

NITRATES FROM AGRICULTURE IN EUROPE: THE EC NITRATES DIRECTIVE AND ITS IMPLEMENTATION IN ENGLAND

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The United Nations recently issued a stern warning regarding the excessive use of nitrogen in agriculture: "[W]e are fertilizing the Earth on a global scale and in a largely uncontrolled experiment." Nitrogen is an essential nutrient for crop production. Excess nitrogen, however, pollutes both surface water and groundwater and has serious health and environmental consequences. In response, the European Community (EC) and its Member States have enacted regulatory measures to reduce further pollution from nitrates used in agriculture. This Article analyzes the 1991 EC Nitrates Directive and its implementation, discussing agriculture in the EC, the use of nitrogen, and the harmful effects of excess nitrates. The Article also considers environmental law-making in the EC and traces the history of the EC's treatment of nitrates from agriculture. The Article focuses on the nitrate situation in England, with emphasis on voluntary programs to control nitrates. Finally, the Article concludes with an analysis of the implementation of the Nitrates Directive in England and a discussion of an important 1999 European Court of Justice decision that interprets the Directive.

INTRODUCTION

The United Nations recently issued a stern warning regarding the excessive use of nitrogen in agriculture: "[W]e are fertilizing the Earth on a global scale and in a largely uncontrolled experiment."¹ Nitrogen, normally supplied in the form of organic or inorganic fertilizers, is an essential nutrient for crop production. Excess nitrogen

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¹ United Nations Environment Programme, *Global Environment Outlook 2000*, (visited Nov. 15, 1999) <<http://www.unep.org/geo2000/english/index.htm>> [hereinafter *GEO 2000*].

(often in the form of nitrates), however, pollutes surface and groundwater, and has serious health and environmental consequences. In response, the European Community (EC) and its Member States have enacted regulatory measures to reduce further pollution from nitrates used in agriculture.

This Article analyzes the 1991 EC Nitrates Directive and its implementation. After an introductory discussion of agriculture in the EC and the use of nitrogen, the Article explains the harmful effects of excess nitrates. The Article next considers environmental law making in the EC and traces the history of the EC's treatment of nitrates from agriculture. The Article then discusses the central EC regulatory measure, the 1991 Nitrates Directive, and the failure of most Member States to implement the Directive correctly and on time. The Article then turns to the nitrate situation in England, focusing first on voluntary programs to control nitrates. Finally, the Article analyzes the implementation of the Nitrates Directive in England and an important 1999 European Court of Justice decision that interprets the Directive.

I. BACKGROUND

A. *Agriculture in the EC*

In 1957, the Treaty of Rome established the European Economic Community.² By creating a common market and harmonizing economic policies, the six founding Member States hoped "to promote throughout the Community a harmonious development of economic activities, a continuous and balanced expansion, an increased stability, an accelerated raising of the standard of living and closer relations between its Member States."³

Agriculture was an important component of the Treaty and has remained a focus of Community activities. After World War II, "continental agriculture . . . was under-capitalized and still overwhelmingly peasant based, with any technological improvement in the inter-war

² See TREATY ESTABLISHING THE EUROPEAN ECONOMIC COMMUNITY, Mar. 25, 1957, 298 U.N.T.S. 11 [hereinafter EEC TREATY]. The consolidated EEC Treaty, with amendments, including the Treaty of Amsterdam, is published at 1997 O.J. (C 340) 173 [hereinafter TREATY].

³ EEC TREATY art. 2. The six founding Member States were Italy, France, the Federal Republic of Germany, Belgium, Luxembourg, and the Netherlands. Article 2 has been amended and now refers, among other things, to "a harmonious, balanced and sustainable development . . . equality between men and women . . . a high level of protection and improvement of the quality of the environment . . ." See TREATY art. 2.

period limited to a minority of farms.”⁴ Surplus production was only a “remote possibility.”⁵ Indeed, Europe’s dependence on foreign food supplies after the War demonstrated the need for a policy to foster self-sufficiency in food production.⁶ Responding to this demand for enhanced agricultural production, the Principles of the Treaty stated that “the activities of the Community shall include . . . the inauguration of a common agricultural policy.”⁷

The provisions governing the Common Agricultural Policy (CAP) take pride of place among the “Foundations of the Community.”⁸ The Treaty prescribed a common market to encompass agriculture and agricultural products.⁹ Measures authorized for the common organization of agricultural markets included “regulation of prices, aids for the production and marketing of the various products, storage and carry-over arrangements and common machinery for stabilising imports or exports.”¹⁰ The CAP, developed through regulations enacted during the 1960s, unified agricultural prices to create a common market. Import duties increased the cost of imported products, and export subsidies made EC products competitive on the world market.¹¹

The CAP, initially dedicated to increased production and higher farm incomes, also led to structural changes in European agricul-

⁴ CLIVE POTTER, *AGAINST THE GRAIN* 26 (1998).

⁵ *Id.* at 14.

⁶ See Andrew Paul Manale, *European Community Programs to Control Nitrate Emissions from Agriculture*, 14 Int’l Env’t Rep. (BNA) 345, 345 (June 19, 1991).

⁷ EEC TREATY art. 3(d).

⁸ *Id.* arts. 38–47. The agricultural articles are now at Treaty, Articles 32–38. EEC Treaty Article 39(1) (now TREATY art. 33) established the objectives of the CAP:

- (a) to increase agricultural productivity by promoting technical progress and by ensuring the rational development of agricultural production and the optimum utilisation of the factors of production, in particular labour;
- (b) thus to ensure a fair standard of living for the agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture;
- (c) to stabilise markets;
- (d) to assure the availability of supplies;
- (e) to ensure that supplies reach consumers at reasonable prices.

Id.

⁹ *Id.* art. 38 (now TREATY art. 32).

¹⁰ *Id.* art. 40(3) (now TREATY art. 34(2)).

¹¹ See OFFICE OF OFFICIAL PUBLICATIONS OF THE EUROPEAN COMMUNITIES, *OUR FARMING FUTURE* 7–8 (1993) [hereinafter *OUR FARMING FUTURE*].

ture.¹² Guaranteed domestic prices—often higher than world prices—and a guaranteed market for agricultural products under the CAP induced EC farmers to increase production of crops and livestock.¹³ High prices were reflected in higher farmland values and a resulting shift toward intensive production of crops and livestock, as well as cultivation of marginal farmland.¹⁴ These developments, which required increased pesticide and fertilizer use and resulted in higher production of animal manure, had adverse environmental implications.¹⁵

Several measures enacted during the 1970s and 1980s (e.g., milk quotas) were designed to reduce production and the cost of the CAP, but these reforms had little impact. Thus, the EC enacted a major CAP reform in 1992 (the Mac Sharry Reform), intended to make farmers more competitive, reduce production, provide income support, encourage farmers to stay on the land, and protect the environment and nature in the countryside.¹⁶ Under the Mac Sharry Reform, cereals and beef prices were reduced over three years. Through a change in the market organization, cereals producers were supported with compensatory payments, a per-ton amount calculated for each farmer on the basis of the number of hectares farmed and average yield in the region. Receipt of payments was conditioned on a set-aside, with environmental restrictions, for larger farmers, but the required set-aside level had changed several times and significant flexibility existed. The 1992 reform also included three “accompanying measures.” Most important was the agro-environmental measure,¹⁷ which recognized farmers’ dual role as producers and stewards of the countryside and therefore authorized financial incentives for less intensive farming practices.¹⁸

¹² See David J. Briggs & Elaine Kerrell, *Patterns and Implications of Policy-Induced Agricultural Adjustments in the European Community*, in *RESTRUCTURING THE COUNTRYSIDE: ENVIRONMENTAL POLICY IN PRACTICE* 85 (Andrew W. Gilg ed., 1992).

¹³ See Stephen Haley, *Assessing Environmental and Agricultural Policy Linkages in the European Community*, in *ENVIRONMENTAL POLICIES: IMPLICATIONS FOR AGRICULTURAL TRADE* 103 (John Sullivan ed., Foreign Agric. Econ. Rep. No. 252, 1994).

¹⁴ See *id.*; see also European Environmental Bureau, Comments of the European Environmental Bureau on the Proposal for a Council Directive Concerning the Protection of Fresh, Coastal and Marine Waters Against Pollution Caused by Nitrates from Diffuse Sources, at 1 (on file with author) [hereinafter EEB].

¹⁵ See Haley, *supra* note 13, at 103.

¹⁶ See *OUR FARMING FUTURE*, *supra* note 11, at 18.

¹⁷ See Council Regulation 2078/92, 1992 O.J. (L 215) 85. For information on the repeal of this regulation, see *infra* note 21.

