio of animals to crop land, or on the use of a more sophisticated screening tool, such as the USDA developed tool described above, but would not necessarily require preparation of a full CNMP by a certified planner. The check list might also include an assurance by the operator that recipients of off-site manure are provided nutrient test results and information on appropriate manure management.

AFOs in this size category that are not able to certify, according to the check list criteria, that they are not likely to be significant contributors of pollutants to waters of the US would be defined as CAFOs and thus required to obtain an NPDES permit. However, the conditions in the permit would not necessarily be the same as those in permits for operations with > 1,000 AU. In particular, the effluent guidelines described in today's proposal would not be applicable to these facilities. Rather, CAFOs in this size category would be required to operate in accordance with BAT, as determined by the best professional judgement (BPJ) of the permit writer. This is the same as the existing requirement for CAFOs in this size category. Or, EPA might promulgate an alternate set of national effluent guidelines for CAFOs in this subcategory. Such effluent guidelines might include zero discharge from the production area in up to a 25-year, 24-hour storm, implementation of a PNP, appropriate BMPs, and appropriate management of manure shipped off-site.

Under this approach, all 26,665 operations between 300 and 1,000 AU would be affected by the rule, just as under the three-tier approach being proposed today. However, EPA expects that a larger number of facilities would be able to avoid definition as a CAFO and the requirement to obtain a permit than under today's proposed approach. EPA has not estimated the number of operations that would be defined as CAFOs under this alternative three-tier approach, but expects that it would be more than 16,420 but fewer than 31,930 (of which some 13,000 would have over 1,000 AU). For those facilities that did receive a permit, compliance would generally be less expensive. This approach was presented to small entity representatives (SERs) during the SBREFA outreach conducted for this rule, and discussed in detail by the Small Business Advocacy Review Panel that conducted the outreach. While some concerns were expressed, the approach was generally received

favorably by both the SERs and the Panel. See the Panel Report (2000) for a complete discussion of the Panel's consideration of this option.

EPA requests comment on this alternative three tier approach. In particular, EPA requests comment on which items should be included in the certification check list, and whether substantive permit requirements for CAFOs in this size category should be left completely up to the BPJ of the permit authority, or based on an alternate set of effluent guidelines, as discussed above. After evaluating public comments, EPA may decide to further explore this option. At that time, EPA would develop and make available for public comment as appropriate a more detailed description of the specific requirements of such an approach, as well as a full analysis of its costs, benefits, and economic impacts. In particular, EPA would add an analysis to the public record of why it would be appropriate to promulgate different effluent guideline requirements, or no effluent guideline requirements, for CAFOs that have between 300 and 1,000 AU as compared to the effluent guidelines for operations with greater than 1,000 AU. This would include an evaluation of whether the available technologies and economic impacts are different for the smaller versus the larger CAFOs.

4. Comparative Analysis

EPA is proposing both the two- and three-tier structures for public comment as they both offer desirable qualities. On the one hand, the two-tier structure is simple and clear, focuses on the larger operations, and provides regulatory relief to smaller businesses. However, it requires permits of all facilities meeting the size threshold. On the other hand, the three-tier structure offers flexibility to States for addressing environmental impacts of AFOs through non-NPDES programs or non-regulatory programs, while focusing the regulation on facilities demonstrating certain risk characteristics. It imposes, however, some degree of burden to all facilities more than 300 AU.

The costs of each of the six alternatives considered by EPA are discussed in Section X of today's proposal, and benefits are discussed in Section XI. Key findings from EPA's analysis are summarized in Table 7–8 for quick reference. See Sections X and XI for full discussions and explanations.

EPA solicits comment on both of today's alternative proposed structures, as well as on the two alternatives discussed above.

EPA is also soliciting comment on whether or not to adopt both the two-tier and the three-tier structures, and to provide a mechanism to allow States to select which of the two alternative proposed structures to adopt in their State NPDES program. Under this option, a State could adopt the structure that best fits with the administrative structure of their program, and that best serves the character of the industries located in their State and the associated environmental problems. This option is viable only if the Agency is able to determine that the two structures provide substantially similar environmental benefits by regulating equivalent numbers of facilities and amounts of manure. Otherwise, States would be in a position to choose a less stringent regulation, contrary to the requirements of the Clean Water Act.

