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An Agricultural Law Research Article

A Comparison of US and UK Law Regarding Pollution from Agricultural Runoff

by

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Originally published in DRAKE LAW REVIEW
45 DRAKE L. REV. 159 (1997)

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A COMPARISON OF US AND UK LAW REGARDING POLLUTION FROM AGRICULTURAL RUNOFF

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TABLE OF CONTENTS

I.	Introduction.....	159
II.	Historical Overview of the Evolution of Rural Areas.....	160
	A. Transformation of Livestock Production.....	161
	B. Modern Pollution Concerns.....	163
III.	Regulation in the United States: Clean Water Act and CAFOs.....	166
	A. Federal Regulation of Livestock Production Facilities.....	167
	B. EPA Region VI General CAFO Permit and CWA Jurisdiction over Manure Application Fields.....	170
	C. State Regulation of Livestock Production Operations.....	174
	D. Enforcement of Agricultural Pollution Laws in the United States.....	176
IV.	The United Kingdom's Regulatory Regime.....	178
	A. European Community Law.....	179
	B. National Legislation.....	181
	C. Enforcement of Environmental Pollution Laws in the United Kingdom.....	188
	1. The European Community.....	188
	2. The United Kingdom Regulators.....	188
	a. Introduction.....	188
	b. Statutory Offenses.....	189
	c. Other Agencies.....	191
V.	Comparison and Analysis.....	191
VI.	Conclusion.....	195

I. INTRODUCTION

Water pollution resulting from the spreading or discharge of livestock effluent and the excessive use of fertilizers generates considerable concern in

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the regulatory community. In particular, many policymakers from the United States and the United Kingdom express anxiety over the potentially damaging environmental effects from concentrating large amounts of livestock on small areas of land and the associated land application of manure. It is the purpose of this Article to compare the approaches developing in both the United States and the United Kingdom which address agricultural runoff and water quality issues. Before proceeding to the legal analyses, however, it is worthwhile to set the stage and examine the evolution of agricultural production practices. Fundamental changes in the nature and scope of agricultural operations account for an increased sensitivity to the potential pollution problems they engender. Using dairy production as a lens for examining the new shape of agriculture, this Article will explore in detail the environmental regulations surrounding industrialized agriculture.

This Article will utilize some of the experience and original data collected by the Texas Institute for Applied Environmental Research (TIAER) in Erath County, Texas, the state's number one milk producing region. For nearly three years TIAER has conducted *Livestock and the Environment: A National Pilot Project* (NPP) pursuant to Environmental Protection Agency (EPA) sponsorship in the 290,000 acre Upper North Bosque River watershed.¹ The watershed includes approximately 86 dairies totaling 26,000 cows.² Nutrient polluted surface waters provided the project's primary focus, directing some attention to nutrient leaching through the vadose zone and livestock odor.

II. HISTORICAL OVERVIEW OF THE EVOLUTION OF RURAL AREAS

The twentieth century has witnessed a transformation in the character of agricultural areas in the United States and the United Kingdom. In prior times, agricultural production occupied the majority of the workforce and the population was dispersed throughout the countryside. A unique culture took root on the farms. As Don Paarlberg observed in his study of farming institutions:

[m]any years ago agriculture was basically different from other occupations; it was more a way of life than a business. Farmers were self-sufficient. They bought and sold little; they took to market only what was in excess of their family needs. Despite regional differences, there was a generally recognizable rural culture, tradition, and life-style.³

1. RON JONES & LARRY FRAREY, *LIVESTOCK AND THE ENVIRONMENT: A NATIONAL PILOT PROJECT DETAILED PROBLEM STATEMENT* 4 (1993).

2. *Id.* at 6. Notably, the United Kingdom presently contains approximately 11,250 cattle. MINISTRY OF AGRICULTURE, FISHERIES & FOOD AGRICULTURAL STATISTICS 6-7 (1994). Its intensive production centers are located in the southern areas of England. DALE LEUCK ET AL., UNITED STATES DEPARTMENT OF AGRICULTURE, *THE EU NITRATE DIRECTIVE AND CAP REFORM: EFFECTS ON AGRICULTURAL PRODUCTION, TRADE, AND RESIDUAL SOIL NITROGEN* 3-4 (1995).

3. DON PAARLBERG, *FARM AND FOOD POLICY, ISSUES OF THE 1980'S* 5 (1980).

Over time this romantic family farm began to disappear as more and more individuals sought out opportunities in the cities and urban areas: From colonial times until late in the nineteenth century farmers outnumbered all other vocational groups combined. The present minority status of agriculture came by decrements. In the census of 1920, for the first time, the urban category exceeded the rural, farm and nonfarm combined. By 1950 farmers were a minority in the rural areas; nonfarmers . . . outnumbered farmers six to one in rural America. And in 1967 an incredible thing happened; for the first time the nonfarm incomes of farm people exceeded their farm incomes.⁴

Statistics released from the United States Census Bureau confirm this picture. In 1790, 95% of the population lived in rural areas, virtually all on farms.⁵ At the turn of the century, farm residents amounted to 40% of the population.⁶ By 1993, they constituted only 1.9% of the national population.⁷ So too, in the United Kingdom, modifications are apparent. As Stephen Tromans, a British solicitor observed,

Significant changes have developed in agriculture since the 1950s. Increased mechanization and the use of more powerful and efficient machinery demand larger fields and allow greater changes, for example, altering drainage systems and removing hedgerows. Agricultural manpower has diminished The amalgamation of farm holdings has resulted in larger fields, the removal of old boundaries and the availability of more capital to fund changes. The effort to specialize and concentrate agricultural production has brought about a diminution in the number of mixed farms⁸

From the 1950s to the 1970s, the British Government also played an active role in encouraging the modernization and expansion of agriculture.⁹

A. *Transformation of Livestock Production*

An essential change in the structure of agriculture accounts for much of the shift in rural demographics. As two Cornell University rural sociologists observed, “[h]istorically, entrepreneurial, small-scale units of production mixing family assets and management with seasonal or permanent hired labor typified U.S. agriculture. In recent years, however, vertically integrated,

4. *Id.* at 8 (citations omitted).

5. U.S. DEPT. OF COMMERCE, BUREAU OF THE CENSUS, RESIDENTS OF FARMS AND RURAL AREAS: 1990, at 3 (Mar. 1992).

6. *Id.*

7. Barbara Vobejda, *U.S. Ends Survey of Its Dwindling Farm Population*, CHICAGO SUN-TIMES, Oct. 9, 1993, at 6.

8. Stephen Tromans, *Agriculture and the Protection of Rural Amenity*, 4 CONN. J. INT'L L. 305, 306-07 (1989).

9. *Id.* at 307.

industrialized farming has begun rapidly displacing production dominated by single families."¹⁰ Recent decades have transformed agriculture into a mechanized, industrial process. While small operations still exist, the trend is towards concentration. Farming ventures from across the spectrum of agricultural activities may realize the benefits of economies of scale by enlarging. Today, five percent of farms account for more than fifty percent of sales.¹¹ As Lee Christensen found, "[g]enetic improvement, labor saving production techniques, feed formulation advances, and processing automation have forced changes. Much of the innovations have resulted in significant economies of size and reduced labor at all levels."¹²

One may witness the move towards concentration in a variety of United States sectors. For example, there were nearly 3 million pork producers in 1950, but only 256,000 in 1992.¹³ "Farms have grown in size with about 6 percent of these producers raising 60 percent of the hogs. Nearly 80 percent of the hogs are grown on farms producing 1,000 or more hogs per year."¹⁴ According to a University of Missouri survey, more than 25% of all hogs marketed come from operations producing 10,000 or more hogs per year.¹⁵

The poultry industry also reflects the increasing concentration of agriculture.¹⁶ Small chicken enterprises began declining in the late 1950s. In 1992, 55 companies maintained flocks of 1 million or more and produced 168.8 million layers.¹⁷ Notably, the twenty largest boiler producers accounted for over 80% of the national broiler industry.¹⁸

For dairies the picture is the same. Even though most dairies remain family run operations, a diminished number of dairies have produced more milk with fewer cows over the span of the last 58 years. In 1934, approximately 4.5 million United States farms milked approximately 24.5 million dairy cows, averaging 5.4 cows per farm.¹⁹ In the same year, average milk production amounted to 40.3 hundredweight per cow per year (CWT/cow/year).²⁰ By 1987, "202,068 dairies and approximately 10.3 million cows supplied the nation's milk."²¹ The average dairy milked 51 cows

10. Charles Geisler & Thomas Lyson, *The Cumulative Impact of Dairy Industry Restructuring*, 41 *BIOSCIENCE* 560 (1991).

11. *Id.*

12. Allan Butcher et al., *Livestock and the Environment: Emerging Issues for the Great Plains*, 1993 *CONSERVATION OF GREAT PLAINS ECOSYSTEMS: CURRENT SCIENCE, FUTURE OPTIONS* 365, 368.

13. *Id.* at 367.

14. *Id.*

15. Steve Marbery, *Pork Production Shifts to Larger Farms*, *FEEDSTUFFS*, Nov. 30, 1992, at 1.

16. See JONES & FRAREY, *supra* note 1, at 12.

17. *Id.*

18. *Id.*

19. TIAER, *LIVESTOCK AND THE ENVIRONMENT: RETHINKING ENVIRONMENTAL POLICY, INSTITUTIONS & COMPLIANCE STRATEGIES* 46 (1992).

20. *Id.*

21. *Id.*

and average annual milk production rose to 138.02 CWT/cow/year.²² Today, in Tulare County, California, the average dairy hosts 900 cows, with 17 operations milking over 2,000 cows.²³

Economies of scale and the adoption of new technologies by producers explain the evolving structure of agricultural production.

On-farm technological progress and, accordingly, higher milk production have been achieved through dairy producers' adoption of artificial insemination and related breeding innovations, improvements in animal nutrition and forage testing, participation in Dairy Herd Improvement Association (DHIA) record-keeping, experimentation with automated feeding equipment and three times a day milking, and improvements in dairy housing.²⁴

These technological advances often appear in the large dairies which can afford to implement expensive innovations relatively easily. Empirical studies reveal that a dairy's per unit cost of producing milk falls as the number of cows milked increases.²⁵

B. Modern Pollution Concerns

The industrialization of dairy farming and diverse agricultural sectors has, however, other consequences. The waste disposal practices of many concentrated livestock operations may lead to water quality degradation.²⁶ In contrast to traditional grazing operations, most industrialized producers collect manure from animal confinement areas, place the waste in lagoons, and then apply it to farmland in bulk.²⁷ There, the manure acts as a nutrient

22. *Id.*

23. UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION TULARE COUNTY, THE MILK LINES 1 (1995).

24. TIAER, *supra* note 19, at 46-47.

25. UNITED STATES CONGRESS, OFFICE OF TECHNOLOGY ASSESSMENT, UNITED STATES DAIRY AT A CROSSROAD: BIOTECHNOLOGY AND POLICY CHOICES 18 (1991); J. HOLT ET AL., PANEL FARM BASE BOOK: DAIRY FARMS (Agricultural and Food Policy Center Data Base Report 90-1, Texas A&M) (1990); AMY PAGANO ET AL., A NATIONAL PILOT PROJECT, LIVESTOCK AND THE ENVIRONMENT: PROFILES OF REPRESENTATIVE ERATH COUNTY DAIRIES 33 (draft report, TIAER, Texas A&M) (1992); Scott C. Matulich, *Efficiencies in Large-Scale Dairying: Incentives for Future Structural Change*, 60 AM. J. AGRIC. ECON. 642-47 (1978).