¹⁸ See Council Regulation 2078/92, 1992 O.J. (L 215) 85. For details of the 1992 CAP reform and the agro-environmental measure, see Margaret Rosso Grossman, *Agro-*

In May 1999, the EC enacted further reform as part of "Agenda 2000." The Agenda 2000 reform continues the Mac Sharry pattern: it also reduces prices further, but increases direct payments to farmers. It is intended to simplify the complicated system of regulations that govern the CAP.¹⁹ To implement the reform for the 2000–2001 marketing year, the European Council enacted numerous regulations, including a new regulation to govern support for arable crops, which reduces prices further, increases direct payments over two or three years (depending on the crop), and imposes a compulsory set-aside until 2006–2007.²⁰ Other regulations affect beef, the milk market and milk quotas, potatoes, and wine. A rural development regulation establishes a framework for EC support of programs to encourage sustainable rural development.²¹ The regulation also authorizes a number of new rural development measures and continues others from previous legislation, including agro-environmental measures. The so-called "horizontal regulation" requires Member States to impose environmental measures that farmers must follow as a condition for receipt of direct payments under CAP programs.²²

Even in light of recent reforms, the CAP continues to influence EC farmers' production decisions, including plans for applying organic and inorganic nitrogen fertilizers. Thus, to provide further background to the EC Nitrates Directive, the focus now turns to the use and effect of nitrogen fertilizer under the CAP.

B. Nitrogen in EC Agriculture

1. Nitrogen as a Nutrient

Successful crop production requires that essential nutrients be available to plants during the appropriate times in their growth cycles. Where land has been farmed for many years, vital natural nutrients are often depleted, and nutrients must be added for optimal plant

Environmental Measures in the Common Agricultural Policy, 25 UNIV. MEM. L. REV. 927 (1995), and sources cited therein.

¹⁹ See Council Press Release 8280, presse 149, (May 17, 1999) available at <http://europe.eu.int/comm/dg06/ag2000/press_en.htm>.

²⁰ See Council Regulation 1251/99, 1999 O.J. (L 160) 1.

²¹ See Council Regulation 1257/99, 1999 O.J. (L 160) 80. Article 55 repeals Council Regulation 2078/92 and other regulations. See *id.* at 100. For detailed rules on the implementation of the rural development regulation, see Commission Regulation 1750/99, 1999 O.J. (L 214) 31.

²² See Council Regulation 1259/99, art. 3, 1999 O.J. (L 160) 113, 114.

growth.²³ Among the nutrients necessary for crop production is nitrogen, which is essential for all living organisms and plays a role in photosynthesis. Nitrogen comprises about seventy-eight percent of the atmosphere, but nitrogen gas must be "fixed" into a form usable by plants. Nitrate (NO_3) and ammonium (NH_4) are forms of nitrogen that plants can absorb.²⁴ The transformation to nitrate through the process of nitrification occurs in the soil.²⁵

Nitrogen is fixed either naturally or artificially. Natural processes include the action of naturally-occurring nitrogen-fixing organisms, bacteria such as *Rhizobia* and algae, and lightning, which converts small amounts of nitrogen into nitrates.²⁶ Human-driven activities fix far more nitrogen than these natural processes. Burning fossil fuels in transportation and industry, for example, releases fixed nitrogen into the atmosphere. Cultivation of legume crops (e.g., soybeans) and a few non-legumes (e.g., rice) fixes substantial amounts of nitrogen in the soil. In terms of quantity, manufacture of commercial nitrogen fertilizers is the most significant human nitrogen-fixing activity.²⁷ Livestock manure is also a source of nitrogen; the nitrogen content of manure comes from the plant feeds eaten by the animals.

In September 1999, the United Nations Environment Programme released a report that identified nitrogen as a major international environmental concern.²⁸ The report, *Global Environment Outlook 2000*, summarized the nitrogen problem:

We are fertilizing the Earth on a global scale through intensive agriculture, fossil fuel combustion and widespread culti-

²³ See Robert Ballard & Karen M. Keating, *Is There an Ocean of Difference?: A Comparison of the European Community's and United States' Environmental Regulations Protecting Air and Water Quality*, 5 VILL. ENVTL. L.J. 115, 152 (1994).

²⁴ See DALE LEUCK ET AL., THE EU NITRATE DIRECTIVE AND CAP REFORM: EFFECTS ON AGRICULTURAL PRODUCTION, TRADE, AND RESIDUAL SOIL NITROGEN 2 (USDA, Foreign Agric. Econ. Rep. No. 255, 1995); Peter M. Vitousek et al., *Human Alteration of the Global Nitrogen Cycle: Causes and Consequences*, 1 ISSUES IN ECOLOGY 3, 3 (1997). A more technical version of this report appears at 7 ECOLOGICAL APPLICATIONS 737 (1997).

²⁵ See MINISTRY OF AGRICULTURE, FISHERIES AND FOOD (MAFF), SOLVING THE NITRATE PROBLEM: PROGRESS IN RESEARCH AND DEVELOPMENT 9-12 (1993, PB 1092) [hereinafter MAFF, SOLVING].

²⁶ See Vitousek, *supra* note 24, at 4.

²⁷ See *id.* at 5. For example, anhydrous ammonia is a liquid nitrogen fertilizer, and it is also used to manufacture ammonium nitrate, a solid nitrogen fertilizer. See Dale Leuck, *The EC Nitrate Directive and its Potential Effects on EC Livestock Production and Exports of Livestock Products*, in ENVIRONMENTAL POLICIES: IMPLICATIONS FOR AGRICULTURAL TRADE 91, 93 (John Sullivan ed., Foreign Agric. Econ. Rep. No. 252, 1994).

²⁸ See *GEO 2000*, *supra* note 1.

vation of leguminous crops. Evidence is growing that the huge additional quantities of nitrogen being used are exacerbating acidification, causing changes in the species composition of ecosystems, raising nitrate levels in freshwater supplies above acceptable limits for human consumption and causing eutrophication in many freshwater habitats. In addition, river discharges laden with nitrogen-rich sewage and fertilizer run-off tend to stimulate algal blooms in coastal waters, which can lead to oxygen starvation and subsequent fish kills at lower depths, and reduce marine biodiversity through competition. Nitrogen emissions to the atmosphere contribute to global warming. Consensus among researchers is growing that the scale of disruption to the nitrogen cycle may have global implications comparable to those caused by disruption of the carbon cycle.²⁹

The UN report also noted that plants take up less than half the applied nitrogen, with the rest "lost to the air, dissolved in surface waters or absorbed into groundwater."³⁰ Further, the report asserted that

[l]arge areas of northern Europe, where intensive agriculture and high fossil fuel combustion coincide, are now in a state of nitrogen saturation: no more nitrogen can be taken up by plants, and additional deposits are simply dispersed into surface water, groundwater and the atmosphere without playing any role in the biological systems for which they were intended.³¹

2. Nitrogen Application in EC Agriculture

In the EC (which includes many of the "large areas of northern Europe" highlighted in the UN report), nitrogen application increased over several decades after establishment of the CAP. As farmers intensified production in response to higher prices and guaranteed markets, they often applied more fertilizers (as well as pesticides and other inputs) to farmland to maximize yields. Because the prices farmers received for farm products rose faster than the price of fertil-

²⁹ *Id.* Introduction, Synthesis.

³⁰ *Id.* chap. 2, Global Issues.

³¹ *Id.*

izers, farmers could increase fertilizer use economically.³² Thus, application of nitrogen fertilizers increased in the original six Member States between 1970 and 1990, and nitrogen use increased even more significantly in other States.³³ In ten Member States, average application of nitrogen increased almost 400% between 1950 and 1981—from twenty-three to ninety-nine kilograms (kg) per hectare (ha).³⁴ Grain yields increased, though less dramatically, roughly doubling between 1960 and 1990.³⁵

In the EU generally, forty-five percent of nitrogen fertilizers are applied to wheat and coarse grains.³⁶ Mineral fertilizers are the main source of nitrogen, followed by livestock manures.³⁷ Indeed, intensive livestock production in some areas of Europe results in production of large amounts of animal manure. Disposal of that animal manure on cropland often results in application of far more nitrogen than plants can absorb, particularly in areas of the Netherlands, Belgium, and France where intensive livestock operations are common.³⁸ In some Member States, both manure and chemical fertilizers are problems. For example, in the Netherlands, livestock production alone leads to nitrate problems,³⁹ but Dutch farmers produce intensively and also use more chemical fertilizers than farmers in other countries.⁴⁰

Both commercial fertilizer and livestock manure have contributed to the excess of nitrogen in the environment. In the worst case, fifty percent of fertilizer or manure can run off the land. Nutrients

³² See AGRA EUROPE, SPECIAL REPORT NO. 60: AGRICULTURE AND THE ENVIRONMENT 9 (1991) [hereinafter SPECIAL REPORT NO. 60].

³³ See POTTER, *supra* note 4, at 27. A decrease in EU fertilizer use is expected during the next decade, with an average seven percent decline in nitrogen use predicted between 1999 and 2009. See *Fertilizer use in long-term decline*, AGRA EUROPE (Nov. 19, 1999), at EP/11.