EPA's preliminary assessment is that there appear to be significant differences in the scope of the structures, such that the two-tier structure could be considered less stringent than the three-tier structure, depending upon which structures, criteria and thresholds are selected in the final proposal. As table 7–8 indicates, for example, the co-proposed two-tier structure with a 500 AU threshold would regulated 25,540 operations, whereas the co-proposed three-tier structure would regulate up to 39,320 operations. A two-tier structure with 750 AU would regulate 19,100 operations, whereas the alternative, less stringent, three-tier structure would regulate as few as 16,000 and as many as 32,000. The range of manure covered under these various alternatives ranges from as little as 49% to as much as 72% of all AFO manure. Further, how each animal sector is affected varies with each alternative, with some alternatives being significantly less protective in certain sectors than other alternatives. Section VI of today's preamble provides more information on the affects on each animal sector of various alternatives.

EPA is not able to conclude that the stringency of the two options is equivalent, due to the lack of data and EPA's uncertainty over exactly how many facilities may be subject to regulation under each alternative. Therefore, EPA is not proposing this option. However, EPA seeks comment on the option to allow States to select which of two structures to implement, and requests information on establishing whether two options provide equivalent environmental protection.

TABLE 7–8.—COMPARISON OF REGULATORY ALTERNATIVES FOR SELECT CRITERIA [a]

Criteria	Baseline	2-Tier alternatives			3-Tier alternatives	
	>1000 AU	>750 AU	>500 AU	>300 AU	Proposed	Alternative
Number Operations that will be Required to Obtain a Permit	12,660	19,100	25,540	39,320	[1] 31,930	[2] >16,420
Percentage of Affected Operations Required to Obtain a Permit	3	5	7	11	9	10
Estimated Compliance Costs to CAFOs ($million/year, pre-tax)	605	721	831	980	930	>680
Percentage Manure Covered by Proposed Regulations	49	58	64	72	72	[3] ND

[1] Three-tier Proposed: Number of affected facilities up to 39,320. Number of permitted facilities between 16,000 and 32,000, rounded.
[2] Three-tier Alternative: Number of affected facilities and industry costs are expected to be greater than that estimated for NPDES Scenario 1 (''Status Quo'').
[3] ND = Not Determined.

5. Additional Scenarios Considered But Not Proposed

EPA also considered two other scenarios, which would retain the existing three-tier approach.

a. *Scenario 1: Retain Existing Structure.* One of the alternative regulatory scenarios would incorporate all of today's proposed revisions except those related to the tiered structure for defining which AFOs are CAFOs. In other words, the existing three-tier structure (greater than 1,000 AU; 300 AU to 1,000 AU; fewer than 300 AU) would remain in place, and the conditions for defining the middle tier operations would not change. Thus, as under the existing regulation, mid-sized AFOs (300 AU to 1,000 AU) would be defined as CAFOs only if, in addition to the number of animals confined, they

also meet one of the two specific criteria governing the method of discharge: (1) Pollutants are discharged through a man-made ditch, flushing system, or other similar man-made device; or (2) pollutants are discharged directly into waters of the United States that originate outside of the facility and pass over, across, or through the facility or otherwise come into direct contact with the confined animals.

EPA is not proposing this scenario because these conditions have proven to be difficult to interpret and implement for AFOs in the 300 to 1,000 AU size category, and thus have not facilitated compliance or enforcement, and the scenario does not meet the goal of today's proposal to simplify the NPDES regulation for CAFOs. The two criteria governing method of discharge, e.g., ''man-made device'' and ''stream running through the CAFO,'' are subject to interpretation, and thus difficult for AFO operators in this size range to determine whether or not the permit authority would consider them to be a CAFO. EPA does not believe it is necessary to retain these criteria because all discharges of pollutants from facilities of this size should be considered point source discharges. While the other proposed changes go a long way to improve the effectiveness of the NPDES program for CAFOs, EPA believes the definition criteria for facilities in this size range also need to be amended to make the regulation effective, simple, and enforceable.

b. *Scenario 2: Revised Conditions Without Certification.* The second scenario EPA considered would also retain the existing three-tier structure, and would modify the conditions for defining the middle tier AFOs as CAFOs in the same way that today's proposed three-tier structure does. That is, any AFO that meets the size condition (300 AU to 1,000 AU) would be defined as a CAFO if it met one or more of the following risk-based conditions: (1) Direct contact of animals with waters of the U.S.; (2) insufficient storage and containment at the production area to prevent discharge from reaching waters of the U.S.; (3) evidence of discharge in the last five years; (4) the production area is located within 100 feet of waters of the U.S.; (5) the operator does not have, or is not implementing, a Permit Nutrient Plan; and (6) any manure transported off-site is transferred to recipients of more than twelve tons annually without following proper off-site manure management, described above in the discussion of the three-tier structure (co-proposed with omitting this requirement).