26. TIAER, *supra* note 19, at 12. The waste produced at large livestock production facilities is remarkable in terms of both quantity and pollutant content. An average 1000-pound milk cow produces approximately 82 pounds of wet manure per day—20 times that of an adult human—containing elevated levels of nitrogen, phosphorus, and fecal bacteria. *Id.* The crucial difference between human and livestock waste, however, is that the former is treated prior to discharge while the latter is land applied with virtually no prior treatment.

27. E.P. Taiganides, *Animal Waste, Solid Waste Management: Selected Topics*, in 1985 WORLD HEALTH ORGANIZATION, COPENHAGEN EUROPEAN REGIONAL OFFICE 151, 151 (Michael J. Suess ed., 1985).

source for crop production or simply rests at a convenient disposal site.²⁸ Operators must carefully manage the time, rate, and location of the application to avoid water quality degradation in these settings. In the Cornell study, researchers observed,

[a]n important cumulative impact related to the changing spatial location of large dairy farms is the redistribution of massive amounts of animal wastes. After World War II, most dairy farmers returned cattle manure to their land, thereby enhancing soil fertility and keeping their need for chemical fertilizers at a minimum. Dairy restructuring is slowly altering this practice. First, as dairy operations increase in scale, the number of animals per dairy farm is rising. Second, with dairy industrialization, nutrient throughput increases to maximize milk output, and waste output also rises. Manure handling then presents a major diseconomy of scale, that is, size of operation yields economic liabilities This diseconomy is particularly important where proximity to urban areas poses added public health and environmental management costs.²⁹

This waste problem creates several potential problems: the capacity of the waste to act as a potential environmental pollutant, public health/disease issues, and the limitations of current methods of waste handling, treatment, and disposal to control such problems. In particular, feedlot waste and wastewater may contain nitrates, pathogens, and toxic metals.³⁰ Elevated nutrient levels engender a significant change in water ecology.

Phosphorus and nitrogen are critical to the life sustaining potential of surface water. However, large concentrations of these nutrients stimulate production of aquatic plants and disturb the balance of the ecosystem. Elevated concentrations of phosphorus can result in excessive aquatic plant growth and a depletion of oxygen in streams.³¹

Thus, eutrophication represents a significant potential problem. Elevated nitrogen and phosphorus levels, as well as associated algal blooms, can significantly increase the costs of filtering water systems.³² They may also

28. *Id.* at 192.

29. Geisler & Lyson, *supra* note 10, at 563 (citations omitted).

30. Taiganides, *supra* note 27, at 162.

31. JONES & FRAREY, *supra* note 1, at 21.

32. See *Whole Farm Planning in New York City Watershed*, COASTLINES, Spring 1995, at 1. Heavy nutrient loads, and the dangers represented by Giardia and Cryptosporidium, forced New York City to consider a \$5-8 billion filtration system for its water supply. *Id.* Innovative planners decided to develop a comprehensive watershed management program focusing on agriculture's role in nonpoint source pollution prevention instead. *Id.* at 2. A successful program will enable New York City to avoid enormous expenditures and to retain land in agricultural use. *Id.*

contribute to dying fish, obnoxious odors, and the "blue baby syndrome" (methemoglobinemia).³³

Water quality information gathered from March 1, 1991 through March 31, 1994, by TIAER shows the relationship between land uses, land practices, soils, and water quality indicators.³⁴ This data indicates that the runoff has occurred as a result of intensive agricultural production in the upper North Bosque River watershed.³⁵ Statistical analyses reveal "that certain land uses and watershed characteristics, most notably percent waste application fields, dairy cow density, percent woodland, and percent rangeland in agricultural watersheds, have strong correlations to observed water quality."³⁶ In addition, phosphorus represents a significant nutrient in the watershed. "Comparison of water quality data to non-regulatory screening levels indicates that some waterborne constituents, especially orthophosphate and total phosphorus, exceed these screening levels in both urban and agricultural watersheds."³⁷ Data revealed a significant positive association of orthophosphate and total phosphorus as the percentage of waste application fields increased in the drainage basins above reservoir and stream sites.³⁸

On the public health front, many people express concern about the potential of animal waste runoff to contaminate drinking water supplies with cryptosporidium.³⁹ A 1993 outbreak of cryptosporidium in Milwaukee caused 400,000 people to suffer through diarrhea, vomiting, and stomach cramps and caused dozens of others with compromised immune systems to die.⁴⁰ Local suspicion centered on an unusually heavy spring runoff that could have carried agricultural waste into the rivers feeding the water supply.⁴¹ Such concerns appear warranted. Livestock represents a significant source of the parasite cryptosporidium.⁴² Cattle, sheep, goats, and swine constitute the major vectors for cryptosporidium. The National Animal Health Monitoring System conducted a study to discover the extent of cryptosporidium infestation among dairies. A survey of 1,811 farms in 28 states revealed that on any given day, 22% of calves were positive for cryptosporidium and that more than 90% of all farms were infested.⁴³ The parasite

33. Martha L. Noble & J.W. Looney, *The Emerging Legal Framework for Animal Agricultural Waste Management in Arkansas*, 47 ARK. L. REV. 159, 165 (1994).

34. ANNE MCFARLAND & LARRY HAUCK, *LIVESTOCK AND THE ENVIRONMENT: SCIENTIFIC UNDERPINNINGS FOR POLICY ANALYSIS* iii (TIAER, 1995).

35. *Id.*

36. *Id.* at 69.

37. *Id.*

38. *Id.*

39. Rob Gurwitt, *Something in the Water*, GOVERNING, Sept. 1994, at 32.

40. *Id.* at 34.

41. *Id.*

42. Jim Quigley, *Nearly All Herds Have Cryptosporidium*, HOARD'S DAIRYMAN, May 25, 1994, at 413.

43. *Id.*

is unusually infectious and resistant to chlorine treatment.⁴⁴ Dr. Herbert DuPont, professor at the University of Texas Medical School, observed that only thirty parasites were enough to infect one-fifth of his study volunteers.⁴⁵ He noted, "The infectiousness of this parasite will undoubtedly change the way water is treated in this country. It gets into our water supplies via animal or human sewage. It is not killed by chlorine. Only heat or filtration is effective against it."⁴⁶ In response to these issues, the EPA has proposed rules requiring public water systems to monitor for the parasite.⁴⁷

III. REGULATION IN THE UNITED STATES: CLEAN WATER ACT AND CAFOS⁴⁸

As a result of evolving livestock production practices, government regulators now recognize livestock waste as an environmental problem deserving concerted examination. Reported incidents of pollution from livestock waste are significant and widespread. A 1989 summary of state water quality assessments conducted under section 319 of the Federal Water Pollution Control Act⁴⁹ (Clean Water Act, CWA, or the Act) revealed that over one-third of all water impairments attributed to agricultural pollution were caused by livestock waste.⁵⁰ In a highly publicized incident occurring in July of 1995, a hog waste lagoon in North Carolina ruptured dumping 25 million gallons of contaminated water over the countryside and into the nearby New River.⁵¹ Observers noted, "[I]t's being called the worst agricultural accident in North Carolina's history."⁵²

The United States deals with livestock runoff primarily under the Clean Water Act and associated regulations. Essentially, the Clean Water Act divides pollutants into point sources and nonpoint sources.⁵³ Traditional point sources are discrete, identifiable emission sources such as industrial operations piping effluent into waterways.⁵⁴ Discharge from animal confinements and process areas also represent point sources of pollution.⁵⁵ In contrast, the application of manure solids and lagoon effluent to pasture or cropland may cause diffuse nonpoint source pollution in the presence of precipitation.

44. Associated Press, *Drinking Water Parasite Infectious in Tiny Doses: Houston Man's Study May Spur Federal Action*, DALLAS MORNING NEWS, MAY 2, 1994, at 10D.

45. *Id.*

46. *Id.*

47. 40 C.F.R. § 141.141 (1996).

48. Portions of Part II first appeared in the following: Larry C. Frarey & Staci J. Pratt, *Environmental Regulation of Livestock Production Operations*, NAT. RESOURCES & ENV'T, Winter 1995, at 8, 12.

49. 33 U.S.C. § 1344 (1994).

50. Frarey & Pratt, *supra* note 48, at 8.

51. *Hog Waste Lagoon Ruptures—Twenty Five Million Gallons Worth* (National Public Radio broadcast, July 6, 1995) (transcript no. 1644-10).

52. *Id.*

53. 33 U.S.C. § 1344.

54. 40 C.F.R. § 122 (1996).

55. *Id.* § 122.23(a).

A. Federal Regulation of Livestock Production Facilities

The Clean Water Act authorizes the EPA to prevent the discharge of any pollutant into the navigable waters of the United States.⁵⁶ The definition of pollutant specifically includes both "solid waste" and "agricultural waste."⁵⁷ The EPA's jurisdiction is, however, generally invoked only in cases of "point sources."⁵⁸ Under statutory authority, the term point source refers to "any discernible, confined and discrete conveyance, including but not limited to any . . . concentrated animal feeding operation (CAFO) . . . from which pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture."⁵⁹ The statute, therefore, specifically refers to CAFO operations as part of the EPA's mandate.

A point source, such as a CAFO, may still discharge pollutants pursuant to the terms of a National Pollutant Discharge Elimination System (NPDES) permit issued by the EPA Administrator or appropriate state pollution control authority.⁶⁰ Section 1342 establishes a permitting scheme under which the EPA "may . . . issue a permit for the discharge of any pollutant, or combination of pollutants . . . upon such conditions as the Administrator determines are necessary to carry out the provisions of this chapter."⁶¹ In the absence of a permit, the discharge of any pollutant is unlawful.⁶² The Fifth Circuit described the purpose of the system:

Congress passed the Federal Water Pollution Control Act Amendments in 1972 with the stated purpose of restoring and maintaining the integrity of the nation's waters. To achieve this goal, the Act requires the strict enforcement of certain technology-based effluent limitations. As the primary means for enforcing these effluent limitations, Congress established the NPDES permit system. In order for any person lawfully to discharge any pollutant from a point source into navigable waters of the United States, that person must obtain an NPDES permit and comply with its terms.⁶³

Thus, an NPDES permit serves to transform generally applicable effluent limitation and other water quality standards into the obligations of the individual discharger.⁶⁴ The EPA establishes these effluent limitations guide-

56. 33 U.S.C. §§ 1251(d), 1311 (1994).

57. *Id.* § 1362(6).

58. *Id.* § 1362(12).

59. *Id.* § 1362(14).

60. *Id.* § 1342(f).

61. *Id.* § 1342(a)(1).

62. *Id.* § 1311(a).

63. *Carr v. Alta Verde Indus.*, 931 F.2d 1055, 1058 (5th Cir. 1991) (citations omitted).