³⁴ See SPECIAL REPORT NO. 60, *supra* note 32, at 12. The 10 Member States are the original six, plus Denmark, Greece, Ireland, and the United Kingdom. Agra Europe reported average use as kg/ha/UAA (utilizable agricultural area). Less dramatic increases in phosphate and potash were indicated.

³⁵ See LEUCK ET AL., *supra* note 24, at 3–4.

³⁶ See OFFICE OF TECHNOLOGY ASSESSMENT, UNITED STATES CONGRESS, AGRICULTURE, TRADE, AND ENVIRONMENT: ACHIEVING COMPLEMENTARY POLICIES 183 (1995) [hereinafter OTA].

³⁷ See Maria Pau Vall & Claude Vidal, *Nitrogen in Agriculture*, in CLAUDE VIDAL ET AL., AGRICULTURE, ENVIRONMENT, RURAL DEVELOPMENT: FACTS AND FIGURES—A CHALLENGE FOR AGRICULTURE (July 1999), (last visited Nov. 2, 1999) <<http://europa.eu.int/comm/dg06/envir/report/en/index.htm>>.

³⁸ See SPECIAL REPORT NO. 60, *supra* note 32, at 17.

³⁹ See OTA, *supra* note 36, at 183.

⁴⁰ See *id.* at 185.

are then lost to the plants for which they were intended and often cause unintended environmental problems.⁴¹ Moreover, as EC officials have noted,

[i]t can take many years for nitrate pollution to reach a water body once it has left the soil rooting zone. Indeed much of the high concentration of nitrate in waters today has been caused by agricultural practices of past decades. It also follows that today's agricultural practices will determine future nitrate pollution levels.⁴²

Commercial fertilizers are sometimes perceived to cause fewer environmental problems than manure because farmers pay for commercial fertilizers and thus apply those products for optimum efficacy and minimum runoff or leaching. Manure, in contrast, is viewed as waste and is therefore not always applied efficiently to aid crop fertility. Livestock production is more concentrated than crop production, and not all livestock producers have enough land available to apply manure at an appropriate agronomic rate. Moreover, in the EC, the "amount of nitrogen from livestock manure totals nearly twice the amount of calculated uptake from forage."⁴³ Manure thus adds to residual nitrogen and often contributes to nitrate pollution, especially in areas where livestock production is intensive.⁴⁴

In the different EC countries, the problems caused by nitrates vary due to "different hydrogeological conditions, ground water extraction methods, and patterns of agricultural production."⁴⁵ Some Member States or regions of States (e.g., Belgium and the Netherlands) have stocked agricultural land with livestock at relatively high densities; other States (e.g., the United Kingdom, France, and Italy) have relatively fewer livestock, though large operations in some re-

⁴¹ See *GEO 2000*, *supra* note 1, at chap. 2, Global Issues; SPECIAL REPORT No. 60, *supra* note 32, at 12.

⁴² European Commission, The implementation of Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources 8 (1998) [hereinafter Implementation].

⁴³ See LEUCK ET AL., *supra* note 24, at 9.

⁴⁴ See *id.* at 2-3. The number of animals per operation may more accurately predict nitrate pollution than the number of animals per hectare. The expense of disposing of waste means that, regardless of size, farmers are likely to dispose of manure relatively close to their operations.

⁴⁵ Jobst Conrad, *Agriculture and the Environment in Western Europe*, 5 INT'L ENVTL. AFF. 79, 86 (1993).

gions may produce excess manure.⁴⁶ As the number of farming operations in Member States has decreased, however, livestock operations have generally become more concentrated.⁴⁷ Soil characteristics are also important. In the Netherlands, for example, in areas of sandy soils, nitrate concentration thirty meters underground was 106 mg/liter (l). The result is that much water in the central Netherlands exceeds drinking water standards for nitrates, and water closer to the surface is unfit even for cattle in some areas.⁴⁸

3. Effects of Nitrates

Nitrates in water are pollutants, and agriculture is the main (but not the only) source of water pollution from nitrogen.⁴⁹ Because plants require only a limited quantity of nitrates, application of too much fertilizer or manure causes environmental problems. Excess nitrates reach groundwater or surface water by running off the land or leaching through the soil. The rate at which the nitrates leach is affected by factors including the type of soil, the amount of rainfall, and type of plant cover. Nitrates already in the soil have potential for further damage; ten to twenty years may elapse before leaching nitrates can be detected in groundwater supplies;⁵⁰ even forty years may elapse before nitrates reach groundwater.⁵¹ Thus, the measurement of nitrates currently in water supplies does not always reflect the severity of the nitrate problem.

In addition to movement of nitrates into water supplies, nitrogen in fertilizer or manure spread on fields (and even manure in barns and storage systems) may end up in the atmosphere through volatili-

⁴⁶ See LEUCK ET AL., *supra* note 24, at 3-4.

⁴⁷ See *EU herd sizes grow as farms get fewer*, AGRA EUROPE, Aug. 27, 1999, at EP/8. In 1997, according to the EC's statistical office Eurostat, fewer than one percent of pig farmers raised 70.3% of pigs, and 30.3% of pigs belonged to herds of 5000 or more animals.

⁴⁸ See Manale, *supra* note 6, at 346. For the drinking water standard of 50 mg/l, see *infra* notes 64-65 and accompanying text.

⁴⁹ See Pierre Strosser, Maria Pau Vall, & Eva Plötscher, *Water and Agriculture: Contribution to an Analysis of a Critical but Difficult Relationship*, in VIDAL ET AL., *supra* note 37.

⁵⁰ See SPECIAL REPORT NO. 60, *supra* note 32, at 16.

⁵¹ See Nick Hanley, *The Economics of Nitrate Pollution Control in the UK*, in FARMING AND THE COUNTRYSIDE: AN ECONOMIC ANALYSIS OF EXTERNAL COSTS AND BENEFITS 98 (Nick Hanley ed., 1991).

zation. This occurs particularly if fertilization is intensive or manure is not applied properly.⁵²

a. *Health*

Excess nitrates are undesirable because they have adverse effects on both health and the environment. The human health effects associated with nitrates are still uncertain.⁵³ One important health concern is the link between excessive nitrate levels and stomach cancer in adults. Research has suggested that people who ingest nitrates in water produce N-nitroso compounds in their digestive tracts. These compounds are carcinogenic in laboratory animals.⁵⁴ Another study found that nitrates (and nitrites) in food and drinking water are not likely to lead directly to human cancer, though these substances could still be a factor in the development of cancer.⁵⁵ Although the link between stomach cancer and nitrates is not conclusive (and one commentator called it "hypothetical"⁵⁶), the public perception is that these excessive nitrates are not desired.⁵⁷

Another health effect of excess nitrates is methemoglobinemia, or "blue baby" syndrome, a form of oxygen starvation in infants. In this condition, "nitrate is reduced to nitrite in the body and causes blood hemoglobin to be oxidized into ferric iron, which interferes with the body's ability to absorb oxygen."⁵⁸ Few cases have occurred in recent years (only fourteen in the United Kingdom in thirty-five

⁵² See Vitousek et al., *supra* note 24, at 6; Leuck, *supra* note 27, at 93. Nitrogen from manure may be volatilized as ammonia (NH₃) or as nitrous oxide (N₂O), a greenhouse gas. See generally Vall & Vidal, *supra* note 37.

⁵³ See STEPHEN R. CRUTCHFIELD ET AL., BENEFITS OF SAFER DRINKING WATER: THE VALUE OF NITRATE REDUCTION 1 (1997).

⁵⁴ See OTA, *supra* note 36, at 77.

⁵⁵ See *Nitrates, Nitrites in Drinking Water Unlikely to Increase Cancer Risk*, NAS Says, 26 Env't Rep. (BNA) 660, 660 (1995).

⁵⁶ M.R. Payne, *Farm Waste and Nitrate Pollution*, in AGRICULTURE AND THE ENVIRONMENT 63, 69 (John Gareth Jones ed., 1993).

⁵⁷ See Hanley, *supra* note 51, at 95.