In this scenario, owners or operators of AFOs in the middle tier would not be required to certify to the permit authority that the facility is not a CAFO. However, all facilities that do meet one or more of the conditions would have a duty to apply for an NPDES permit. This scenario is not being proposed because of concerns that there would be no way for the permit authority to know which operations were taking the exemption and which should, in fact, be applying for a permit. The certification scenario provides a measure of assurance to the public, the permit authority, and the facilities' owners or operators, that CAFOs and AFOs are implementing necessary practices to protect water quality.

C. Changes to the NPDES Regulations

In addition to changing the threshold for determining which facilities are CAFOs, EPA is proposing a number of other changes that address how the permitting authority determines whether a facility is an AFO or a CAFO that, therefore, must apply for an NPDES permit. These proposed revisions are discussed in this section and in section D.

1. Change the AFO Definition to Clearly Distinguish Pasture Land

EPA is proposing to clarify the regulatory language that defines the term ''animal feeding operations,'' or AFO, in order to remove ambiguity. See proposed § 122.23(a)(2). The proposed rule language would clarify that animals are not considered to be ''stabled or confined'' when they are in areas such as pastures or rangeland that sustain crops or forage during the entire time animals are present. Other proposed changes to the definition of AFO are discussed below in section 3.e.

To be considered a CAFO, a facility must first meet the AFO definition. AFOs are enterprises where animals are kept and raised in confined situations. AFOs concentrate animals, feed, manure and urine, dead animals, and production operations on a small land area. Feed is brought to the animals rather than the animals grazing or otherwise seeking feed in pastures, fields, or on rangeland. The current regulation [40 CFR 122.23(b)(1)] defines an AFO as a ''lot or facility where animals have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12 month period; *and where crops, vegetation[,] forage growth, or post-harvest residues are not sustained over any portion of the lot or facility in the normal growing season*'' [emphasis added].

The definition states that animals must be kept on the lot or facility for a minimum of 45 days, in a 12-month period. If an animal is at a facility for any portion of a day, it is considered to be at the facility for a full day. However, this does not mean that the same animals must remain on the lot for 45 consecutive days or more; only that some animals are fed or maintained on the lot or at the facility 45 days out of any 12-month period. The 45 days do not have to be consecutive, and the 12-month period does not have to correspond to the calendar year. For example, June 1 to the following May 31 would constitute a 12-month period.

The definition has proven to be difficult to implement and has led to some confusion. Some CAFO operators have asserted that they are not AFOs under this definition where incidental growth occurs on small portions of the confinement area. In the case of certain wintering operations, animals confined during winter months quickly denude the feedlot of growth that grew during the summer months. The definition was not intended to exclude, from the definition of an AFO, those confinement areas that have growth over only a small portion of the facility or that have growth only a portion of the time that the animals are present. The definition is intended to exclude pastures and rangeland that are largely covered with vegetation that can absorb nutrients in the manure. It is intended to include as AFOs areas where animals are confined in such a density that significant vegetation cannot be sustained over most of the confinement area.

As indicated in the original CAFO rulemaking in the 1970s, the reference to vegetation in the definition is intended to distinguish feedlots (whether outdoor confinement areas or indoor covered areas with constructed floors) from pasture or grazing land. If a facility maintains animals in an area without vegetation, including dirt lots or constructed floors, the facility meets this part of the definition. Dirt lots with nominal vegetative growth while animals are present are also considered by EPA to meet the second part of the AFO definition, even if substantial growth of vegetation occurs during months when animals are kept elsewhere. Thus, in the case of a wintering operation, EPA considers the facility an AFO potentially subject to NPDES regulations as a CAFO. It is not EPA's intention, however, to include within the AFO definition pasture or rangeland that has a small, bare patch of land, in an otherwise vegetated area, that is caused by animals frequently

congregating if the animals are not confined to the area.

The following examples are presented to further clarify EPA's intent. (1) When animals are restricted to vegetated areas as in the case of rotational grazing, they would not be considered to be confined in an AFO if they are rotated out of the area while the ground is still covered with vegetation. (2) If a small portion of a pasture is barren because, e.g., animals congregate near the feed trough in that portion of the pasture, that area is not considered an AFO because animals are not confined to the barren area. (3) If an area has vegetation when animals are initially confined there, but the animals remove the vegetation during their confinement, that area would be considered an AFO. This may occur, for instance, at some wintering operations.