64. *Id.* at 1059.

lines for existing point sources based on the application of the "best available technology (BAT) economically achievable."⁶⁵

CAFOs are the only type of agricultural production operation regulated by the EPA or the delegated states under the NPDES program.⁶⁶ In contrast, most agricultural pollution falls under the category of nonpoint source pollution. Nonpoint source pollution is comprised largely of precipitation-induced surface runoff or leaching through soil layers.⁶⁷ This area is addressed principally through state nonpoint source pollution assessments and management plans developed pursuant to CWA section 319 and coastal zone management plans. Thus far, the EPA has delegated NPDES authority to thirty-nine states.⁶⁸ The EPA and many delegated states have treated CAFOs as a relatively low priority when contrasted with industrial and municipal point source dischargers and have failed to vigorously pursue CAFO permitting. Consequently, in 1992, less than 10% of the estimated 10,000 livestock operations classified as CAFOs held an NPDES permit, even though the EPA initially promulgated NPDES CAFO regulations in 1974.⁶⁹

A livestock production operation must qualify as an "animal feeding operation" prior to designation as a CAFO point source by the EPA.⁷⁰ The EPA regulations define an animal feeding operation as a facility that confines or maintains animals for a total of forty-five days or more in any twelve month period and, as a result, cannot sustain crops or vegetative growth over any portion of the lot or facility.⁷¹ The specific animals confined throughout the twelve month period may change any number of times; the forty-five days need not be consecutive nor must the twelve month period correspond to the calendar year. The most important criterion for determining whether animals are confined or maintained in a facility is that animal waste be generated in that specific facility.⁷² As a result, "stomped out" areas where livestock congregate for a total of forty-five days or more per year likely satisfy the definition of animal feeding operation.⁷³

The EPA may classify an animal feeding operation as a CAFO in two different ways: 1) the facility contains more than 1000 animal units; or 2) the facility contains more than 300 animal units and discharges pollutants directly into waters of the United States or through a man-made ditch, flushing system, or similar device.⁷⁴ Significant ambiguity exists concerning the scope of a

65. *Id.*

66. 40 C.F.R. § 122.23(a). The EPA has delegated CAFO regulatory authority to forty states. See 33 U.S.C. § 402(b) (1994). Livestock operations in nondelegated states must obtain both state and EPA permits.

67. 33 U.S.C. § 1362(14).

68. *Id.* § 402(b).

69. See Larry Frarey, *Jurisdictional and Enforcement Issues Under the New EPA Region VI General CAFO Permit*, 10 AGRIC. UPDATE 4, 4 (May 1993).

70. 40 C.F.R. § 122.23(b)(i).

71. *Id.*

72. *Id.* § 122.23(c).

73. *Id.* § 122.23(b)(i).

74. *Id.* § 122, app. B.

man-made conveyance, although courts have generally interpreted the concept broadly. Section 122, appendix B, provides conversion factors for determining the number of animal units for various species based on a factor of 1.0 animal units per head of slaughter and feeder cattle.⁷⁵ Alternatively, under appropriate circumstances, the EPA may designate any animal feeding operation as a CAFO regardless of the number of animals confined, if the facility represents a significant source of pollution to the waters of the United States.⁷⁶

Poultry operations, however, represent a special case. Two categories of laying hen and broiler waste management systems are listed in the regulation.⁷⁷ Neither, however, adequately describes the most common method of waste disposal by poultry producers—the dumping of dry poultry litter and combined manure on agricultural land. As a result, poultry producers have often circumvented CAFO designation by the EPA and the delegated states. A September 1993 EPA draft guidance for interpreting CAFO regulations provided, however, that animal feeding operations, including poultry operations, that remove waste from pens and stack it in areas exposed to rainfall or an adjacent watercourse may have established a crude liquid manure system for process wastewater that may discharge pollutants, and therefore would be subject to the CAFO regulations.

EPA CAFO regulations contain an important exception that tends to muddle the CAFO permitting analysis: no animal feeding operation is a CAFO if the operation only discharges during a 25-year, 24-hour storm event, i.e., a statistically calculated maximum 24-hour rainfall with a probable recurrence once every 25 years.⁷⁸ In contrast to most industrial and municipal point sources of pollution that treat and discharge effluent under NPDES permits, CAFOs are subject to a “no discharge” effluent limitation.⁷⁹ This provision allows permitted CAFOs to discharge only during a “chronic or catastrophic” rainfall event that exceeds the capacity of a structure designed to contain runoff during a 25-year, 24-hour storm event as well as process generated waste water, for example, water used in a milking parlor.⁸⁰ Consequently, the best available technology, economically achievable, employed by most CAFOs to satisfy the no discharge effluent limitation consists of one or more large lagoons or holding ponds to capture storm runoff and process generated waste water. An animal feeding operation that otherwise qualifies as a CAFO need not, however, obtain an NPDES permit if the operation can guarantee “no discharge” absent a 25-year, 24-hour storm event.⁸¹ This option is unavailable to industrial point sources whose permits designate the quantity and quality of effluent discharged.

75. *Id.*

76. *Id.* § 123.23.

77. *Id.*

78. *Id.* §§ 122, app. B; 412.11.

79. *Id.* § 412.13.

80. *Id.*

81. *Id.* § 122, app. B.

The decision by a large animal feeding operation to forego the NPDES permitting process does entail significant risk. In *Carr v. Alta Verde Industries*,⁸² a CWA citizen suit alleged illegal discharge by an unpermitted 20,000-30,000 head cattle feedlot in Texas.⁸³ Runoff from the feedlot was captured in a series of six wastewater lagoons and subsequently used to irrigate adjacent fields.⁸⁴ From April to June 1987, heavy rains exceeded the capacity of the lagoons, causing feedlot workers to cut a spillway into the side of one of the lagoons.⁸⁵ The resulting outflow reached a nearby creek.⁸⁶ The trial court dismissed the suit for lack of standing; however, the Fifth Circuit reversed.⁸⁷ At no time did the rainfall during the period in question constitute a 25-year, 24-hour storm event; thus the exception did not apply.⁸⁸ Further, the feedlot clearly qualified as a CAFO under the size criteria.⁸⁹ Consequently, the feedlot was a CAFO point source that discharged without a permit and was therefore in violation of the CWA.⁹⁰

The potential peril for operators of livestock production facilities operating without an NPDES permit is inadequate to spur all operators to obtain a permit. The authors are aware of at least one local dairy operator who has not obtained an NPDES permit in the belief that the facility can contain all wastewater absent a 25-year, 24-hour storm event. Unfortunately, several weeks of intense rain that fail to qualify as a 25-year, 24-hour storm event could prove this operator's undoing to be true.

B. EPA Region VI General CAFO Permit and CWA Jurisdiction over Manure Application Fields

EPA Region VI, headquartered in Dallas, covers Texas, Oklahoma, New Mexico, Arkansas, and Louisiana.⁹¹ Arkansas is the only state in the region which has delegated NPDES authority by the EPA.⁹² The region includes many large livestock production operations that have functioned without the required NPDES permit since the mid-1970s. This situation persisted due to the relatively low priority the EPA afforded CAFO permitting. State water quality assessments from the region reveal that a significant number of water bodies are now impaired by livestock waste.⁹³ Consequently, in February 1993, Region VI published a general NPDES permit for CAFOs.⁹⁴ The per-

82. *Carr v. Alta Verde Indus.*, 931 F.2d 1055 (5th Cir. 1991).

83. *Id.* at 1057-58.

84. *Id.* at 1057.

85. *Id.*

86. *Id.* at 1058.

87. *Id.* at 1066.

88. *Id.* at 1060.

89. *Id.* at 1059.

90. *Id.* at 1060.

91. See Frarey, *supra* note 69, at 4.

92. *Id.*

93. *Id.*

94. 58 Fed. Reg. 7610 (1993).

mit covers all of the states in the region except Arkansas.⁹⁵ These states joined Arizona, Idaho, and South Dakota as those covered by a general CAFO permit. By applying uniform management criteria to hundreds of operations, the general CAFO permit provides the EPA an effective way to require broad compliance within a relatively brief time.

The general permit requires CAFOs to develop a detailed pollution prevention plan and retain the plan on site.⁹⁶ CAFOs with over 1,000 animal units were required to implement the plan within one year from the issuance date of the permit; those with 300 to 1,000 animal units are provided two years for plan implementation.⁹⁷ The plan must include information concerning the construction and maintenance of facility waste containment structures.⁹⁸ Operators must document the capacity of containment structures, design standards for structural embankments, liner certification for containment structures, and dewatering schedules to insure adequate storage capacity, termed freeboard.⁹⁹ A permanent freeboard marker must exist in every containment structure to allow immediate observation of containment capacity by inspection personnel.¹⁰⁰ A rain gauge is also required on each site. The permit also lists mandatory best management practices for the application of solid and liquid manure to designated agricultural fields, including application only at agronomic rates and on thawed and unsaturated soil. Agronomic rates describe the capacity of crops or pasture grass to utilize the readily available nitrogen or phosphorus present in the manure applied. Notably, the permit allows manure land application to exceed agronomic rates "[w]here land application sites are isolated from surface waters and no potential exists for runoff to reach a water of the U.S."¹⁰¹ This provision appears to represent a potential risk to groundwater reserves in some areas.

One extremely important issue raised by the general permit concerns the enforceability of provisions prohibiting polluted runoff from manure application fields.¹⁰² The permit provides that "land application of manure shall not cause a discharge of significant pollutants to waters of the United States or cause a water quality violation in waters of the United States."¹⁰³ A similar prohibition specifically addresses lagoon effluent.¹⁰⁴ The CWA, however, only prohibits pollutant discharges from a point source.¹⁰⁵ By definition, a CAFO includes only those areas of a livestock production facility where animals are confined and crops or grasses cannot be maintained.¹⁰⁶

95. *Id.* at 7613.

96. *Id.* at 7610.

97. *Id.* at 7614, 7630.

98. *Id.* at 7632.

99. *Id.* at 7630.

100. *Id.* at 7631.

101. *Id.* at 7611.

102. *See* Frarey, *supra* note 69, at 4.

103. *Id.*

104. *Id.*

105. *Id.*

106. *Id.* at 5.

Thus, manure application fields may not fall within NPDES control.¹⁰⁷ Yet, if manure application fields fall outside the purview of the CWA, the no discharge effluent limitation applying to CAFOs may readily degenerate into deferred discharge.

The case of *Concerned Area Residents for the Environment v. Southview Farm*,¹⁰⁸ recently addressed the status of manure application fields and ruled that direct runoff from the fields violates the CWA. The case involved a suit by neighbors of a 2,000-head dairy located in Wyoming County in western New York state.¹⁰⁹ Plaintiffs' complaint sought over \$4 million in damages for trespass, nuisance, negligence, and violations of the CWA.¹¹⁰ The jury awarded plaintiffs a total of \$4,101 on the trespass claim for contamination of plaintiffs' wells, and also found defendants in violation of the CWA on five occasions.¹¹¹ The trial court then overturned the jury's findings. On September 2, 1994, the United States Second Circuit Court of Appeals reviewed the case.¹¹² The court held that "the liquid manure spreading operations are a point source within the meaning of CWA section 1362(14) because the farm itself falls within the definition of a concentrated animal feeding operation."¹¹³

The *Southview Farm* opinion has generated considerable comment from the agricultural community, with some commentators suggesting that all agricultural fields are now destined for point source designation and federal regulation.¹¹⁴ While *Southview Farm* represents a clear prohibition against direct discharge from manure application fields, the case affirms the notion that storm discharge from fields falls outside the purview of the Clean Water Act.¹¹⁵ Polluted storm runoff from manure application fields remains a significant problem in many watersheds where intensive livestock production occurs.¹¹⁶ Given the random nature of storm events and resulting field runoff, innovative environmental compliance strategies must be developed to ensure that livestock producers in these targeted areas adopt and maintain best manure management practices that will prevent excessive pollution during storm events.¹¹⁷

107. *Id.*

108. *Concerned Area Residents for the Env't v. Southview Farm*, 34 F.3d 114 (2d Cir. 1994).

109. *Id.* at 115-116.

110. *Id.* at 115.

111. *Id.* at 116.

112. *Id.* at 115.

113. *Id.*

114. Lorraine Stuart Merrill, *New York Case Reversal Raises Regulatory Concerns*, HOARD'S DAIRYMAN, Jan. 10, 1995, at 9.

115. Larry Frarey et al., *The 2d Circuit's Southview Farm Decision Represents a Reasonable Approach to the Regulatory Treatment of Liquid Manure Disposal Practices of Livestock Farms*, NAT'L L.J., Mar. 6, 1995, at B5.