⁵⁸ See LEUCK ET AL., *supra* note 24, at 2.

years),⁵⁹ and most cases occur in areas served by small private water supplies.⁶⁰

Spontaneous abortions in humans may also stem from excess nitrates in drinking water. Research has suggested a link between nitrates and abortions in laboratory animals and livestock. A Centers for Disease Control investigation in the early 1990s suggested a possible link between drinking water from nitrate-contaminated wells and spontaneous abortions in several Indiana women. The probable source of nitrate contamination was agricultural: wastes from a hog-confinement facility.⁶¹

Excess nitrates also affect the health of livestock. Research published in the 1950s indicated that high nitrate levels interfere with the metabolism of livestock.⁶² In cattle, "nitrate reduced to nitrite can also be toxic and causes [anemia similar to methemoglobinemia] as well as abortions."⁶³

EC law reflects these concerns about nitrates and human health. The EC Drinking Water Directive, enacted in 1980 and effective in 1985, established a maximum admissible nitrate (NO₃) concentration of fifty mg/l, with a guide level of twenty-five mg/l.⁶⁴ The 1995 Dobris

⁵⁹ See Hanley, *supra* note 51, at 94. A 1996 study suggested that many infants in the U.S. are exposed to dangerously high nitrate levels, either from public water systems or from private wells. See *Thousands of Infants Exposed to Unsafe Levels of Nitrate, Report by Environmental Group Says*, 26 Env't Rep. (BNA) 2025, 2025 (1996). The research, from the Environmental Working Group, seems to conflict with a 1995 report from the National Academy of Sciences. See *id.*

⁶⁰ See Commission of the European Communities, Proposal for a Council Directive concerning the protection of fresh, coastal and marine waters against pollution caused by nitrates from diffuse sources, COM(88)708 (final) at 15 [hereinafter Nitrates Proposal]. The proposed directive also appears at 1989 O.J. (C 54) 4, with an amended version (after the Parliament's opinion) at 1990 O.J. (C 51) 12.

⁶¹ See Centers for Disease Control, *Spontaneous Abortions Possibly Related to Ingestion of Nitrate-Contaminated Well Water—LaGrange County, Indiana, 1991–1994*, 45 MORBIDITY AND MORTALITY WEEKLY REPORT 569, 569 (1996).

⁶² See LEUCK ET AL., *supra* note 24, at 2.

⁶³ Stephen Carpenter et al., *Nonpoint Pollution of Surface Waters with Phosphorus and Nitrogen*, 3 ISSUES IN ECOLOGY 2, 6 (1998). For a more technical version of this report, see 8 ECOLOGICAL APPLICATIONS 559 (1998).

⁶⁴ See Council Directive 80/778, 1980 O.J. (L 220) 11. This directive will be repealed five years after entry into force of the new drinking water directive. Council Directive 98/83, art. 16, 1998 O.J. (L 330) 32, repealing Directive 80/778. The nitrate standard in the new Directive remains 50 mg/l. Council Directive 98/83, *supra*.

The U.S. drinking water standard is 10 mg/l, but the US measures nitrate level differently. "The EU measures the level of nitrate concentration by measuring the whole NO₃ molecule; the United States measures the level of nitrate concentration by measuring just

Assessment indicated that eighty-seven percent of European agricultural areas had groundwater nitrate concentrations above the twenty-five mg/l guide level, and twenty-two percent above the maximum of fifty mg/l. Nitrate levels in some areas continue to increase.⁶⁵

b. *Environment*

The environmental effects of excess nitrates are more certain and less controversial. In surface waters, excess nitrates play a role in eutrophication, or "hypertrophication," an overabundance of nutrients.⁶⁶ Eutrophication occurs in both fresh and salt waters, and excess algae growth is often a result.⁶⁷ Algae growth in fresh waters is related to the level of phosphorus, as well as nitrates. As officials of the EU recognized,

[e]xcessive use of nitrogenous and phosphate fertilisers causes eutrophication in surface waters in many regions of the Community; the resulting algal blooms disturb the oxygen levels of the water with dramatic consequences for fish, feeding matter and the ecosystem in general as well as the use of the water for drinking and recreation purposes.⁶⁸

Algae blooms smell bad and decrease water transparency. They also consume oxygen, and the lack of oxygen often kills aquatic life, especially fish that need high levels of oxygen to survive.

Further, drinking water with excess nitrates deteriorates in quality. Nitrates are stable and soluble, so complex and expensive water

the nitrogen (N) component of the molecule." Fifty mg/l is about 11 mg/l, when only N is considered. See OTA, *supra* note 36, at 175 n.12.

⁶⁵ See Directions towards sustainable agriculture, COM(99)22 final at 11 [hereinafter Directions]; Implementation, *supra* note 42, at 7.

⁶⁶ See EEB, *supra* note 14, at 3. As the EEB and others have noted, phosphates are also relevant to eutrophication, because phosphates are often the limiting factor in eutrophication of fresh water. Symptoms of eutrophication are "algal blooms, dead plant material, lack of dissolved oxygen."

⁶⁷ Citing problems of eutrophication, which promotes algae growth, the Worldwide Fund for Nature began a program, Living Rivers for Europe, in September 1999. Among the program's demands on EU decisionmakers are strict enforcement of the Nitrates Directive and conditions attached to CAP payments to prevent pollution of rivers. See *Reversing Eutrophication in EU Rivers Among Targets of New WWF Initiative*, 22 Int'l Env't Rep. (BNA) 797, 797 (1999).

⁶⁸ See Resolution of the Council and the Representatives of the Governments of the Member States, Meeting Within the Council of 1 February 1993 on a Community Programme of Policy and Action in Relation to the Environment and Sustainable Development, 1993 O.J. (C 138) 1, 36 [hereinafter Fifth EAP].

treatments are often required to remove them.⁶⁹ Because of increased levels of bacteria and other problems connected with eutrophication, treatment may require undesirably high levels of chlorine before consumption. Organic substances and chlorine sometimes result in "significant concentrations of toxic organochlorine compounds," which may be carcinogenic.⁷⁰

Increased nitrate levels also have caused eutrophication, with characteristic algae blooms, in the open seas and coastal waters of the EU. The resulting oxygen depletion often harms both fauna and fish. Fish in aquaculture operations have been killed, and mussels have been contaminated.⁷¹ Moreover, some harmful marine algae—known as red or brown tides—release harmful toxins, which can result in poisoned shellfish and marine animal mortality.⁷²

Excess nitrogen also leads to reduced diversity of wildlife in the natural environment. Intensive fertilization leads to "the replacement of the original flora, rich in diversity and abundance of species and associations of species, by a few dominant nitrophilic species."⁷³ In Western Europe, nitrogen deposited by humans has caused loss of biodiversity. In the Netherlands, for example, with its dense populations of humans, livestock, and industry, high nitrogen deposition has resulted in

conversion of species-rich heathlands to species-poor grasslands and forest. Not only the species richness of the heath but also the biological diversity of the landscape has been reduced because the modified plant communities now resemble the composition of communities occupying more fertile soils. The unique species assemblage adapted to sandy, nitrogen-poor soils is being lost from the region.⁷⁴

In England, "nitrogen fertilizers applied to experimental grasslands have led to increased dominance by a few nitrogen-responsive grasses

⁶⁹ See Anoop Kapoor & T. Viraraghavan, *Nitrate Removal from Drinking Water—Review*, 123 J. OF ENVTL. ENG'G 371, 371 (1997) (discussing and comparing water treatment methods).

⁷⁰ Nitrates Proposal, *supra* note 60, at 17. "[T]he high load of organic detritus reacts with chlorine to form carcinogens known as trihalomethanes." Carpenter et al., *supra* note 63, at 5.

⁷¹ See Nitrates Proposal, *supra* note 60, at 16.

⁷² See Carpenter et al., *supra* note 63, at 4.

⁷³ EEB, *supra* note 14, at 4.

⁷⁴ Vitousek et al., *supra* note 24, at 9.

and loss of many other plant species. At the highest fertilization rate, the number of plant species declined more than five-fold.⁷⁵

In addition to problems associated with nitrates in surface and ground water, volatilized nitrogen contributes to acid rain, damaging forests and other crops. Intensive fertilization "can increase the rates at which nitrogen in the form of ammonia is volatilized and lost to the air. It can also speed the microbial breakdown of ammonium and nitrates in the soil, enhancing the release of nitrous oxide," which exacerbates the greenhouse effect.⁷⁶

II. EC REGULATORY FOCUS ON NITRATES

A. *Environmental Law-Making*

The EC enacted the Nitrates Directive pursuant to its environmental law-making authority under the Treaty of Rome, as amended by the Single European Act (SEA). But the EC did not always enjoy explicit authority to regulate in favor of the environment.⁷⁷ Indeed, the 1957 Treaty of Rome did not include the word "environment" or the concept of environmental protection.⁷⁸ Instead, the Treaty focused on economic development, with emphasis on the common market and harmonized economic policies.⁷⁹ The Treaty Preamble articulated another objective of the Member States, "the constant improvement of the living and working conditions of their peoples."⁸⁰ Measures to protect the environment thus developed along with economic measures, first with strong links to economics and later more independently.⁸¹

Without specific treaty-based authorization, early environmental legislation was based on Article 100 (often combined with Article 235) or on Article 235 itself.⁸² Article 100 permitted enactment of direc-

⁷⁵ *Id.*

⁷⁶ *Id.* at 6.

⁷⁷ For a more detailed explanation and numerous references, see Grossman, *supra* note 18, at 937-53.