Thus, to address the ambiguities noted above, EPA is proposing to clarify the regulatory language that defines the term ''animal feeding operation'' as follows: ''An animal feeding operation or AFO is a facility where animals (other than aquatic animals) have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period. Animals are not considered to be stabled or confined when they are in areas such as pastures or rangeland that sustain crops or forage growth during the entire time that animals are present. Animal feeding operations include both the production area and land application area as defined below.'' EPA is interested in receiving comments regarding whether the proposed revision to the AFO definition clearly distinguishes confinement areas from pasture land.

2. Proposed Changes to the NPDES Permitting Regulation for Determining Which AFOs are CAFOs

To improve the effectiveness and clarity of the NPDES regulation for CAFOs, EPA is proposing to revise the regulation as discussed in the following sections.

a. *Eliminate the Term ''Animal Unit''.* To remove confusion for the regulated community concerning the definition of the term ''animal unit'' or ''AU,'' EPA is proposing to eliminate the use of the term in the revised regulation. Instead of referring to facilities as having greater or fewer than 500 animal units, for example, EPA will use the term ''CAFO'' to refer to those facilities that are either defined or designated, and all others as ''AFOs.'' However, in the text of today's preamble, the term AU will be used in order to help the reader understand the differences between the existing regulation and today's proposal. If this revision is adopted, the term AU will not be used in the final regulation. Section VII.B, above, lists the numbers of animals in each sector that would be used to define a facility as a CAFO.

EPA received comment on the concept of animal units during the AFO Strategy listening sessions, the small business outreach process, and on comments submitted for the draft CAFO NPDES Permit Guidance and Example Permit. EPA's decision to move away from the concept of ''animal units'' is supported by the inconsistent use of this concept across a number of federal programs, which has resulted in confusion in the regulated community. A common thread across all of the federal programs is the need to normalize numbers of animals across animal types. Animal units have been established based upon a number of different values that include live weight, forage requirements, or nutrient excretion.

USDA and EPA have different ''animal unit'' values for the livestock sectors. Animal unit values used by USDA are live-weight based, and account for all sizes and breeds of animals at a given operation. This is particularly confusing as USDA's animal unit descriptions result in different values in each sector and at each operation.

The United States Department of Interior (Bureau of Land Management and National Park Service) also references the concept of ''animal unit'' in a number of programs. These programs are responsible for the collection of grazing fees for federal lands. The animal unit values used in these programs are based upon forage requirements. For Federal lands an animal unit represents one mature cow, bull, steer, heifer, horse, mule, or five sheep, or five goats, all over six months of age. An animal unit month is based on the amount of forage needed to sustain one animal unit for one month. Grazing fees for Federal lands are charged by animal unit months.

In summary, using the total number of head that defines an operation as a CAFO will minimize confusion with animal unit definitions established by other programs. See tables 7–6 and 7–7 above.

b. *How Will Operations With Mixed Animal Types be Counted?* EPA is proposing to eliminate the existing mixed animal provision, which currently requires an operator to add the number of animal units from all animal sectors at the facility when determining whether it is a CAFO. (Poultry is currently excluded from this mixed animal type calculation). While the mixed calculation would be eliminated, once the number of animals from one sector (e.g. beef, dairy, poultry, swine, veal) of one type cause an operation to be defined as a CAFO, manure from all confined animal types at the facility would be covered by the permit conditions. In the event that waste streams from multiple livestock species are commingled, and the regulatory requirements for each species are not equivalent, the permit must apply the more stringent requirements.

In the existing regulation, a facility with 1,000 animal units or the cumulative number of mixed animal types which exceeds 1,000, is defined as a CAFO. Animal unit means a unit of measurement for any animal feeding operation calculated by adding the following numbers: the number of slaughter and feeder cattle multiplied by 1.0, plus the number of mature dairy cattle multiplied by 1.4, plus the number of swine weighing over 25 kilograms (approximately 55 pounds) multiplied by 0.4, plus the number of sheep multiplied by 0.1, plus the number of horses multiplied by 2.0. As mentioned, poultry operations are excluded from this mixed unit calculation as the current regulation simply stipulates the number of birds that define the operation as a CAFO, and assigns no multiplier.

Because simplicity is one objective of these proposed regulatory revisions, the Agency believes that either all animal types, including poultry, covered by the effluent guidelines and NPDES regulation should be included in the formula for mixed facilities, or EPA should eliminate the facility multipliers from the revised rule. Today's rulemaking proposes changes that would have to be factored in to a revised mixed animal calculation which would make the regulation more complicated to implement. For example, EPA is proposing to cover additional animal types (dry chicken operations, immature swine and heifer operations). Thus, EPA is proposing to eliminate the mixed operation calculation rather than revise it and create a more complicated regulation to implement that would potentially bring smaller farms into regulation.