116. *Id.*

117. *Id.*

Initially, defendants argued that the runoff from manure application fields "was not a point source discharge because the liquid simply and quite naturally flowed to and through the lowest areas of the field, and that the pollutants reached the stream that flows into the Genesee 'in too diffuse a manner to create a point source discharge.'" ¹¹⁸ The Second Circuit held that the five point source discharges occurred in at least two ways.¹¹⁹ First, the pipe, swale, and ditch collecting the liquid effluent at the base of the manure application field and directing it into a nearby stream comprised point sources under the Clean Water Act definition.¹²⁰ Second, the liquid manure spreading vehicles were point sources.¹²¹ The court cited several cases as precedent for these conclusions.¹²²

In rejecting the trial court's conclusion that two of the violations fell outside the purview of the Clean Water Act due to the "agricultural stormwater discharge" exception, the appeals court stated, "[w]e agree that agricultural stormwater run-off has always been considered nonpoint-source pollution exempt from the Act."¹²³ Nonetheless, the Second Circuit concluded that the discharges in question were not caused by precipitation but simply occurred on days when it rained: "We think the jury could properly find that the run-off was primarily caused by the over-saturation of the fields rather than the rain and that sufficient quantities of manure were present so that the run-off could not be classified as 'stormwater.'" ¹²⁴ Only where rain causes the discharge to occur will the court characterize the event as a nonpoint source and exempt it from the Act.

Polluted storm discharge likely represents a more common phenomenon and difficult problem to remedy than the direct discharge at issue in *Southview Farm*. In addition to the great number of manure application fields that exist, storm events are random and stochastic. Such variability requires that storm runoff from manure application fields be treated like polluted agricultural runoff from cropland, pasture, and other agricultural lands.¹²⁵

118. *Concerned Area Residents for the Env't v. Southview Farm*, 34 F.3d at 118.

119. *Id.*

120. *Id.*

121. *Id.* at 119.

122. *Id.* at 118-19. *See, e.g.,* *Sierra Club v. Abston Constr. Co.*, 620 F.2d 41, 45-46 (5th Cir. 1980) (strip mining debris placed in highly erodible piles carried away by rain water through naturally created ditches amounted to point source); *United States v. Tull*, 615 F. Supp. 610, 622 (E.D. Va. 1983) (bulldozers and dump trucks amounted to point sources), *aff'd*, 769 F.2d 182 (4th Cir. 1985); *United States v. Weisman*, 489 F. Supp. 1331, 1337 (M.D. Fla. 1980) (bulldozers and dump trucks amounted to point sources); *Avoyelles Sportsmen's League v. Alexander*, 473 F. Supp. 525, 532 (W.D. La. 1979) (landclearing equipment, ditch excavation equipment are point sources).

123. *Concerned Area Residents for the Env't v. Southview Farm*, 34 F.3d at 120. (The Clean Water Act's definition of point source specifically excludes agricultural stormwater discharges and return flows from irrigated agriculture.).

124. *Id.* at 121.

125. Frarey et. al., *supra* note 115, at B8.

Since the inception of the present CWA (Clean Water Act) regulatory framework in 1972, Congress and EPA have recognized the futility of attempting to impose command-and-control regulation on several hundred million acres of farmland across the country. Consequently, Congress initially called for area-wide waste treatment planning under Sec. 208 of the act to control polluted storm runoff. For a variety of reasons, that process proved largely unsuccessful. In 1987, Congress enacted Sec. 319 to reaffirm the nation's commitment to non-point source pollution control. Absent some enforcement mechanism, however, to induce all agricultural producers and other sources of polluted runoff in targeted areas to adopt appropriate management measures, Sec. 319 perpetuates the shortcomings of Sec. 208.¹²⁶

In 1987, Congress included the agricultural stormwater discharge exception to the definition of point source in the Act to underscore the inappropriateness of applying a regulatory regime to millions of acres of farmland.¹²⁷ The previous definition was designed to control discrete, readily identified industrial, and municipal discharge points.¹²⁸

C. State Regulation of Livestock Production Operations

The regulation of livestock production operations by individual states has been inconsistent, even among the thirty-nine states to which the EPA has delegated NPDES CAFO permitting authority.¹²⁹ In 1993, the authors surveyed state agencies charged with regulating waste discharge by livestock operations in nine of the top ten milk producing states: California, Wisconsin, New York, Minnesota, Pennsylvania, Michigan, Ohio, Washington, and Iowa.¹³⁰ Table 1 includes information on the criteria used for issuing a CAFO permit, the approximate number of CAFO permits issued by the agencies, whether a public hearing precedes permit issuance, and whether and how often a permitted facility is inspected. TIAER compiled this data in August of 1993 and updated it in August of 1995.¹³¹

126. *Id.*

127. 33 U.S.C. § 1362(14).

128. *Id.*

129. LARRY FRAREY & RON JONES, DIMENSIONS OF PLANNED INTERVENTION 14 (1994).

130. *Id.* at 15.

131. *Id.* at 14.

TABLE 1
Permitting of CAFOs by State

STATE	PERMITS ISSUED	PERMITTING CRITERIA	NUMBER OF PERMITS ISSUED	PUBLIC HEARING	POST-PERMIT INSPECTION
Wisconsin	Yes	>1000 AU	50	Yes	Yes
California	Yes	Regulate all	650	Yes	Yes
New York	Yes	>1000 AU	Unknown	Yes	No
Minnesota	Yes	10 AU	17,000 ^a	No ^b	Complaint basis
Pennsylvania	No	N/A	N/A	N/A	N/A
Michigan	No	N/A	N/A	N/A	N/A
Ohio	Yes	>1000 AU	50 construction permits	Yes	Yes
Washington	Yes	Known pollution problems	16	Yes	Yes
Iowa	Yes	>1000 AU	150 construction permits annually	No	Complaint basis
Texas	Yes	>200 dairy cattle	Unknown	Yes ^c	Yes ^d

N/A = Not Applicable

AU = Animal Units

- a. Minnesota issues certificates of compliance for feedlots with ten or more animal units.
- b. Public hearings may be held if an Environmental Impact Statement is needed.
- c. Public hearings are only held in very limited circumstances.
- d. Routine inspections are being conducted in Dairy Outreach Program Areas (Comanche, Erath, and Hopkins counties).

All of the surveyed states have been delegated NPDES authority by the EPA. Even as late as 1993, respondents from New York, Minnesota, and Pennsylvania indicated that a no discharge effluent limitation generally receives little enforcement.¹³² All respondents indicated that runoff from manure application fields represent a significant water quality problem within their states.¹³³ Notably, the survey also revealed that neither Pennsylvania nor Michigan issue permits to livestock production operations, despite NPDES delegation from the EPA.¹³⁴ A Nutrient Management law recently passed in Pennsylvania does, however, require even small farms raising livestock to develop and implement a nutrient management plan.¹³⁵

In contrast to the surveyed states, Texas has not received NPDES delegation from the EPA.¹³⁶ Consequently, operators of large livestock production facilities in Texas must obtain discharge permits from both the Texas Natural Resource Conservation Commission (TNRCC) and EPA Region VI.¹³⁷ Such duplication of effort increases operators' costs and has spurred renewed efforts in the Texas Legislature to remedy existing impediments to NPDES delegation.¹³⁸ Nonetheless, Texas regulations covering CAFOs are among the most stringent in the country. For example, operators of dairy operations with 200 milking head or more must obtain a waste discharge permit from TNRCC.¹³⁹ Dairy expansion in the upper North Bosque River watershed area in North Central Texas has been the driving force behind development and enforcement of regulations for the Texas livestock production industry, as well as the publication of the EPA Region VI General CAFO Permit.¹⁴⁰

D. *Enforcement of Agricultural Pollution Laws in the United States*

Fundamental problems with inspection and enforcement still remain. The presence of point source control structures such as lagoons, diversions, and lagoon markers may be readily observed through site inspection. Manure application practices are, however, behavioral in nature, and proper behavior is difficult to enforce across a vast watershed. Livestock production operations generally utilize several manure application fields. The average dairy in the upper North Bosque River watershed includes four.¹⁴¹ "Thus, approximately 400 application fields exist on the watershed's 100 dairies,

132. Frarey & Pratt, *supra* note 48, at 12.

133. *Id.*

134. *Id.*

135. *Id.*; see PA. STAT. ANN. tit. 3, § 1706 (West 1997).

136. Frarey & Pratt, *supra* note 48, at 12.

137. *Id.*

138. *Id.*; see Texas S. Res. 1047, 74th Leg., 2d Sess. (Tex. 1995); 20 Tex. Reg. 4659, 4727 (June 30, 1995); 30 TEX. ADMIN. CODE § 321.181-.198 (West 1996).

139. TEX. ADMIN. CODE § 321.184.

140. Frarey & Pratt, *supra* note 48, at 12.

141. *Id.*

together with untold fields dedicated to crop and pasture production."¹⁴² Monthly TIAER surveys conducted for more than a year on many of these dairies revealed that "the amount of solid or liquid manure applied to a field is virtually impossible to determine after application."¹⁴³ Consequently, an inspector must be present at the time of application to ensure adherence to agronomic application rates. Moreover, most runoff from manure application fields occurs during random storm events.¹⁴⁴ "Storm-related water quality data collected by TIAER for over two years in the upper North Bosque River watershed show substantial differences in nutrient concentrations between sampling sites during the same storm event."¹⁴⁵ All told, an almost insurmountable task faces any regulatory agency attempting to regulate polluted runoff from manure application fields through site inspection alone.¹⁴⁶ Thus, inherent limitations appear for agencies such as the EPA and the TNRCC, which are regulatory agencies schooled in command and control approaches for dealing with environmental problems.

Other agencies exist in the United States with a history of addressing natural resource issues in an agricultural context. In the Great Depression of the 1930s, unprecedented soil erosion left much of the land to the dust bowl.¹⁴⁷ The government responded by promoting the United States Department of Agriculture (USDA), Soil Conservation Service (SCS),¹⁴⁸ and other mechanisms which provide federal technical assistance at the local level.¹⁴⁹ In this manner the local soil and water conservation district came into being.¹⁵⁰ Supporters of local conservation districts cited the need for a local sponsor for SCS programs and the expectation that conservation initiatives would be conducted on a watershed basis as reasons for their establishment.¹⁵¹ Adoption of state conservation districts enabling legislation progressed quickly, and by 1945 every state permitted them.¹⁵² Approximately 3000 districts presently exist in the United States and cover nearly all private farmland.¹⁵³ Thus, state conservation agencies form an integral link in the chain of local-state-federal conservation partnerships. In addition, they are

142. *Id.*

143. *Id.*

144. *Id.*

145. *Id.*

146. *Id.*

147. See Larry C. Frarey et al., *Conservation Districts as the Foundation for Watershed-Based Programs to Prevent and Abate Polluted Agricultural Runoff*, 18 *HAMLIN L. REV.* 151, 153 (1994).

148. Presently referred to as the Natural Resource Conservation Service (NRCS).

149. Frarey et al., *supra* note 147, at 153.

150. *Id.*

151. ROBERT MORGAN, *GOVERNING SOIL CONSERVATION: THIRTY YEARS OF THE NEW DECENTRALIZATION* 159 (1965).

152. Edwin E. Ferguson, *Nation-Wide Erosion Control: Soil Conservation Districts and the Power of Land-Use Regulation*, 34 *IOWA L. REV.* 166, 168 (1949).