⁷⁸ See Ludwig Krämer, *The Single European Act and Environment Protection: Reflections on Several New Provisions in Community Law*, 24 COMMON MKT. L. REV. 659, 659 (1987).

⁷⁹ See EEC TREATY art. 2.

⁸⁰ *Id.* Preamble.

⁸¹ For information on the history of environmental legislative power, see STANLEY P. JOHNSON & GUY CORCELLE, *THE ENVIRONMENTAL POLICY OF THE EUROPEAN COMMUNITIES* (2d ed. 1995); LUDWIG KRÄMER, *EEC TREATY AND ENVIRONMENTAL PROTECTION* (1990).

⁸² See Philippe Sands, *European Community Environmental Law: The Evolution of a Regional Regime of International Environmental Protection*, 100 YALE L.J. 2511, 2513-14 (1991).

tives required to harmonize Member State laws, when the establishment or functioning of the common market is affected directly.⁸³ Article 235, used less frequently, permitted enactment of measures necessary to attain one of the Community objectives when the Treaty does not grant the specific power.⁸⁴ Relying on these articles, the EC adopted environmental policies and enacted environmental measures—more than 150 by 1987.⁸⁵

In 1987, the SEA took effect,⁸⁶ adding, among other changes, a new Title on the Environment to the Treaty of Rome. Article 130r (now art. 174) articulated the broad objectives and guiding principles of EC environmental policy, along with considerations for preparing environmental policy. Article 130s (now art. 175) established the legislative process for enacting environmental measures, and Article 130t (now art. 176) provided a means for Member States to maintain or introduce more stringent environmental measures, compatible with the EEC Treaty. Further, a new Article 100a (now art. 95), directed toward harmonization of legislation, also provided a basis for certain environmental legislation.

Although the Nitrates Directive was enacted under authority of the SEA, it is important to note that the Treaty on European Union (Maastricht Treaty) and the Treaty of Amsterdam have amended EC environmental provisions. The Maastricht Treaty, effective in 1993, expressed an enhanced commitment to the environment⁸⁷ and amended the SEA environmental provisions and Article 100a. Further, it referred prominently to the task of promoting “sustainable

⁸³ See EEC TREATY art. 100 (as amended 1992; now TREATY art. 94). Article 100 provided: “The Council shall, acting unanimously on a proposal from the Commission . . . issue directives for the approximation of such laws, regulations or administrative provisions of the Member States as directly affect the establishment or functioning of the common market.” *Id.*

⁸⁴ See *id.* art. 235 (now TREATY art. 308). Article 235 reads:

If action by the Community should prove necessary to attain, in the course of the operation of the common market, one of the objectives of the Community and this Treaty has not provided the necessary powers, the Council shall, acting unanimously on a proposal from the Commission and after consulting the [European Parliament], take the appropriate measures.

Id.

⁸⁵ See Sands, *supra* note 82, at 2512–13.

⁸⁶ See 1987 O.J. (L 169) 1.

⁸⁷ See 1992 O.J. (C 191) 1. Entry into force on November 1, 1993, is noted at 1993 O.J. (L 293) 61, after ratification by all the Member States.

and non-inflationary growth respecting the environment.”⁸⁸ It listed among the activities of the Community “a policy in the sphere of the environment.”⁸⁹ Amended Article 130r(2) (now art. 174) states the crucial integration principle more strongly: “Environmental protection requirements must be integrated into the definition and implementation of other Community policies.”⁹⁰

The Treaty of Amsterdam,⁹¹ effective May 1, 1999, after Member State ratification, further emphasizes the importance of the environment. It enshrines the principle of sustainable development in the preamble and objectives of the Treaty and among the tasks of the Community (art. 2).⁹² The integration principle now appears at the beginning of the Treaty (art. 6). Other changes simplify the legislative process for environmental measures.⁹³ The Treaty of Amsterdam retains the provision that Member States may maintain or introduce more stringent environmental measures than those adopted by the EC.⁹⁴ Those measures must be compatible with the Consolidated Treaty and notified to the Commission.⁹⁵ Further, after the EC adopts a harmonization measure, a Member State may maintain national provisions related to the environment.⁹⁶ If based on “new scientific evidence relating to the protection of the environment,” a Member State may introduce national provisions, after notification to the Commission.⁹⁷ If the Member State is authorized to maintain or introduce different national provisions, the Commission must reconsider its harmonized measure.⁹⁸ A special Declaration appended to the Treaty of Amsterdam notes that the Commission will perform en-

⁸⁸ See EEC TREATY art. 2 (as amended by MAASTRICHT TREATY art. G(2)).

⁸⁹ *Id.* art. 3(k) (as amended by MAASTRICHT TREATY art. G(2)).

⁹⁰ *Id.* art. 130r(2) (as amended by MAASTRICHT TREATY art. G(38)).

⁹¹ 1997 O.J. (C 340) 1. The Amsterdam Treaty was signed October 2, 1997; it became effective May 1, 1999, after ratification by all Member States. 1999 O.J. (C 120) 24. The Consolidated Treaty governing the EC (after amendment) is printed at 1997 O.J. (C 340) 173-308.

⁹² See TREATY art. 2.

⁹³ See *id.* Article 6 reads: “Environmental protection requirements must be integrated into the definition and implementation of the Community policies and activities referred to in Article 3, in particular with a view to promoting sustainable development.” *Id.* art. 6.

⁹⁴ See *id.* art. 176. The provision was also part of art. 130t of the amended EEC Treaty.

⁹⁵ See *id.*

⁹⁶ See *id.* art. 95(4).

⁹⁷ TREATY art. 95(5).

⁹⁸ See *id.* art. 95(7).

environmental impact assessments when proposals have environmental implications.⁹⁹

B. Nitrates in the Environmental Action Programs

Long before the EC had clear authority for environmental legislation, officials recognized the importance of protecting the environment. In 1972, the Heads of State or Government of the Member States noted that economic expansion should improve the quality of life and standard of living, and they recognized that environmental protection required special attention. These officials invited establishment of a Community environmental policy.¹⁰⁰ In 1973, therefore, the Council of Ministers adopted the first in a series of Action Programs on the Environment to set out Community environmental policy.¹⁰¹ The Environmental Action Programs—five to date—announced Community policy, but have no binding legal force and authorize no legislation.¹⁰² Nonetheless, the Programs have shaped environmental policy and often influence subsequent legislation.

The first three EAPs, which link environmental protection with EC economic policy, preceded enactment of the SEA and its new environmental title. The Fourth EAP came after the SEA, and the Fifth followed the Maastricht Treaty. Later programs amend, rather than replace, earlier programs: "In reality, . . . there is only one program, which has been periodically updated and amended."¹⁰³ The most recent programs, however, reflect amendments to the EEC Treaty and new (or proposed) legislative measures.

Each of the EAPs recognized the effects of agriculture on the environment, and the focus on agriculture has become more intense

⁹⁹ See *id.* Declaration 12. This declaration, on environmental impact assessment, reads: "The conference notes that the Commission undertakes to prepare environmental impact assessment studies when making proposals which may have significant environmental implications." *Id.*

¹⁰⁰ See Declaration of the Council of the European Communities and of the Representatives of the Governments of the Member States Meeting in the Council of 22 November 1973 on the Programme of Action of the European Communities on the Environment, Annex II, 1973 O.J. (C 112) 1, 3, 5 [hereinafter First EAP]. The First EAP quotes the statement on the environment from the Paris Summit, October 19-20, 1972.

¹⁰¹ See generally First EAP, *supra* note 100.

¹⁰² See Auke Haagsma, *The European Community's Environmental Policy: A Case-Study in Federalism*, 12 *FORDHAM INT'L L.J.* 311, 319 (1989); Christian Zacker, *Environmental Law of the European Economic Community: New Powers Under the Single European Act*, 14 *B.C. INT'L & COMP. L. REV.* 249, 262 (1991).

¹⁰³ See Haagsma, *supra* note 102, at 319.

between the First EAP in 1973 and the Fifth in 1992. Focus on nitrates, too, developed gradually; the Fourth EAP in 1987 indicated that the Commission planned to propose the legislation that eventually resulted in the Nitrates Directive.

Starting with the First EAP in 1973, agriculture was identified as an activity that affects the natural environment. In the context of nature protection, the First EAP suggested further study on the ecological effects of the "intensive use of certain types of fertilizers" and "intensive stock-rearing involving the danger of organic pollution and microbic contamination," among other farm practices.¹⁰⁴ It reflected concern about air and water pollution from "the increasingly industrialized nature of pig and poultry production."¹⁰⁵ The Second EAP,¹⁰⁶ adopted in 1977, focused on agriculture directly, rather than in relation to nature protection, and pointed to the need for endeavors to accentuate agriculture's positive effects and reduce its negative effects on the environment.¹⁰⁷ The Commission focused on wastes, especially droppings, and odors from intensive livestock operations, and planned to take measures regarding waste collection, storage, and spreading. Mineral fertilizers raised issues of "eutrophication of surface waters and nitrate enrichment of underground waters," and the Second EAP recognized that "the effects of spreading stock-rearing effluents as manure and of using mineral fertilizers are different aspects of the same problem."¹⁰⁸ This official recognition of the nitrate problem, along with the promise of further study of the impact of fertilizers on surface and ground waters, would lead eventually to the Nitrates Directive. The Third EAP,¹⁰⁹ shorter and less detailed than its predecessors, focused on pollution prevention and emphasized the polluter pays principle.¹¹⁰ This program did not refer to the Second

¹⁰⁴ First EAP, *supra* note 100, at 39.