EPA believes that the effect of this proposed change would be sufficiently protective of the environment while maintaining a consistently enforceable regulation. EPA estimates 25 percent of AFOs with less than 1,000 AU have multiple animal types present simultaneously at one location, and only a small fraction of these AFOs would be CAFOs exceeding either 300 AU or 500 AU when all animal types are

counted. EPA also believes that few large AFOs possess mixed animals due to the increasingly specialized nature of livestock and poultry production. Therefore, EPA believes that a rule which required mixed animal types to be part of the threshold calculation to determine if a facility is a CAFO would result in few additional operations meeting the definition of a CAFO. In addition, most facilities with mixed animal types tend to be much smaller, and tend to have more traditional, oftentimes more sustainable, production systems. These farms tend to be less specialized, engaging in both animal and crop production. They often have sufficient cropland and fertilizer needs to land apply manure nutrients generated at the farm's livestock or poultry business. Nevertheless, should such an AFO be found to be a significant contributor of pollution to waters of the U.S., it could be designated a CAFO by the permit authority.

EPA is, therefore, proposing to eliminate the mixed animal calculation in determining which AFOs are CAFOs. Once an operation is a CAFO for any reason, manure from all confined animal types at the facility is subject to the permit requirements. EPA is requesting comment on the number of operations that could potentially have the equivalent of 500 AU using the mixed calculation that would be excluded from regulation under this proposal.

c. *Is an AFO Considered a CAFO if it Only Discharges During a 25-Year, 24-Hour Storm?* EPA is proposing to eliminate the 25-year, 24-hour storm event exemption from the CAFO definition (40 CFR 122.23, Appendix B), thereby requiring any operation that meets the definition of a CAFO either to apply for a permit or to establish that it has no potential to discharge. Under the proposed three-tier structure an operation with 300 AU to 1,000 AU may certify that it is not a CAFO if it is designed, constructed, and maintained in accordance with today's effluent guidelines and it does not meet any of the risk-based conditions. See Section VII.B.2.

The existing NPDES definition of a CAFO provides that ''no animal feeding operation is a concentrated animal feeding operation * * * as defined above * * * if such animal feeding operation discharges only as the result of a 25-year, 24-hour storm event'' (40 CFR § 122.23, Appendix B). This provision applies to AFOs with 300 AU or more that are defined as CAFOs under the existing regulation. (Facilities of any size that are CAFOs by virtue of designation are not eligible for this exemption because, by the terms of designation, it does not apply to them. Moreover, they have been determined by the permit authority to be a significant contributor of pollution to waters of the U.S.)

The 25-year, 24-hour standard is an engineering standard used for construction of storm water detention structures. The term ''25-year, 24-hour storm event'' means the maximum 24-hour precipitation event with a probable recurrence of once in 25 years, as defined by the National Weather Service (NWS) in Technical Paper Number 40 (TP40), ''Rainfall Frequency Atlas of the United States,'' May 1961, and subsequent amendments, or by equivalent regional or State rainfall probability information developed therefrom. [40 CFR Part 412.11(e)]. (Note that the NWS is updating some of the Precipitation Frequency Publications, including part of the TP40. In 1973, the National Atmospheric and Oceanic Administration (NOAA) issued the NOAA Atlas 2, Precipitation Frequency Atlas of the Western United States. The Atlas is published in a separate volume for each of the eleven western states. An update for four of the State volumes is currently being conducted. In addition, the NWS is updating TP40 for the Ohio River Basin which covers a significant portion of the eastern U.S. The updates will reflect more than 30 years of additional data and will benefit from NWS enhanced computer capabilities since the original documents were generated almost 40 years ago.) As discussed further in section VIII, the 25-year, 24-hour storm event also is used as a standard in the effluent limitation guideline.

The circularity of the 25-year, 24-hour storm event exemption in the existing CAFO definition has created confusion that has led to difficulties in implementing the NPDES regulation. The effluent guidelines regulation, which is applicable to permitted CAFOs, requires that CAFOs be designed and constructed to contain such an event. However, the NPDES regulations allows facilities that discharge only as a result of such an event to avoid obtaining a permit. This exemption has resulted in very few operations actually obtaining NPDES permits, which has hampered implementation of the NPDES program. While there are an estimated 12,000 AFOs likely to meet the current definition of a CAFO, only about 2,500 such facilities have obtained an NPDES permit. Many of these unpermitted facilities may incorrectly believe they qualify for the 25-year, 24-hour storm permitting exemption. These unpermitted facilities operate outside the current NPDES program, and State and EPA NPDES permit authorities lack the basic information needed to determine whether or not the exemption has been applied correctly and whether or not the CAFO operation is in compliance with NPDES program requirements.