153. Sandra S. Batic, *Soil Conservation in the 1980s: A Historical Perspective*, 59 *AGRIC. HIST.* 107, 109 (1985).

increasingly seen as the natural locus for nonpoint source programs. The National Association of State Conservation Agencies conducted a survey in 1992 which examined the relationship between nonpoint source programs and state conservation agencies.¹⁵⁴ In twenty-four states and the District of Columbia, the state conservation agency or its parent acts either as the designated lead agency for all section 319 nonpoint source programs or specifically for agricultural nonpoint source pollution prevention and abatement programs.¹⁵⁵

As a final note, one may observe that very little regulation exists to deal with pesticide runoff. Former U.S. Senator and Secretary of State Edmund Muskie recognized in a commemorative analysis that “[w]hile the provisions of these laws begin to respond to this nation’s environmental needs, much remains to be done The flow of nitrates and pesticides from agricultural activity continues unabated.”¹⁵⁶ House of Representative Bill 1132 was introduced on March 3, 1995, to amend the Clean Water Act and address nonpoint sources of water pollution.¹⁵⁷ It calls for the development of water quality criteria reflecting “total nitrogen, total phosphorus, and other pollutants producing eutrophication effects in waterbodies” and “pesticides in use in the U.S.”¹⁵⁸ A similar bill was proposed to promote the development of riparian forest buffers in order to intercept nutrient and pesticide runoff.¹⁵⁹ Given the current political climate, the fate of this proposal remains dubious. It does, however, highlight the need to refine existing approaches for handling nonpoint source pollution.¹⁶⁰

IV. THE UNITED KINGDOM’S REGULATORY REGIME

British authorities also recognize the contribution modern farming methods may make in terms of pollution. In some rural areas, agriculture amounts to the most serious cause of pollution of rivers, streams, and water. Overall, agriculture accounts for 13% of all pollution reported to the National

154. NATIONAL ASSOCIATION OF STATE CONSERVATION AGENCIES, SURVEY OF STATE CONSERVATION AGENCY INVOLVEMENT IN THE DELIVERY OF NONPOINT SOURCE POLLUTION ABATEMENT PROGRAMS 1 (1992).

155. *Id.*

156. Edmund S. Muskie, *The Global Environmental Crisis*, 19 B.C. ENVTL. AFF. L. REV. 731, 734 (1992).

157. H.R. 1132, 104th Cong., 1st Sess. (1995).

158. *Id.* § 301(a)(10)(A)-(B).

159. S. 935, 104th Cong., 1st Sess. (1995).

160. Alan L. Goldstein & Gary J. Ritter, *A Performance Based Regulatory Program for Phosphorus Control to Prevent the Accelerated Eutrophication of Lake Okeechobee, Florida*, 28 WATER SCI. TECH. 13, 20 (1993). A pioneering program in Florida required the state to develop a management plan that would ensure a 40% reduction in total phosphorus loading to Lake Okeechobee. Eventually, the management program mandated that all sub basins draining into the lake would be limited to average annual phosphorus concentrations of .18 mg/L, and that individual parcels within these areas could not exceed average annual phosphorus discharge rates ranging from .18 to 1.20 mg/L depending on land use.

Rivers Authority (NRA).¹⁶¹ Pollution is often caused by nitrates from fertilizers entering surface and ground waters. The slurries and silage utilized in livestock farming also cause pollution problems.¹⁶² Notably, dairy farming provides the greatest source of agricultural pollution in the United Kingdom.¹⁶³ These realities encourage both the United Kingdom and the European Community to address agriculture's role in the environment.¹⁶⁴ As a member state of the European Community, the United Kingdom must adhere to the European Community standards.

A. *European Community Law*

The European Community is the source of many of the environmental laws which apply in the United Kingdom.¹⁶⁵ This is certainly true in the field of pollution from agricultural sources where many Directives have been issued.¹⁶⁶ The European Community Directive concerning the protection of waters from agricultural nitrate sources¹⁶⁷ indicates international sensitivity to the potential pollution resulting from intensive agricultural operations. The

161. *Water Pollution Incidents in England and Wales 1994*, NATIONAL RIVERS AUTHORITY, July 1995, at 5.1.2.

162. Tromans, *supra* note 8, at 308.

163. NATIONAL RIVERS AUTHORITY, *supra* note 161.

164. Please note that the laws regarding sewage sludge application to cropland are outside the scope of this paper. While they may represent a significant source of polluted runoff, this examination is primarily focused on the problems associated with runoff from concentrated animal operations and manure. Sewage sludge stems from urban sources and is treated in a variety of regulations. See, e.g., MINISTRY OF AGRICULTURE, FISHERIES AND FOOD CODE OF PRACTICE FOR AGRICULTURAL USE OF SEWAGE SLUDGE (1989).

165. See NIGEL HAIGH, *MANUAL OF ENVIRONMENTAL POLICY: THE EC AND BRITAIN* (1991); Lord Slynn of Hadley, *The European Community and the Environment*, 5 J. ENVTL. L. 261 (1993).

166. See Council Directive 91/676, 1991 O.J. (L 375) 1. For example, the Department of Environment (DOE) is currently drafting regulations to implement the United Kingdom's obligations under the Framework Waste Directive (FWD). Council Directive 75/442/EC as amended by Council Directive 91/156/EC. Article 2 of the Directive sets "limits on the extent of which these wastes may be excluded from the provisions of the Directive." *Id.* Article 2 specifically excludes provisions from the scope of the Directive stating "where they are already covered by other legislation: . . . animal carcasses [sic] and the following agricultural waste: faecal matter and other natural non-dangerous substances used in farming." Nonetheless, the DOE requires certain categories of agricultural waste to be included in the requirements of the FWD, in particular non-natural agricultural waste. The DOE is expected to issue a consultation paper with their proposals to extend waste management controls to these substances. See Joint Circular from the DOE, Welsh Office and the Scottish Office Environment Department No. 11/94, *Environmental Protection Act 1990: Part II Waste Management Licensing The Framework Directive on Waste*, at 8 (Apr. 19, 1994) [hereinafter Joint Circular]. Thus, waste which is non natural or dangerous (e.g., pesticides, solvents) should be included within the scope of the FWD and the implementing UK Regulations. The Regulations are expected in early 1996. *Id.* at 14.

167. Council Directive 91/676, 1991 O.J. (L 375) 1.

Council of the European Communities recognizes the need to reduce pollution caused by nitrates from agricultural sources, as well as, the importance of taking "measures to limit the land-application of all nitrogen-containing fertilizers and in particular to set specific limits for the application of livestock manure."¹⁶⁸ Article 3 of the Directive requires Member States to identify vulnerable zones which are or could be affected by pollution.¹⁶⁹ Where waters contain more than 50 mg/L nitrates, designation is required.¹⁷⁰ Member States would then be required to develop action programs, taking into account available scientific data, technical data, and environmental conditions.¹⁷¹ The action programs must reflect the measures required by Annex III and general codes established pursuant to Article 4.¹⁷²

Annex III contains a variety of requirements aimed at protecting vulnerable areas. Action programs shall include rules restricting the application of certain types of fertilizer,¹⁷³ setting the requisite capacity of storage vessels for livestock manure, and requiring consideration of limitations of soil, climate, land use, and nitrogen needs of crops when applying fertilizer.¹⁷⁴ "These measures will ensure that, for each farm or livestock unit, the amount of livestock manure applied to the land each year, including by the animals themselves, shall not exceed a specified amount per hectare."¹⁷⁵ During the first four year action program, nitrogen applications via manure will be limited to a maximum of 210 kg N/ha, and in general to 170 kg N/ha (152 lbs/acre) thereafter unless a different limit can be justified to the European Commission.¹⁷⁶

In an attempt to protect all waters, Member States must also establish codes of good agricultural practice, "to be implemented by farmers on a voluntary basis, which should contain provisions covering at least the items mentioned in Annex IIA."¹⁷⁷ Such codes should include provisions describing when the application of fertilizer is inappropriate; recommendations for application on steeply sloped, water-saturated, flooded, frozen or snow-covered ground; conditions of application near water courses; measures regarding the capacity and construction of manure storage vessels; and application procedures, including the rate and uniformity of spreading of chemical fertilizer and livestock manure, in order to maintain nutrient losses.¹⁷⁸ The codes may also include items relating to land use management, the maintenance of a minimum quantity of vegetation cover during rainy periods, the

168. *Id.* at 2.

169. *Id.* at 3.

170. *Id.* at 6.

171. *Id.* at 3.

172. *Id.*

173. *Id.* at 7.

174. *Id.*

175. *Id.*

176. *Id.*

177. *Id.* at 3.

178. *Id.* at 6.

establishment of fertilizer plans on a farm-by-farm basis, and the prevention of water pollution due to run off and the downward water movement.¹⁷⁹

Pursuant to Article 4 of the EC Directive and other mandates, the United Kingdom has produced three pertinent codes of good agricultural practice: the Code of Good Agricultural Practice for the Protection of Water,¹⁸⁰ the Code of Good Agricultural Practice for the Protection of Air,¹⁸¹ and the Code of Good Agricultural Practice for the Protection of Soil.¹⁸² Of particular interest is the Code of Good Agricultural Practice for the Protection of Water. This code identifies the methodology for a variety of tasks, including: recognizing when certain areas are unsuitable for spreading, or when waste may only be spread at specific times, determining how much land is necessary to spread the waste based on nitrogen content, calculating the maximum waste a farmer will have to store, and designing suitable storage systems.¹⁸³ The code generally suggests that one should not apply more than 50 m³/ha (4500 gallons/acre) of slurry or 50 tonnes/ha (20 tons per acre) of manure at one time in high risk areas.¹⁸⁴ One may also inject slurry into the ground in order to reduce nuisance odor and ammonia.

B. National Legislation

The Water Resources Act 1989 has several sections designed to prevent water pollution. Section 110 of the Water Resources Act 1989 and the resulting Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1991, aim to prevent pollution by silage effluent, slurry, dirty water, and fuel oil by setting standards for keeping and handling these substances.¹⁸⁵ Facilities existing before March 1, 1991, are usually exempt from these rules, however, the NRA can ask for improvements where a significant risk of causing pollution exists. New, substantially enlarged, or substantially reconstructed tanks are subject to the regulations.¹⁸⁶ A producer must inform

179. *Id.*

180. MINISTRY OF AGRICULTURE, FISHERIES AND FOOD, CODE OF GOOD AGRICULTURAL PRACTICE FOR THE PROTECTION OF WATER 1 (1991).

181. MINISTRY OF AGRICULTURE, FISHERIES AND FOOD, CODE OF GOOD AGRICULTURAL PRACTICE FOR THE PROTECTION OF AIR 1 (1992).

182. MINISTRY OF AGRICULTURE, FISHERIES AND FOOD, CODE OF GOOD AGRICULTURAL PRACTICE FOR THE PROTECTION OF SOIL 1 (1993). (The CODES OF GOOD AGRICULTURAL PRACTICE are also adopted pursuant to Water Resources Act, 1991, § 97 and Water Act, 1989, § 116 (Eng.).)

183. *Id.* at 7-13.

184. *Id.* at 10.

185. Control of Pollution Silage, Slurry and Agricultural Fuel Oil Regulation, S.I. 1991, No. 324 [hereinafter Regulations]. Under the Regulations, slurry—that is, waste produced from dairy, beef, or pig housing ranging from a semi-solid with about 12% dry matter to a liquid with 3-4% dry matter—must be kept in a reception pit or slurry storage tank. *Id.* § 2. The slurry storage tank includes a lagoon, pit, or above ground circular store used for the storage of slurry. The regulations then specify construction requirements for storage tanks in detail. *Id.* § 2.

186. *Id.* § 6.

NRA at least fourteen days before using such facilities.¹⁸⁷ Although following the regulations is required, it does not provide a defense against a charge of causing pollution. It may, however, present an important factor in sentencing.