¹⁰⁵ *Id.* at 40.

¹⁰⁶ See Resolution of the Council of the European Communities and of the Representatives of the Governments of the Member States Meeting Within the Council of 17 May 1977 on the Continuation and Implementation of a European Community Policy and Action Programme on the Environment, 1977 O.J. (C 139) 1 [hereinafter Second EAP].

¹⁰⁷ See *id.* at 20.

¹⁰⁸ *Id.* at 22.

¹⁰⁹ See Resolution of the Council of the European Communities and of the Representatives of the Governments of the Member States, Meeting Within the Council, of 7 February 1983 on the Continuation and Implementation of a European Community Policy and Action Programme on the Environment (1982-1986), 1983 O.J. (C 46) 1 [hereinafter Third EAP].

¹¹⁰ The polluter pays principle is one of the guiding environmental principles that appears in the consolidated EEC Treaty. See TREATY art. 174(2). It was articulated in the

EAP's promised study of pollution from organic and inorganic fertilizers.

The Fourth EAP,¹¹¹ adopted after enactment of the SEA, restated the environmental objectives and principles established in the SEA.¹¹² Consistent with the SEA, the agricultural component of the Fourth EAP focused on integration of agricultural and environmental policies, and referred to several measures to protect the soil and other agricultural resources.¹¹³ Specifically, in its discussion of actions concerning fresh and sea waters, the Program referred to the planned Nitrates Directive: "The Commission intends to make proposals for Directives on the control and reduction of water pollution resulting from the spreading or discharge of livestock effluents and the excessive use of fertilizers"¹¹⁴

The proposed Nitrates Directive became a reality before enactment of the Fifth EAP in 1992, which focuses in part on the important objective of the Maastricht Treaty—sustainable growth.¹¹⁵ Because of the significant burden it places on the environment, agriculture is identified as one of five target sectors for special attention. Nitrates play a role in that burden. Part III of the Fifth EAP, which evaluated the state of the environment, noted a rise in the nitrate concentration of groundwater in many Member States, with millions of people drinking water with excessive nitrates. Increased use of nitrogen fertilizer and livestock manure led to nitrate pollution of waters and decreased diversity of fauna and flora.¹¹⁶ In the Fifth EAP itself, nitrate reduction heads the list of actions to be accomplished in the agricul-

OECD Guiding Principles on the Environment, *reprinted in* 11 Int'l Legal Materials 1172 (1972).

¹¹¹ See Resolution of the Council of the European Communities and of the Representatives of the Governments of the Member States, Meeting Within the Council of 19 October 1987 on the Continuation and Implementation of a European Community Policy and Action Programme on the Environment (1987–1992), 1987 O.J. (C 328) 1 [hereinafter Fourth EAP].

¹¹² See *id.* at 1–2.

¹¹³ See *id.* at 10, 31–32. Article 130r of the Treaty, added by SEA article 25, introduced this integration principle, which now appears in article b. See also TREATY art. 6.

¹¹⁴ Fourth EAP, *supra* note 111, at 24. The Program also refers to excess use of pesticides and continues: "advisory and education actions are also necessary to increase farmers' awareness of the problems which may arise; in this way agriculture, like other sectors, would contribute to the Community's efforts to reduce water pollution." *Id.*

¹¹⁵ See generally Fifth EAP, *supra* note 68, Annex: Towards Sustainability. Part I (Council Resolution) and Part II (Program) are published in the Official Journal. Part III (The State of the Environment in the European Community) is published as COM(92)93 final.

¹¹⁶ See *id.* Part III, at 23, 57–58.

tural sector by the year 2000. A "[s]tandstill or reduction of nitrate levels in groundwaters" is to be achieved through "[s]trict application" of the Nitrates Directive, and a reduction in surface waters with excessive nitrates or eutrophication should also be achieved.¹¹⁷

III. THE NITRATES DIRECTIVE

The Nitrates Directive,¹¹⁸ proposed in the Fourth EAP¹¹⁹ and discussed for several years prior to enactment, is the EC measure designed to address the serious problem of nitrate pollution from agricultural activities.¹²⁰ In its preamble, the Nitrates Directive refers to a 1985 document drafted in preparation for the CAP reform finally enacted in 1992. That document recognized that, although crop production requires nitrogen fertilizers, the problems caused by intensive livestock production required solutions and that "agricultural policy must take greater account of environmental policy."¹²¹ The Nitrates Directive seeks a solution through environmental policy, however, because the Directive was enacted under EC environmental authority, rather than under agricultural authority.¹²²

Even before enactment of the Nitrates Directive, some Member States had adopted national measures to control nitrogen from agriculture by regulating application of chemical fertilizers and manures.¹²³ Those measures, however, did not solve the problem, and some

¹¹⁷ See *id.* Part II, at 38, Table 4: Agriculture and Forestry.

¹¹⁸ Council Directive 91/676 concerning the protection of waters against pollution caused by nitrates from agricultural sources, 1991 O.J. (L 375) 1 [hereinafter Nitrates Directive].

¹¹⁹ See *supra* notes 111–14 and accompanying text.

¹²⁰ This Article does not focus on regulation of sewage sludge, which is governed by Council Directive 86/278 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture. See 1986 O.J. (L 181) 6, amended by Council Directive 91/692, 1991 O.J. (L 377) 48. That measure requires treatment of sewage sludge before application to agricultural land, and prohibits use of sludge that exceeds given concentrations of heavy metals.

Sewage sludge attracted attention in the summer of 1999 because of its use in France and other EU nations as a component of animal feed. See *Slurry in feed 'common' in France*, says EU study, AGRA EUROPE, Oct. 22, 1999, at EP/9.

¹²¹ Nitrates Directive, preamble, *supra* note 118, at 1 (referring to the Commission Green Paper, Perspectives for the Common Agricultural Policy, COM(85)333).

¹²² See EEC TREATY, as amended by SEA, art. 130s.

¹²³ See Nitrates Proposal, *supra* note 60, at 21–33. For somewhat dated information, see SØREN RUDE & BOIE S. FREDERIKSEN, NATIONAL AND EC NITRATE POLICIES—AGRICULTURAL ASPECTS FOR 7 EC COUNTRIES (1994) (dealing with Belgium, Denmark, Germany, France, the Netherlands, the United Kingdom, and Italy); Manale, *supra* note 6.

States had no regulatory measures. As a result, drinking water in many areas had levels of nitrates that exceeded EC standards,¹²⁴ and nitrates from agriculture were the main cause of diffuse (nonpoint) water pollution in the Community.¹²⁵ Because water pollution from nitrates in one Member State can affect waters in other States, Community action was appropriate.

A. Contents

The Nitrates Directive had two main objectives: to reduce water pollution "caused or induced by nitrates from agricultural sources" and to prevent further nitrate pollution.¹²⁶ The Directive required Member State implementation, with a number of deadlines for action.¹²⁷ Most of these deadlines have already passed and, as later discussion will indicate, most Member States have not complied adequately with the Directive.¹²⁸

The Directive required Member States to identify water with nitrate problems, and the land that contributed to the nitrate pollution. First, Member States were to identify waters affected by nitrate pollution and waters that could be affected, if preventive actions were not taken. Identification of affected waters was based on three criteria:¹²⁹ whether surface freshwaters (especially drinking water sources) contained more nitrates than the concentration allowed by legislation

¹²⁴ See Council Directive 80/778, *supra* note 64.

¹²⁵ See Nitrates Directive, preamble, *supra* note 118, at 1. The draft directive, COM(88)708 final, seems more friendly to agriculture than the final version. The preamble to the proposal, for example, includes the following two clauses, which have been omitted from the Directive:

Whereas there is a need for the benefit of Community agriculture for certain nitrogen containing fertilizers and manures to be used; . . . Whereas the use of livestock manures and similar materials should be encouraged, consistently with the protection of the freshwaters of the Community, in order to conserve natural resources.

Nitrates Proposal, *supra* note 60, at 38, 39.

¹²⁶ Nitrates Directive, *supra* note 118, art. 1, at 2.