EPA does not believe that the definition as a CAFO should hinge on whether an AFO only discharges pollutants due to a 25-year, 24-hour storm event. Congress clearly intended for concentrated animal feeding operations to be subject to NPDES permits by explicitly naming CAFOs as point sources in the Clean Water Act Section 502(14). Further, Section 101(a) of the Act specifically states that elimination of discharges down to zero is to be achieved where possible, and EPA does not believe that facilities should avoid the regulatory program altogether by merely claiming that they meet the 25-year, 24-hour criterion. This issue is discussed further below in section VII.C.2(c).

The public has expressed widespread concern regarding whether some of these currently unpermitted facilities are, in fact, entitled to this exemption. Based on comments EPA has received in a variety of forums, including during the AFO Strategy listening sessions and on the draft CAFO permit guidance, EPA believes there is a strong likelihood that many of these facilities are discharging pollutants to waters of the U.S. EPA is concerned that, in applying the 25-year, 24-hour storm exemption, operations are not now taking into consideration runoff from their production areas, or are improperly interpreting which discharges are the result of 25-year 24-hour storms and chronic rainfall which may result in breaches and overflows of storage systems, all of which cause pollution to enter waters of the U.S. Additionally, facilities may not be considering discharges from improper land application of manure and wastewater.

EPA is today proposing to eliminate the 25-year, 24-hour storm exemption from the CAFO definition (40 CFR 122.23, Appendix B) in order to: (a) Ensure that all CAFOs with a potential to discharge are appropriately permitted; (b) ensure through permitting that facilities are, in fact, properly designed, constructed, and maintained to contain a 25-year, 24-hour storm event, or to meet a zero discharge requirement, as the case may be; (c) improve the ability of EPA and State permit authorities to monitor compliance; (d) ensure that facilities do

not discharge pollutants from their production areas or from excessive land application of manure and wastewater; (e) make the NPDES permitting provision consistent with today's proposal to eliminate the 25-year, 24-hour storm design standard from the effluent guidelines for swine, veal and poultry; and (f) achieve EPA's goals of simplifying the regulation, providing clarity to the regulated community, and improving the consistency of implementation.

Under the proposed two-tier structure, any facility that is defined as a CAFO would be a CAFO even if it only discharges in the event of a 25-year, 24-hour storm. Further, the CAFO operator would be required to apply for an NPDES permit, as discussed below regarding the duty to apply for a NPDES permit. (If the operator believes the facility never discharges, the operator could request a determination of no potential to discharge, as discussed below.) Under the three-tier structure a facility with 300 AU to 1,000 AU would be required to either certify it is not a CAFO, to apply for a permit, or demonstrate it has no potential to discharge. Today's effluent guidelines proposal would retain the design specification for beef or dairy facilities, which would allow a permitted facility to discharge due to a 25-year, 24-hour event, as long as the facility's containment system is designed, constructed and operated to handle manure and wastewater plus precipitation from a 25-year, 24-hour storm event (unless a permit writer imposed a more stringent, water quality-based effluent limitation). However, a facility that meets the definition of CAFO and discharges during a 25-year, 24-hour storm event, but has failed to apply for an NPDES permit (or to certify in the three-tier structure), would be subject to enforcement for violating the CWA. Swine, veal and poultry CAFOs would be required to achieve a zero discharge standard at all times.

EPA considered limiting this change to the very largest CAFOs (e.g., operations with 1,000 or more animal units), and retaining the exemption for smaller facilities. However, EPA is concerned that this could allow significant discharges resulting from excessive land application of manure and wastewater to remain beyond the scope of the NPDES permitting program, thereby resulting in ongoing discharge of CAFO-generated pollutants into waters of the U.S. Moreover, EPA believes that retaining the exemption for certain operations adds unnecessary complexity to the CAFO definition.

The Small Business Advocacy Review Panel also considered the idea of removing the 25-year, 24-hour exemption. While the Panel agreed that this was generally appropriate for operations above the 1,000 AU threshold, it was divided on whether it would also be appropriate to remove the exemption for facilities below this threshold. The Panel noted that for some such facilities, removing the exemption would not expand the scope of the current regulation, but rather ensure coverage for facilities that should already have obtained a permit. However, the Panel also recognized that eliminating the exemption would require facilities that *do* properly quality for it—e.g., because they do have sufficient manure management and containment in place, or for some other reason, do not discharge except in a 25-year, 24-hour storm—to obtain a permit or certify that none is needed. The Panel recommended that EPA carefully weigh the costs and benefits of removing the exemption for small entities and that it fully analyze the incremental costs associated with permit applications for those facilities not presently permitted that can demonstrate that they do not discharge in less than a 25-year, 24-hour storm event, as well as any costs associated with additional conditions related to land application, nutrient management, or adoption of BMPs that the permit might contain. The Panel further recommended that EPA consider reduced application requirements for small operators affected by the removal of the exemption. The Agency requests comment on whether to retain this exemption for small entities and at what animal unit threshold would be appropriate for doing so.