The Water Act 1989¹⁸⁸ and the Water Resources Act 1991¹⁸⁹ draw specific attention to the potential of agriculture to act as a significant source of nitrates and pollution in a watershed.¹⁹⁰ Pursuant to section 94 of the Water Resources Act 1991, the Minister possesses the authority to designate nitrate sensitive areas for "preventing or controlling the entry of nitrate into controlled waters as a result of . . . the use for agricultural purposes of any land."¹⁹¹ These acts respond to concerns voiced in the European Community over nitrate. Essentially, the nitrate sensitive areas program creates a scheme whereby the Minister may pay a landowner or designated occupier to accept obligations on land management, including requirements for positive action.¹⁹²

The Minister may enter into an agreement with an individual agricultural producer to adopt certain management practices for a fee.¹⁹³ Within this scheme the general preference is to provide for voluntary mechanisms, or make available financial resources when one requires positive action from farming communities. The environmental problems caused by agriculture are deeply rooted and complex. "Unlike industrial pollution, regulation by compulsion is the exception; environmental improvements are generally sought by incentives and voluntary restraint."¹⁹⁴ Notably, the authority may not designate nitrate sensitive areas without finding that pollution is occurring or is likely to occur as a result of agricultural activities, and that other provisions are not sufficient to deal with the problem.¹⁹⁵ In addition, healthy notice and comment provisions are included prior to the promulgation of mandatory order provisions.

In 1990, the Minister of Agriculture of Fisheries and Food (MAFF) and the Secretary of State for the Environment jointly directed the designation of specified land as nitrate sensitive.¹⁹⁶ "The goal was to ensure that nitrate levels in groundwater within the NSA catchments are kept or reduced below 50mg/l, the limit set by the 1980 EC Directive on drinking water."¹⁹⁷ The Nitrate Sensitive Areas (Designation) Order 1990 came into force on June 1, 1990. Designated areas include: Ogbourne St. George, Kilham, Egford, Old

187. *Id.* § 11

188. Water Act, 1989, ch. 15 (Eng.).

189. Water Resources Act, 1991, ch. 3 (Eng.) (formerly § 112 of the Water Act 1989).

190. *Id.* § 94.

191. *Id.*

192. *Id.*

193. *Id.* § 95(2)-(3).

194. Tromans, *supra* note 8, at 315.

195. See Water Resources Act, 1991, § 94.

196. Nitrate Sensitive Areas (Designation) Order, SI No. 1013, III/201A (1990).

197. *Effectiveness of New Plan to Curb Nitrate Leaching in Doubt*, ENDS REPORT NO. 219, Apr. 1993, at 33 [hereinafter ENDS REPORT NO. 219].

Chalford, Wellings, Tom Hill, Wildmoor, Boughton, Sleaford, and Branston Booths.¹⁹⁸

According to the order, the Minister may enter into agreements with landowners and occupiers in the sensitive areas, and require the land owner or occupier to permit the Minister to monitor compliance.¹⁹⁹ Agreements in Nitrate Sensitive Areas between farmers and the MAFF will last for five years. The Order also sets out scheduled payments to qualifying farmers given their location²⁰⁰ and mandatory provisions necessary in a basic scheme agreement.²⁰¹ In particular, "the farmer shall not apply more than 120 kilograms per hectare of inorganic nitrogen fertilizer to a crop in a single application."²⁰² For specified crops, the farmer is required to apply from 25 to 50 kilograms per hectare below the economic optimum.²⁰³ Slurry application and cultivation are restricted to designated timeframes, with the requirement that the farmer seek the Minister's permission before sowing a covered crop.²⁰⁴ In addition, a farmer may generally not remove hedgerows or woodland, or convert grassland to arable land.²⁰⁵ The farmer must record the amount of application of fertilizer, the dates and times when such fertilizer was applied, and the areas of the land and the crop to which application was made.²⁰⁶ For premium scheme agreements, the farmer must cease arable production on the land and establish a grassland sward equivalent to the one existing as of July 31, 1989.²⁰⁷ Generally, premium scheme arrangements provide higher rates of compensation in exchange for greater restrictions on farming practices.

MAFF published proposals for thirty new Nitrate Sensitive Areas (NSAs) in April of 1993.²⁰⁸ Essentially, the new NSAs were meant to extend the pilot scheme of ten NSAs established in 1990.²⁰⁹ "The goal of NSA is to reduce leaching to groundwaters in areas where nitrate levels breach, or are likely to breach, the 50mg/l limit set by the 1980 EC Directive on drinking water. The schemes are voluntary and offer farmers compensation payments in exchange for changes in agricultural practice."²¹⁰ The 1993 proposals

198. Nitrate Sensitive Areas (Designation) Order 1990, SI 1990 No. 1013, Schedule 4, at III/206.

199. *Id.* §§ 5, 6.

200. *Id.* sched. 4.

201. *Id.* sched. 1.

202. *Id.*

203. *Id.*

204. *Id.*

205. *Id.*

206. When a farmer is a producer of pigs or poultry which permanently reside on the owner's property, he is governed by Article 4(2) of the Nitrate Sensitive Areas (Designation) Order 1990.

207. Nitrate Sensitive Areas (Designation) Order, 1990, sched. 2 (Eng.).

208. ENDS REPORT NO. 219, *supra* note 197, at 33-34.

209. MAFF *Softens Nitrate Plan to Appeal to Farmers*, ENDS REPORT NO. 223, Aug. 1993, at 34 [hereinafter ENDS REPORT NO. 223].

210. *Id.*

differ from the pilot scheme in that they target small "inner zones," near water supply boreholes, rather than wider catchments.²¹¹ In addition, the land use options will generally reflect those in the existing premium scheme. In August of 1993, however, MAFF announced its desire to dilute the proposals for thirty new NSAs to make the scheme more attractive to farmers.²¹² As a concession to agricultural interests, farmers under the premium scheme may continue arable cropping with limited nitrogen inputs.²¹³ Even though the National Farmers Union endorsed the changes, concerns still remain.²¹⁴ "There are fears that the measures may go too far and threaten the scheme by allowing higher levels of nitrate leaching."²¹⁵

MAFF models predicted the success of nitrate curbs in the three NSAs where large numbers of farmers converted arable land to low-intensity grass.²¹⁶ The ENDS Report details the anticipated progress:

The NSA scheme has two tiers. Under a "basic scheme," farmers are offered payments for restricting the application of manures and fertilisers and establishing cover crops over the winter months. The scheme was designed to be compatible with existing crop rotations.

The "premium scheme" offers farmers larger payments to convert arable land to unfertilised or lightly fertilised grassland. It was designed to achieve bigger reductions in nitrate leaching at the expense of reduced agricultural production.

MAFF's progress report shows that 87% of the area within the NSAs was entered for the scheme. However, the vast majority of this was for the basic scheme, with only 14% being entered on the premium scheme.

Between 1990 and 1992, average annual applications of nitrogen within the NSAs were cut from 141kg/ha to 103kg/ha. The reduction occurred on all types of crop.

Manure usage also declined, with an estimated 420,000kg of nitrogen in manures being exported from the NSAs. Most pig and poultry units within the NSAs had to find additional land to dispose of their manure. NSA rules preventing the spreading of poultry manures and slurries in the autumn also resulted in a need for extra storage facilities.²¹⁷

211. *Id.*

212. *Id.*

213. *Id.* at 35.

214. *Id.*

215. *Id.*

216. *MAFF Makes Premature Claim for Success of Nitrate Curbs*, ENDS REPORT NO. 227, Dec. 1993, at 9-10 [hereinafter ENDS REPORT NO. 227].

217. *Id.* at 10.

Model results showed the greatest apparent success occurring in NSAs with large areas of "premium scheme" grassland.²¹⁸ As observed in the ENDS Report,

Sleaford, Old Chalford and Branston NSA between them contain 86 percent of the premium grassland in the whole scheme, and all show large reductions in nitrate levels. The report fails to highlight these findings, perhaps because MAFF was not anxious to draw attention to the implication that the relatively harsh restrictions on farming in the premium scheme bring more rapid improvements in nitrate levels.²¹⁹

Work still lies ahead. A study by the National Rivers Authority in one of the limestone NSAs, Old Chalford, "found that nitrate levels in the groundwater regularly exceeded 50 mg/L in 1991 and 1992 and showed no evidence of decline."²²⁰

In May 1994, MAFF and DOE began the process of developing Nitrate Vulnerable Zones (NVZs) pursuant to the previously discussed European Community Directive concerning the protection of waters against pollution caused by nitrates from agricultural sources.²²¹ In some ways, NVZs represent the natural follow up to NSAs. Nevertheless,

[t]here are two important differences between NSA and NVZs. Participation in the former is voluntary; and participating farmers receive financial compensation, in line with rates specified in new regulations. However, all 28 new NSAs fall within areas proposed for designation as NVZs, and farmers in these areas will have to comply with future mandatory NVZ rules, whether they participate in the NSA arrangements or not."²²²

The National Farmers Union voiced a demand for compensation to continue as the transition is made from voluntary NSA to mandatory NVZs.²²³ "The cost of operating the entire NSA programme is expected to rise to £8.3 million per year."²²⁴ "Whether the NSAs will survive beyond 1999 remains to be seen. In that year action programmes to curb nitrate leaching into areas designated as Nitrate Vulnerable Zones under the 1991 EC Directive on protection of water against nitrate pollution from agriculture must be brought into effect."²²⁵

218. *Id.*

219. *Id.*

220. *Id.*

221. Council Directive, 91/676, 1991 O.J. (L 375) 2.

222. *Farmers and Water Industry in Tussle Over Nitrate Zones*, ENDS REPORT NO. 236, Sept. 1994, at 33 [hereinafter ENDS REPORT NO. 236].

223. *Id.*

224. *Id.*

225. ENDS REPORT NO. 219, *supra* note 197, at 34.

Proposals to designate seventy-two Nitrate Vulnerable Zones where farming practices will be controlled to prevent nitrate leaching and runoff have, however, met with criticism. The consultation paper *Designation of Vulnerable Zones in England and Wales Under the EC Nitrate Directive* from MAFF defines seventy-two NVZs in England and Wales.²²⁶ The zones cover some 650,000 hectares, mainly in East Anglia and the Midlands.²²⁷ This number represents a far smaller area than provided in the government's original estimate anticipating the designation of 1.9 million hectares.²²⁸ The discrepancy reflects an extremely narrow interpretation of what the directive actually requires. The proposals protect only waters currently used for public water supply, rather than the broader requirements set forth in the EC Directive mandating protection for all ground and surface waters exceeding established nitrate criteria.²²⁹ They focus on public water supply areas where nitrate levels already exceed the EC drinking limit of 50 mg/L in more than 5% of the samples taken during a year or are likely to do so by 2010.²³⁰ Friends of the Earth argue that this will leave a large number of impacted sites unprotected.²³¹

The government must "draw up action programmes for each NVZ by December 1995. These will have to be implemented within four years thereafter."²³² As previously detailed, the directive sets forth "certain minimum measures which must be included in the action programmes, such as restrictions on the timing and quantity of fertilizer and manure applications."²³³ "Autumn applications of slurry, sludge and poultry manures to grassland will be prohibited, but the use of inorganic fertilizers will only be limited to the crop requirement."²³⁴ In NVZs, "[n]itrogen applications via manure will be limited to a maximum of 210kg/ha per year during the first four-year action programme, and in general to 170kg/ha thereafter."²³⁵ "Farmers will also be required to have sufficient storage capacity for animal manures to ensure that no spreading is required during prohibited periods."²³⁶ In addition,

226. ENDS REPORT NO. 236, *supra* note 222, at 32.

227. *Proposals to Curb Nitrate Leaching May Fall Short of EC Requirements*, ENDS REPORT NO. 232, May 1994, at 35 [hereinafter ENDS REPORT NO. 232].