¹²⁷ These deadlines are measured from the date the Directive was notified to the Member States: December 19, 1991. For example, Nitrate Vulnerable Zones were to be designated within two years from notification; Action Programs, within two additional years. Because these dates have passed, deadlines will not be emphasized in the text. See *id.* at 3-5.

¹²⁸ See *infra* notes 163-75 and accompanying text.

¹²⁹ See Nitrates Directive, *supra* note 118, art. 3(1) & Annex I, at 3, 6. The criteria require consideration of the present and potential condition of waters, if preventive action pursuant to art. 5 of the Directive is not taken.

(fifty mg NO₃ per l of surface freshwaters, also referred to as fifty mg/l of NO₃),¹³⁰ whether groundwaters contained more than fifty mg/l of nitrates;¹³¹ and, whether bodies of water were eutrophic.¹³² To aid in this identification, the Directive requires monitoring of all surface and groundwaters over a one-year period.¹³³

Each Member State was then to identify "nitrate vulnerable zones" (NVZs), land areas that drain into the waters already identified and that contribute to nitrate pollution.¹³⁴ At least every four years, the NVZ designations must be reviewed, with revisions and additions as appropriate. Member States may avoid designating specific NVZs by applying the Directive's requirements for NVZs to their whole national territory.¹³⁵

Further, Member States were to establish a code of good agricultural practice and, if necessary, to set up a program to promote application of the code, including training and informing farmers.¹³⁶ Farmers in NVZs must follow the codes, and all other farmers are to implement these codes voluntarily.¹³⁷ An Annex to the Directive pre-

¹³⁰ For surface freshwaters, the Nitrates Directive refers to Council Directive 75/440 concerning the quality required of surface water intended for the abstraction of drinking water in the Member States, 1975 O.J. (L 194) 26, as amended. The 50 mg/l limit is mandatory; the guideline limit is 25 mg/l. *See id.*, Annex II.

¹³¹ This value, for drinking water, is the maximum allowable level. The European Environmental Bureau strongly criticized the draft directive for using this value, instead of the guideline value of 25 mg/l. Indeed, for infants, even 25 mg/l may be harmful. *See* EEB, *supra* note 14.

¹³² The Directive (art. 2(i)) gives a definition of eutrophication: "the enrichment of water by nitrogen compounds, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned." Nitrates Directive, *supra* note 118, at 2.

¹³³ *See id.* art. 6, at 4. The monitoring program is to be repeated every four years. Methods of measurement for monitoring, established in earlier directives, are set out in Annex IV to the Directive. *See id.* at 8.

¹³⁴ *See id.* at 3.

¹³⁵ *See id.* arts. 3(2), (4), (5), at 3. Article 3(3) provides for cooperation when waters from one Member State affect another State.

¹³⁶ Perhaps this requirement for training responds to a comment from the Economic and Social Committee on the draft proposal: "As penalties do not constitute effective deterrents, the Directive should comprise recommendations to Member States regarding the role of the programmes in informing, advising and assisting both producers and users of manure and fertilizers, thus ensuring maximum impact in a short space of time." Economic and Social Committee, Opinion on the proposal for a Council Directive concerning the protection of fresh, coastal and marine waters against pollution caused by nitrates from diffuse sources, ¶ 2.10, 1989 O.J. (C 159) 1, 2.

¹³⁷ *See* Nitrates Directive, *supra* note 118, arts. 4(1), 5(4) (b), at 3.

scribes several practices that must be included in the codes and others that may be included.¹³⁸

Member State Action Programs are central to implementation of the Nitrates Directive. Each Member State must prepare an Action Program (or Programs, if appropriate) for its NVZs, ensure that the Program is effective by monitoring the nitrate content of waters, and review and revise the program every four years.¹³⁹ The Programs must consider scientific and technical data concerning nitrogen, as well as Member State environmental conditions. Action Programs must include measures prescribed in Annex III to the Directive. In addition, for NVZs, the Program must require compliance with the code of good agricultural practice, except for measures superseded by one of the measures prescribed in the annex.¹⁴⁰ If the measures specified in the Directive are insufficient, Member States must impose additional requirements, after evaluating "their effectiveness and their cost relative to other possible preventive measures."¹⁴¹

Annex III to the Directive prescribes two types of measures for Action Programs: rules for farming practices and limits on livestock manures. Member States must impose rules for periods when land application of certain fertilizers is prohibited. Therefore, because manure must be stored, Member States must also enact rules for the capacity of manure storage vessels. Normally manure storage capacity must be sufficient for the periods when application is prohibited. Further, Member States must establish limitations on land application of fertilizer, based on a balance between the nitrogen requirement of the crop and the availability of nitrogen from the soil and from fertilization.¹⁴² These limitations must take account of the characteristics of

¹³⁸ See *id.* Annex II, at 6. Required provisions include periods when application of fertilizer is inappropriate; rules for application to steeply sloping, saturated, flooded, frozen, or snow-covered ground; conditions for application near watercourses; capacity and construction of manure storage vessels; and procedures for application of chemical fertilizer and livestock manure. See *id.* Optional provisions include land-use management practices, vegetative cover to take up nitrogen, farm-level fertilizer plans and record-keeping, and prevention of nitrate pollution from run-off and leaching.

¹³⁹ See *id.* art. 5, at 3–4.

¹⁴⁰ See Nitrates Directive, *supra* note 118, Annex III at 3, 7.

¹⁴¹ *Id.* art. 5(5), at 3.

¹⁴² See *id.* at 7. The nitrogen supply in this calculation includes the nitrogen in the soil when the crop starts to use it at the end of winter, mineralization of organic nitrogen reserves in soil, added nitrogen from livestock manure, and added nitrogen from chemical and other fertilizers.

the NVZ, including soil conditions, type, and slope; climate, rainfall, and irrigation; and, landuse practices, including crop rotations.¹⁴³

Annex III further requires Member States to "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."¹⁴⁴ The maximum that can be applied is manure containing 170 kg N/ha.¹⁴⁵ To account for gradual implementation of this standard, Member States may permit up to 210 kg N/ha for the first four-year Action Program. The amount of nitrogen may be calculated on the basis of animal numbers.¹⁴⁶ With scientific justification, different (higher) amounts may be fixed for crops with long growing seasons or high nitrogen uptake, for a NVZ with high precipitation, or for soils with high denitrification capacity.¹⁴⁷

Thus, under the Directive, Member States have significant responsibilities: most importantly, to establish a code of good agricultural practice, to identify and designate NVZs, and to establish and implement an Action Program. Member States are directed to enact the laws, regulations, and administrative provisions required to carry out these responsibilities, and States must notify the Commission of the various measures enacted.¹⁴⁸

¹⁴³ See *id.*, Annex III(1).

¹⁴⁴ *Id.*, Annex III(2).

¹⁴⁵ This maximum represents a change from the approach of the proposed Directive. See Nitrates Proposal, *supra* note 60 (requiring, at Article 4 and Annex II, measures to ensure that manure would not exceed the amount produced by a specific number of animals). The proposed annex listed the maximum number of animals per hectare: e.g., two dairy cows, 16 fattening pigs, five sows with piglets. Also, the draft directive included rather specific measures in Article 4; some of these now appear in Annex III of Directive 91/676. The draft directive, at Article 4(4), would have required treatment of certain municipal sewage discharges, a provision omitted from Directive 91/676, which focuses on agricultural sources of nitrogen. See *generally id.*

¹⁴⁶ See Nitrates Directive, *supra* note 118, Annex III at 7. The Nitrates Directive manure limits are reflected in other legislation. For example, a recent regulation that governs organic livestock farming limits total annual manure application to 170 kg N/ha, and refers to the Nitrates Directive. See Council Regulation 1804/99 of July 19, 1999 supplementing Regulation (EEC) No. 2092/91 on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs to include livestock production, Annex, 1999 O.J. (L 222) 1, 14.

¹⁴⁷ See Nitrates Directive, *supra* note 118, Annex III(2) (b), at 7.

¹⁴⁸ See *id.* art. 12, at 4-5.

B. Effect of the Directive

Soon after enactment of the Directive, researchers considered its possible effects. It was assumed that Member State implementation would regulate application of manure, rather than chemical fertilizers; farmers already used purchased chemical fertilizers more prudently than manure, which they viewed as waste and therefore applied less efficiently.¹⁴⁹ Interpreting the Directive's limit of 170 kg N/ha as a maximum annual residual, research indicated that several countries (e.g., Belgium, Denmark, and the Netherlands) would have to decrease residual nitrogen significantly, perhaps by reductions in livestock numbers. Although large reductions in livestock numbers appeared necessary, such reductions were admitted to be "politically difficult to achieve."¹⁵⁰ Other approaches, such as reduced fertilizer use, changes in location of livestock production, different feeding systems, manure management rules, and taxes or subsidies could be expected.¹⁵¹

A recent document from the EU Commission, *Directions toward sustainable agriculture*, commented that the Nitrates Directive could help to solve structural problems, as well as water pollution problems, in some Member States.¹⁵² That is, compliance with the Directive will require reduction of concentrations of pigs and poultry in some areas.¹⁵³ Moreover, as that document noted, "[t]he adoption of [the Nitrates] Directive represents an important step towards integration of environment into agriculture with the Directive adhering to both the 'polluter pays' and the 'prevention at source' principles."¹⁵⁴ Farmers in NVZs must comply with the compulsory measures under the Directive without compensation.¹⁵⁵

¹⁴⁹ See Leuck, *supra* note 27, at 95.