d. *Who Must Apply for and Obtain an NPDES Permit?* EPA is proposing today to adopt regulations that would expressly require all CAFO owners or operators to apply for an NPDES permit. See proposed § 122.23(c). That is, owners or operators of all facilities defined or designated as CAFOs would be required to apply for an NPDES permit. The existing regulations contain a general duty to apply for a permit, which EPA believes applies to virtually all CAFOs. The majority of CAFO owner or operators, however, have not applied for an NPDES permit. Today's proposed revisions would clarify that all CAFOs owners or operators must apply for an NPDES permit; however, if he or she believes the CAFO does not have a potential to discharge pollutants to waters of the U.S. from either its production area or its land application area(s), he or she could make a no potential discharge demonstration to the permit authority in lieu of submitting a full permit application. If the permit authority agrees that the CAFO does not have a potential to discharge, the permit authority would not need to issue a permit. However, if the unpermitted CAFO does indeed discharge, it would be violating the CWA prohibition against discharging without a permit and would be subject to civil and criminal penalties. Thus, an unpermitted CAFO does not get the benefit of the 25-year, 24-hour storm standard established by the effluent guidelines for beef and dairy, nor does it have the benefit of the upset and bypass affirmative defenses.

The duty to apply for a permit under existing regulations. EPA believes that virtually all facilities defined as CAFOs already have a duty to apply for a permit under the current NPDES regulations, because of their past or current discharges or potential for future discharge. Under NPDES regulations at 40 CFR Part 122.21(a), any person who discharges or proposes to discharge pollutants to the waters of the United States from a point source is required to apply for an NPDES permit. CAFOs are point sources by definition, under § 502 of the CWA and 40 CFR 122.2. Thus, any CAFO that ''discharges or proposes to discharge'' pollutants must apply for a permit.

Large CAFOs with greater than 1,000 AU pose a risk of discharge in a number of different ways. For example, a discharge of pollutants to surface waters can occur through a spill from the waste handling facilities, from a breach or overflow of those facilities, or through runoff from the feedlot area. A discharge can also occur through runoff of pollutants from application of manure and associated wastewaters to the land or through seepage from the production area to ground water where there is a direct hydrologic connection between ground water and surface water. Given the large volume of manure these facilities generate and the variety of ways they may discharge, and based on EPA's and the States' own experience in the field, EPA believes that all or virtually all large CAFOs have had a discharge in the past, have a current discharge, or have the potential to discharge in the future. A CAFO that meets any one of these three criteria would be a facility that ''discharges or proposes to discharge'' pollutants and would therefore need to apply for a permit under the current regulations.

Where CAFO has not discharged in the past, does not now discharge pollutants, and does not expect to discharge pollutants in the future, EPA

believes that the owner or operator of that facility should demonstrate during the NPDES permit application process that it is, in fact, a ''no discharge'' facility. See proposed § 122.23(e). EPA anticipates that very few large CAFOs will be able to successfully demonstrate that they do not discharge pollutants and do not have a reasonable potential to discharge in the future, and furthermore, that very few large CAFOs will wish to forego the protections of an NPDES permit. For instance, only those beef and dairy CAFOs with an NPDES permit will be authorized to discharge in a 25-year, 24-hour storm.

EPA also believes that a CAFO owner or operator's current obligation to apply for an NPDES permit is based not only on discharges from the feedlot area but also on discharges from the land application areas under the control of the CAFO operator. More specifically, discharges of CAFO-generated manure and/or wastewater from such land application areas should be viewed as discharges from the CAFO itself for the purpose of determining whether it has a potential to discharge. EPA recognizes, however, that it has not previously defined CAFOs to include the land application area. EPA is proposing to explicitly include the land application area in the definition of a CAFO in today's action.

The need for a clarified, broadly applicable duty to apply. EPA believes that virtually all large CAFOs have had a past or current discharge or have the potential to discharge in the future, and that meeting any one of these criteria would trigger a duty to apply for a permit. Today, EPA is proposing to revise the regulations by finding that, as a rebuttable presumption, all CAFOs do have a potential to discharge and, therefore, are required to apply for and to obtain an NPDES permit unless they can demonstrate that they will not discharge. See proposed § 122.23(c). (See section VII(F)3 for a fuller discussion on demonstrating ''no potential to discharge.'')