228. *Id.*

229. *Id.*

230. *Id.*

231. *Id.* Friends of the Earth (FoE) emphasizes that "data from National Rivers Authority . . . suggest that nitrate levels in some 3000 surface waters and 300 ground waters exceeded the 50mg/L limit in 1992." *Id.* Thus, FoE believes that the United Kingdom's interpretation of their obligation will leave many of these waters unprotected. *Id.* Other European countries have chosen the path of designating their whole nation. *Id.*

232. *Id.*

233. *Id.*

234. *Id.*

235. *Id.*

236. *Id.*

Farmers will be required to keep records of all fertilizer and manure applications. NVZs will affect about 12,000 farms, which will receive no compensation for the restrictions, unlike participants in MAFF's voluntary Nitrate Sensitive Areas (NSAs) scheme. NSAs and NVZs have been chosen on similar principles, and farmers who did not participate in an NSA scheme will now generally find themselves subject to NVZ proposals.²³⁷

"The National Farmers' Union has attacked the Government's plans to establish [NVZs] to protect water supplies from nitrate leaching, claiming that farmers will be bankrupted by being forced to pay for manure disposal or reduce livestock numbers."²³⁸ A ban on the application of animal slurries during the autumn is likely to pose particular difficulties for farmers.

The NFU argues that farmers should be compensated for any measures which go beyond good agricultural practice. Livestock farmers are "extremely concerned," it says, that annual manure inputs within NVZs will be limited to 210 kilos per hectare initially, and to 170kg/ha after four years. These would be "major reductions," the NFU says, from the 250kg/ha allowed by the official code of good agricultural practice for the protection of water. . . . The NFU warns that farmers will be forced to pay to dispose of manure if it cannot readily be spread outside NVZs. In some cases, the only option may be to reduce stock numbers, which could result in the failure of farms that are fully financially committed.²³⁹

Farmers have complained about the incorporation of their land into nitrate vulnerable zones.²⁴⁰ In response, the government announced plans in March 1995 to establish an independent review panel to review incorporation decisions.²⁴¹ Junior Environment Minister Sir Paul Beresford explained this decision "during an adjournment debate in the House of Commons on March 14, 1995. But he rejected criticisms that the 1991 EC Directive on nitrate in water which requires NVZs to be established was unfairly weighted against agricultural interests."²⁴² In addition, a separate consultation exercise will also be carried out on measures which may be introduced within NVZs to limit nitrate leaching.²⁴³ The European Community may still prove critical of the approach taken by the United Kingdom.

237. *Id.*

238. ENDS REPORT NO. 236, *supra* note 222, at 32.

239. *Id.*

240. *Minister Defends EC Rules on Nitrate Pollution*, ENDS REPORT NO. 242, Mar. 1995, at 31 [hereinafter ENDS REPORT NO. 242].

241. *Id.*

242. *Id.*

243. *Id.*

C. Enforcement of Environmental Pollution Laws in the United Kingdom

1. The European Community

While the European Commission may bring errant Member States before the European Court of Justice for failure to implement provisions of EC law, it is important to note that the EC has no enforcement powers in the environmental field.²⁴⁴ It is completely dependent on the regulatory authorities in the Member States for the administration of its policies.

2. The United Kingdom Regulators

a. *Introduction.* In the United Kingdom, various Ministers of the Crown have wide ranging powers under the diverse acts which regulate agricultural pollution. In particular, sections 82-84 of the Water Resources Act 1991 (WRA) empower the Secretary of State (SOS) to set forth objectives for water quality.²⁴⁵ Under section 94, the SOS can designate areas Nitrate Sensitive Areas (NSAs).²⁴⁶

As previously discussed, the SOS has also exercised its power under section 97 WRA to issue Codes of Good Agricultural Practice.²⁴⁷ These essentially provide a method for the SOS to promote desirable practices in agriculture. The codes, although authorized by statute, are not legally binding. They provide a useful mechanism for the Government to encourage farmers to voluntarily comply with the environmental protection standards. Moreover, from the enforcement perspective, the National Rivers Authority (NRA) must take compliance or noncompliance with the codes into account in any prosecution.²⁴⁸ This neatly dovetails the voluntary and mandatory instruments available for the control of pollution.²⁴⁹

The principal enforcement body with respect to water pollution generally is the NRA.²⁵⁰ Section 1(5) of the WRA states the NRA is not to be a

244. The standards concerning pollution from agricultural sources are on the whole contained in Directives which have to be implemented into national law by the Member States under Article 189 EC Treaty (Feb. 2, 1992).

245. Water Resources Act, 1991 §§ 82-84.

246. *Id.* § 94. These Nitrate Sensitive Areas while voluntary (see § 95 and Schedule 12 WRA) are useful in that orders given under the section can require positive action from farmers, such as the construction of waste handling facilities in addition to prohibiting and restricting certain activities. *Id.*

247. *Id.* § 97.

248. *Id.* § 97(2).

249. Compliance with the Code is, however, no longer a defense to a prosecution under the WRA 1991. The Code, which largely replaced the provisions of the Water Act 1989, did not re-enact the statutory defense contained in the Control of Pollution Act 1974.

250. The NRA was first established by the Water Act 1989 and those provisions were substantially re-enacted in the WRA 1991 which substantially replaced many parts of the 1989 Act. The River Purification Boards (RPBs) and Island Councils perform a similar role in Scotland under a similar though not identical regime. The powers of both of these bodies shall

servant or agent of the Crown.²⁵¹ Despite this, the Minister of Agriculture can under section 5 of the WRA issue broad directions of a general or specific nature to the NRA.²⁵² This power allows the Minister a great deal of influence over the way the NRA operates. The use of this guiding power is, however, subject to a political check—the NRA's Annual Report must list details of any such directions allowing MPs to question the use of the directing power in Parliament.²⁵³

b. *Statutory Offenses.* Sections 82-104 WRA concerns controlling the pollution of water resources, in particular the pollution of "controlled waters"²⁵⁴ and essentially provide a series of interrelated water pollution offenses. The most important for present purposes is section 85 which provides that an offense is committed if a person

- (1) causes or knowingly permits any poisonous, noxious or polluting matter or any solid waste to enter controlled waters.
- (2) causes or knowingly permits any matter other than trade effluent or sewage effluent to enter controlled waters by being discharged from a drain or a sewer in contravention of a prohibition contained in section 86 (which provides for prohibition notices to be served).²⁵⁵

The section also creates offenses for causing matter to enter inland fresh waters which impedes the proper flow of the waters and leads to aggravation of pollution from other sources.²⁵⁶ There is, however, a defense to a prosecution under this section if the discharge is in accordance with a consent issued by the NRA.²⁵⁷

The wording "causes or permits" which is used throughout section 85(1) covers two distinct offenses. If a defendant is charged with a "causes" offense, it is not necessary to show that the defendant has acted intentionally or negligently.²⁵⁸ Furthermore, in *Regina v. Dovermoss, Ltd.*²⁵⁹ the Court of

be transferred to the Environment Agency and The Scottish Environment Protection Agency under the provisions of the Environment Act 1995 which has just passed through Parliament and went into force in 1996.

251. Water Resource Act, 1991 § 1(5).

252. *Id.* § 5(1).

253. *Id.* § 187.

254. *Id.* § 104. Section 104 defines "controlled waters" as including rivers and other inland surface and underground waters, estuaries and territorial waters within three miles of the baselines. *Id.*

255. *Id.* § 85(1)-(2).

256. *Id.* § 85(5).

257. *See id.* § 88, sched. 10 (Eng.). Schedule 10 WRA sets out at length the conditions under which discharge consents/licenses can be issued. *Id.* Section 88 WRA also provides other circumstances in which discharge licenses can be granted. *Id.* § 88.

258. *Southern Water Auth. v. Pegrum*, 153 J.P. 581 (Q.B. Div'1 Ct. 1989).

259. *Regina v. Dovermoss, Ltd.*, summarized in *Law Reports*, THE TIMES, Feb. 8, 1995, at

Appeals rejected the proposition that for the matter to be held to be polluting some actual harm had to be demonstrated and that matter was polluting if the capability or likelihood of causing harm to plants, animals, or water users could be shown.²⁶⁰

The penalties for breach of these sections are set out in section 85(6) WRA as follows:

- (a) on summary conviction, to imprisonment for a term not exceeding three months or a fine not exceeding £20,000 or to both;
- (b) on conviction on indictment, to imprisonment for a term not exceeding two years or to a fine or to both.²⁶¹

The NRA, in keeping with its vigorous enforcement policy, is increasingly bringing prosecutions in the Crown Court to take advantage of the unlimited fines which are available there.²⁶² Prosecutions for diffuse agricultural pollution appear, however, more difficult.

Under the WRA, the SOS can make regulations to prohibit persons who control polluting matter.²⁶³ Furthermore, the NRA may enter onto land and carry out works necessary to prevent pollution or take steps to remedy pollution which has already occurred and recover the costs from the persons responsible.²⁶⁴ The NRA or the SOS also is empowered to give advice or require information to be provided to carry out their functions under the Act.²⁶⁵ As in all dealings with the regulatory authorities, experience has shown that consensual dealings with regulators reaps the greatest rewards. The regulators recognize this themselves in the use of the voluntary and mandatory instruments which are available to the regulators.

The passage of the Environment Act 1995,²⁶⁶ which transfers the functions of the NRA and the RPBs to the new Environment Agency and the Scottish Environment Protection Agency, was dogged by controversy.

260. *Id.* See also *NRA v. White*, summarized in *Garner's Environmental Law*, Bulletin No. 26, at 8-10 (1995 update) (fining a farmer £2,500 for the pollution of controlled waters with farm effluent).

261. *Water Resources Act*, 1991, § 85(6)(a),(b).

262. See Albert O. Mumma, *Use of Compliance Monitoring Data in Water Pollution Prosecutions*, 5 *J. ENVTL. L.* 191 (1993). Note also, that existing agricultural pollution prosecutions reflect point source style discharges. For example, on April 20, 1995, two farmers were each fined £250 and £750 in costs by the Hereford Magistrates for allowing a cattle slurry tank to overflow directly into a stream and kill twenty-eight brown trout and ten eels. Other prosecutions also reflect direct discharges. For example, the fine for slurry pipe spill into a stream is £2000 and the fine for overflow from waste irrigation system into a river killing 600 brown trout is £2500. *Garner's Environmental Law*, Bulletin No. 26, at 8-10 (1995 update).

263. *Water Resources Act*, 1991 § 92(1)(a), (b).

264. *Id.* § 161(1).

265. *Id.* § 202.

266. *Environment Act 1995*, § 39 (Eng.).

Section 39 of the new act imposes a duty on both agencies to "take into account" the costs and benefits of their action unless it is "unreasonable" to do so and unless this would conflict with other duties and objectives.²⁶⁷ Most believed the legislatures framed this duty so broadly that almost anything the agencies propose to undertake could be challenged, particularly with respect to prosecution policy.²⁶⁸ The government's spokesman attempted to assuage these fears by stating the government was "not seeking to impose upon the Agency a requirement to undertake a full cost/benefit analysis before it acts in any case or to follow slavishly the results of such analysis."²⁶⁹ He added that, although the agencies should have some regard for costs and benefits, this "must not interfere with their ability to ensure effective environmental protection, management or enhancement."²⁷⁰ The government will soon provide guidance to the agencies regarding the unreasonableness of taking the costs and benefits into account.²⁷¹ Environmentalists, multinationals, and individual farmers must wait to see the form this guidance shall take although it could indicate a shift in the government's thinking on environmental pollution.

c. *Other Agencies.* To assist farmers with the increasingly onerous environmental regulations, the Agricultural Advisory and Development Service (ADAS) was created.²⁷² ADAS has been actively supporting individual farmers pursuant to a program which advises farmers on pollution issues and NSAs. Furthermore, ADAS also assists smaller farmers through a free farm pollution advisory service which involves 3000 visits per year to farms throughout England and Wales.²⁷³ The whole operation is based on an extensive R&D program with research benefits passed on to individual farmers through the MAFF and individual consultants who travel the country providing the specialized advice direct to farmers. In addition, other consultants operating in the United Kingdom, who provide advice, are beginning to form associations to ensure common standards.

V. COMPARISON AND ANALYSIS

Both the United States and the United Kingdom developed frameworks for addressing the pollution issues generated by livestock operations and the land application of manure. For some areas, water quality criteria exist and mandate stringent management guidelines for livestock operators. One key remaining question, however, centers on the methods of enforcement. In the

267. *Id.*

268. *Agencies Duties and Contaminated Land Dominate Early Stage of Environment Bill*, ENDS REPORT NO. 241, Feb. 1995, at 21 [hereinafter ENDS REPORT NO. 241].

269. *Id.* at 23.

270. *Id.*

271. *Id.*

272. ADAS is an Executive Agency, formed in 1971, which is jointly owned by the MAFF and the Welsh Office. It is essentially a consultancy and R&D business and increasing pressure is being brought to bear upon it to recover its operating costs. Its role in Scotland is fulfilled by the Scottish Agricultural Colleges.

273. ENDS REPORT NO. 241, *supra* note 268, at 20.

United States, the EPA and state environmental agencies lack the capacity to monitor individual application fields to ensure the appropriate management of manure. Diffuse runoff simply does not allow the type of regulatory oversight associated with point sources. Similarly, the European Community and the United Kingdom will struggle with insuring cooperation by farmers who have a history of environmental violations. How does one insure that manure management application records reflect reality or trace those who fail to comply? Despite the broad enforcement powers of the NRA, and its commitment to prosecute, the difficulties represented by diffuse pollution sources create obstacles to prosecution.

Cost share provides an important element in any program aimed at abating agricultural pollution. Texas provides strong cost-share assistance for agricultural producers who implement best management practices.²⁷⁴ This element corresponds to the framework and support provided by the NSAs in the United Kingdom. The resistance engendered by designation of NVZs reflects the frustration of many British agricultural producers when they consider the potential cost involved in complying with NVZ requirements. British authorities may need to consider committing to some level of financial support to achieve compliance with environmental goals.²⁷⁵ Individual agricultural producers often lack the financial resources necessary to undertake significant improvements. Currently, the United States is considering various proposals which provide funding for agricultural pollution abatement.²⁷⁶ The United Kingdom may wish to follow suit.

Targeting limited resources towards true problem areas provides another element of the equation. This approach allows governments to identify priorities and to establish areas for observing chosen abatement mechanisms. The concept of NVZs and NSAs represents a logical narrowing of governmental inquiry to manageable units. One must also insure, however, that truly impacted areas are not overlooked. Proposals in the United States to address nonpoint source pollution also contain targeting provisions. TIAER proposed an initiative in the Lake Waco/Bosque River watershed, combining USDA and EPA support, which identifies modeling and monitoring programs which target significantly impacted watersheds, in addition to smaller micro-watersheds for action.

To properly address pollution issues generated by agriculture, governments must also embrace those institutions which have established relationships with agricultural producers. Those institutions may guide producers and productively handle difficult situations. In the United States, the

274. 31 TEX. ADMIN. CODE § 523 (West 1995).

275. This should not violate common market principles, given the environmental purpose of the support.

276. For example, the proposed Farm Bill provisions identify a Conservation Farm Option that could guarantee producers a program payment in exchange for voluntarily implementing a whole farm conservation plan. They also describe a Conservation Reserve Program that would target new enrollments to the most environmentally sensitive land, and provide payment for maintaining environmentally favorable practices. *Both Houses Deliberate Farm Bill*, NONPOINT SOURCE NEWS-NOTES, Issue #41, June 1995, at 3.

Soil and Water Conservation Service (SWCS) was established to deal with erosion problems which resulted from dust bowl days. Over the years, the SWCS has been a trusted resource for farmers. Local soil and water conservation districts exist in 3000 counties and provide the natural venue for implementing nonpoint source programs. Texas adopted this approach in 1993 and gave the Texas State Soil and Water Conservation Board (TSSWCB) authority over state agricultural nonpoint source pollution efforts. The ADAS could easily perform a similar function. The ADAS has historically provided service to agriculture and understands the nature of livestock production. By allowing such groups to facilitate nonpoint source programs, governments will begin to make management measures palatable.

Regulators may offer an acceptable, yet effective program by offering a program which combines "bad actors" who refuse to comply with management programs. In an effort to address the inadequacies of a purely regulatory approach, the TSSWCB manages an alternative environmental compliance program for small dairies which combines elements from voluntary and regulatory approaches.²⁷⁷ Under the planned intervention approach adopted in Texas, TSSWCB will handle all complaints concerning agricultural nonpoint source pollution and, where a problem is verified, "develop and implement a corrective action plan to address the complaint."²⁷⁸ The first response is coordinating a plan of action with the producer. Where a pollution problem persists, "the state board shall refer the complaint to the Texas Natural Resource Conservation Commission" for enforcement action.²⁷⁹ Thus, the regulatory agency steps are only enforced when agricultural producers refuse to cooperate.

Implementation of the planned intervention scheme depends upon an abatement program developed around watershed subbasins, or micro-watersheds. TIAER's research in the Upper North Bosque River watershed indicates the value of targeting small micro-watersheds as priorities for action. Pollution loadings congregate in micro-watersheds that receive a disproportionate share of intensive agricultural use, particularly dairies and waste application fields. Monitoring data revealed:

The percent land area in waste application fields and dairy cow density associated with each site consistently showed the highest positive correlations with water quality constituents of any land characteristics for both reservoir and stream sites. . . . This significant positive correlation indicates that as the percent of land used for waste application (or dairy cow density) in a drainage basin increases, the concentration of water quality constituents in stormwater runoff and downstream reservoirs increases.²⁸⁰

277. TEX. AGRIC. CODE ANN. § 201.026 (West 1995).

278. *Id.* § 201.026(d).

279. *Id.*

280. MCFARLAND & HAUCK, *supra* note 34, at 66.

Micro-watersheds essentially provide discrete targets for real problem areas. For these reasons, Texas planners hope to implement a watershed approach to agricultural pollution in the Lake Waco/Bosque River basin which emphasizes the utility of the micro-watershed. This methodology may also assist agencies pursuing regulation in nitrate vulnerable zones in the United Kingdom.

Micro-watersheds also permit institutional management at the local level and utilize the benefits of peer pressure in enforcing environmental norms. Unlike those involved in basin-wide top down planning processes, local stakeholders in targeted watersheds are best positioned to undertake assessments of local activity and to determine land uses within the immediate area requiring modification for nonpoint source pollution abatement. In those micro-watersheds producing excessive nutrient loads, local soil and water conservation districts will designate all stakeholders into consortia, advisory bodies utilized to develop cooperative, innovative solutions to local water quality problems. Consortia stakeholders are all land holders in a micro-watershed, plus other parties with a direct interest in issues affecting water quality. The goal of consortia meetings is to develop a micro-watershed plan that will reduce phosphorus loading to target levels established by environmental quality agencies. Stakeholders also collectively recommend how cost-sharing and other available resources should be spent for maximum impact. In addition, stakeholders aid in developing site specific water quality management plans which incorporate the required best management practices (BMPs). In sum, consortia organization allows local people to collectively discuss pollution problems and assist in the development of solutions for reducing phosphorous loads. Local soil and water conservation districts, or district offices of ADAS, should become the initiators of micro-watershed consortia.

The value of local participation in the enforcement arena is clear. First, local people can best identify true sources of pollution within a micro-watershed. Water quality regulatory agencies face tremendous obstacles in isolating the polluted runoff contribution of individual landowners within a micro-watershed. While the agencies may find success where massive agricultural pollution loading occurs, far less obvious agricultural runoff represents the norm. Once a suspected source of excessive polluted runoff is identified within a micro-watershed, automatic sampling equipment can be placed below the operation's property lines to determine the difference between the two readings. This helps to determine the source of excessive pollutant loadings. Peer pressure within the consortia provides the enforcement mechanism spurring appropriate action. With local people discussing these key issues, effective solutions will germinate in the community. As a last precaution, the TNRCC will take action when a bad actor fails to cooperate with TSSWCB in implementing corrective action plans. The micro-watershed, therefore, will provide the natural stepping stone for regulators that hope to implement management measures.

Similarly, the United Kingdom could promote the cooperative partnership of the ADAS and NRA, the bodies best suited to jointly examine agricultural pollution problems. The ADAS would provide the initial contact with the agricultural producer, instigate the formation of micro-watershed consortia in targeted areas, and help operators with pollution problems

develop corrective action plans. As an enforcement backdrop, when bad actors refuse to cooperate with the ADAS and micro-watershed consortia, the ADAS could refer them to NRA for sanctions.

As a final note, British and American farmers may wish to guard against ever escalating regulatory demands by pro-actively addressing their pollution issues. Nitrates provide the primary impetus for action in the United Kingdom. Studies from impacted watersheds in the United States suggest, however, that phosphorus represents another important environmental hazard receiving increased governmental attention. Dairy journals express concern about the increasing attention on the phosphorus standard.

First, it was nitrogen and the concerns it created for groundwater. Now, the environmental pendulum is swinging toward phosphorus and its potential to harm surface waters. The shift to phosphorus is bad news for dairy producers, because it means they will need a larger land base to justify the spreading of manure than is currently the case with nitrogen.²⁸¹

Given the inherent ratio of nitrogen and phosphorous within manure, nitrogen based standards encourage the over application of phosphorus. Notably, most studies suggest that where controls shift to regulating phosphorus the land required for manure application doubles or triples.²⁸²

VI. CONCLUSION

Agricultural runoff continues to present pollution issues for regulators in the United States and the United Kingdom. Establishing appropriate management practices and insuring their implementation constitute the critical elements in the move towards improved water quality. Both the United States and the United Kingdom have taken significant steps along this path. Future progress will necessitate focusing further attention and resources on this persistent environmental problem.

Texas' planned intervention approach may provide the foundation for future action. The planned intervention approach combines a number of elements which induce environmental compliance by livestock producers: voluntary incentives, enforcement mechanisms, and micro-watershed consortia formation. Operators of livestock production facilities who fail to properly manage manure application fields are most easily identified, educated, and encouraged to properly manage their fields by neighbors who are negatively affected by the degraded water quality. Thus, when combined with voluntary incentives, such as public sector cost-sharing and technical assistance, as well as enforcement activity reserved for bad actors, peer pressure within micro-

281. Steve Cabbage, *Look Out for Phosphorus*, DAIRY HERD MANAGEMENT, Sept. 1994, at 42.

282. See, e.g., H. Van Horn et al., *Components of Dairy Manure Management Systems*, 77 J. DAIRY SCI. 2023 (1994).

watershed consortia should provide an important element for controlling pollution from livestock production facilities.²⁸³

283. For a full exposition of the planned intervention approach, one may refer to Staci Pratt et al., *AGRICULTURE AND THE ENVIRONMENT: A WATERSHED PERSPECTIVE LINK USDA AND EPA INITIATIVES* 4 (1995); Frarey & Pratt, *supra* note 48.