EPA has not previously sought to categorically adopt a duty to apply for an NPDES permit for all facilities within a particular industrial sector. The Agency is proposing today to do so for CAFOs for reasons that involve the unique characteristics of CAFOs and the zero discharge regulatory approach that applies to them.

First, as noted, since the inception of the NPDES permitting program in the 1970s, a relatively small number of larger CAFOs has actually sought permits. Information from State permit authorities and EPA's own regional offices indicates that, currently, approximately 2,500 CAFOs have NPDES permits out of approximately 12,000 CAFOs with greater than 1,000 AU.

EPA believes there are a number of reasons why so few CAFOs have sought NPDES permits over the years. The primary reason appears to be that the definition of a CAFO in the current regulations (as echoed in the regulations of some State programs) excludes animal feeding operations that do not discharge at all or discharge only in the event of a 25-year, 24-hour storm. [40 CFR 122.23, Appendix B]. Based on the existing regulation, many animal feeding operations that claim to be ''zero dischargers'' believe that they are not subject to NPDES permitting because they are excluded from the CAFO definition and thus are not CAFO point sources.

EPA believes that many of the facilities that have relied on this exclusion from the CAFO definition may have misinterpreted this provision. It excludes facilities from the CAFO definition only when they neither discharge pollutants nor have the potential to discharge pollutants in a 25-year, 24-hour storm. In fact, as explained above, a facility that has at least a potential to discharge pollutants (and otherwise meets the CAFO definition) not only is defined as a CAFO but also has a duty to apply for an NPDES permit, regardless of whether it actually discharges. (40 CFR 122.21(a)). Thus, many facilities that have at least a potential to discharge manure and wastewaters may have avoided permitting based on an incorrect reliance on this definitional exclusion.

To compound the confusion under the current regulations, EPA believes, there has been misinterpretation surrounding the issue of discharges from a CAFO's land application areas. As EPA has explained in section VII.D of today's notice, runoff from land application of CAFO manure is viewed as a discharge from the CAFO point source itself. Certain operations may have claimed to be ''zero dischargers'' when in fact they were not, and are not, zero dischargers when runoff from their land application areas is taken into account.

Another category of operations that may have improperly avoided permitting are those that have had a past discharge of pollutants, and are not designed and operated to achieve zero discharge except in a 25-year, 24-hour storm event. Many of these facilities may have decided not to seek a permit because they believe they will not have any future discharges. However, as explained above, an operation that has had a past discharge of pollutants is covered by the NPDES permitting regulations in the same way as operations that have a ''potential'' to discharge—*i.e.,* it is not only defined as a CAFO (where it meets the other elements of the definition) but is required to apply for a permit [Carr v. Alta Verde Industries, Inc., 931 F.2d 1055 (5th Cir. 1991)]. Facilities that have had a past discharge meet the criteria of § 122.21(a), in EPA's view, both as ''dischargers'' and as operations that have the potential for further discharge. Accordingly, they are required to apply for an NPDES permit. Misinterpretation regarding the need to apply for a permit may also have occurred in cases where the past discharges were from land application runoff, as explained above.

Finally, the nature of these operations is that any discharges from manure storage structures to waters of the U.S. are usually only intermittent, either due to accidental releases from equipment failures or storm events or, in some cases, deliberate releases such as pumping out lagoons or pits. The intermittent nature of these discharges, combined with the large numbers of animal feeding operations nationwide, makes it very difficult for EPA and State regulatory agencies to know where discharges have occurred (or in many cases, where animal feeding operations are even located), given the limited resources for conducting inspections. In this sense, CAFOs are distinct from typical industrial point sources subject to the NPDES program, such as manufacturing plants, where a facility's existence and location and the fact that it is discharging wastewaters at all is usually not in question. Accordingly, it is much easier for CAFOs to avoid the permitting system by not reporting their discharges, and there is evidence that such avoidances have taken place.

In sum, EPA believes it is very important in these regulatory revisions to ensure that all CAFOs have a duty to apply for an NPDES permit, including those facilities that currently have a duty to apply because they meet the definition of CAFO under the existing regulations and those facilities which would meet the proposed revised definition of CAFO. Two of the revisions that EPA is proposing today to other parts of the CAFO regulations would themselves significantly address this matter. First, EPA is proposing to eliminate the 25-year, 24-hour storm exemption from the definition of a CAFO. Operations would no longer be able to avoid being defined as CAFO point sources subject to permitting on