¹⁵⁰ *Id.* at 97.

¹⁵¹ See *id.* at 97, 100. In the 10 European countries analyzed, average reduction to meet the Directive looks rather moderate: sheep, 1%; dairy, 7.8%; beef, 4.8%; poultry, 10%; pigs, 11.7%. But these numbers do not reflect areas of concentrated livestock production, where nitrate pollution is especially severe and far more reduction will be necessary. See *id.* at 97.

¹⁵² See *Directions*, *supra* note 65, at 11.

¹⁵³ See *id.*

¹⁵⁴ *Id.*; see *Implementation*, *supra* note 42, at 5.

¹⁵⁵ COPA, the European farmers' organization, commented on the draft version of the Nitrates Directive in 1990. COPA believed that guidelines for good agricultural practice, required by art. 4 of the Directive, should apply in all regions. Further, '[r]estrictive measures should only be implemented in sensitive or vulnerable areas. The farmers in those areas, who are obliged to apply measures which go beyond agricultural practice, should

Because some Member State efforts to control nitrates from agriculture have been integrated into programs enacted under the CAP agro-environmental measure,¹⁵⁶ it is interesting to consider the relationship of the Nitrates Directive and the Agenda 2000 Rural Development regulation that now governs agro-environmental programs.¹⁵⁷ The Rural Development regulation makes clear that agro-environmental programs can pay only for measures that "involve more than the application of usual good farming practices."¹⁵⁸ Further, support for agro-environmental practices is to be calculated in part on the basis of income foregone,¹⁵⁹ and the standard for income foregone is "the usual good farming practice in the given area."¹⁶⁰ Thus, it would seem that a code of good agricultural practice, mandatory in NVZs, would also establish minimal practices for which no compensation can be paid under agro-environmental programs. Further, under the detailed Commission Regulation applying the Rural Development Regulation, undertakings to extensify or manage livestock farming, including undertakings intended to limit nutrient leaching, can be compensated.¹⁶¹ But payments can compensate limitations on fertilizer use only if those limitations are "technically and economically measurable."¹⁶²

C. Implementation of the Nitrates Directive

1. Member State Reports

The Nitrates Directive required Member States to report by June 1996 on their progress during the first four years of implementation.¹⁶³ Thereafter, the Commission was to publish a Summary Report

receive full financial compensation for the resultant decline in income." *COPA Proposals for the Definition of a Code of "Good Agricultural Practice" in Connection with the Commission's Proposal for a Directive on "Nitrates"* (Com(88)708 final), Pr(90)17.

¹⁵⁶ See Nitrate Sensitive Areas in England, *infra* notes 264–87 and accompanying text.

¹⁵⁷ See Council Regulation 1257/99, 1999 O.J. (L 160) 80.

¹⁵⁸ *Id.* art. 23(2), at 90.

¹⁵⁹ See *id.* art. 24(1).

¹⁶⁰ Commission Regulation 1750/99, art. 17(1), 1999 O.J. (L 214) 31, 35.

¹⁶¹ See *id.* art. 12(c), at 34. Livestock density must be defined to include "in the case of an undertaking aimed at limiting nutrient leaching, all livestock kept on the farm relevant to the undertaking in question." *Id.*

¹⁶² *Id.* art. 17(3), at 35.

¹⁶³ See Nitrates Directive, *supra* note 118, art. 10, at 4. Annex V lists the general types of information required in the Member State reports. See *id.* at 8.

on implementation of the Directive, to be communicated to the European Parliament and the Council.¹⁶⁴ Only Ireland submitted its report on time, but all of the Member States—with the exception of Belgium, Italy, and Spain—had submitted reports by the end of February 1997.¹⁶⁵ Reports submitted by Member States varied considerably in quality, perhaps in part because the Directive gives rather vague standards for information required in the report.¹⁶⁶

Member States adopted some measures as required by the Directive. For example, five of the twelve Member States that reported to the Commission in 1997 had decided to apply action programs to all of their territory, rather than designating NVZs.¹⁶⁷ These States were not obligated to monitor waters under article 6, an obligation meant to guide designation of NVZs. Other States, required to designate NVZs, measured nitrate pollution levels in fresh surface waters or in fresh drinking water sources. Several States monitored groundwater sources, exhibiting different degrees of thoroughness (for example, 461 sites monitored in the UK; only abstraction sites monitored in Portugal) and accuracy (poor statistical sample in Greece).¹⁶⁸ A few States (Sweden, Finland, and Greece) identified problems of eutrophication, while other countries (e.g., Portugal) had no eutrophication monitoring information.¹⁶⁹

A list of Member State legislation implementing the Directive can be found in the SCAD-Plus database of National Implementation Measures. See National Implementation Measures, (visited Oct. 6, 1999) <http://europa.eu.int/scadplus/leg/en/mne/m91_676.htm>. The list may not reflect the most current Member State regulatory measures.

¹⁶⁴ See Nitrates Directive, *supra* note 118, art. 11, at 4.

¹⁶⁵ See generally European Commission, Measures Taken pursuant to Council Directive 91/676/EEC concerning the Protection of Waters Against Pollution caused by Nitrates from Agricultural Sources 8 (1998) [hereinafter Measures Taken]; see also Report of the Commission to the Council and European Parliament, Measures Taken pursuant to Council Directive 91/676/EEC concerning the Protection of Waters against Pollution caused by Nitrates from Agricultural Sources: Summary of Reports submitted to the Commission by Member States under Article 11, COM(98)16.

¹⁶⁶ See generally Measures Taken, *supra* note 165; see also Nitrates Directive, *supra* note 118, Annex V, at 8.

Annex V of the Directive offered significant flexibility to Member States. Some Member States, however, omitted information or had not taken measures about which reporting was required. See Measures Taken, *supra* note 165, at 8. The Commission planned to propose a common reporting format for Member States to ensure more consistent information for reports due June 21, 2000.

¹⁶⁷ See Measures Taken, *supra* note 165, at 9. The States are Austria, Denmark, Germany, Luxembourg, and the Netherlands.

¹⁶⁸ See *id.* at 9–10.

¹⁶⁹ See *id.* at 13.

Most States that submitted reports to the Commission drafted codes of good agricultural practice. Some States (Denmark and Sweden) had code provisions already enacted through previous legislation; others enacted codes as a single document. A few States (including Germany and Luxembourg) combined measures for codes and Action Programs in one law and also enacted separate codes. The Directive requires training and information about the codes, where necessary, and Member States used training courses, seminars, written information, and advisors to fulfill this requirement.¹⁷⁰

A few States created Action Programs: Austria, Denmark, Germany, Luxembourg, Sweden, and the Netherlands (which later withdrew its Program). An important element in these Programs is the nitrogen limit on livestock manure applied to land (170 kg N/ha/year). Austria, Germany, and Luxembourg based their requirements on this limit, and France planned to use that method.¹⁷¹ Denmark and Sweden used livestock units—that is, manure application is limited by the number of livestock calculated to produce the annual 170 kg N/ha.¹⁷² Member States also reported about monitoring the effectiveness of Action Programs, both in NVZs and in States that apply NVZ requirements over the whole territory. Again, the extent of monitoring varied among the reporting States.¹⁷³

One of the obligations of Member State reports was to estimate when the objectives of the Directive would be met.¹⁷⁴ Late development of Action Programs made these estimates difficult. One Member State suggested that achieving the Nitrates Directive targets would require additional measures, including, for example, enhanced agro-environmental payments, more focus on sustainability in EU agricultural policy, and application of maximum fertilizer limits in Member States to avoid distortions of competition.¹⁷⁵

¹⁷⁰ See *id.* at 13–14.

¹⁷¹ See *id.* at 14.

¹⁷² See Measures Taken, *supra* note 165, at 14. Under the Directive, Annex III, Member States can decide to calculate nitrogen on the basis of the number of livestock that produce 170 kg N/ha.

¹⁷³ See *id.* at 14–15.

¹⁷⁴ See Nitrates Directive, *supra* note 118, at 8.

¹⁷⁵ See Measures Taken, *supra* note 165, at 17. Agro-environmental payments were enacted as a measure accompanying the Mac Sharry Reform. See Council Regulation 2078/92, 1992 O.J. (L 215) 85.

2. Commission Evaluation

In 1997, the Commission reported generally on implementation of the Directive,¹⁷⁶ taking “a timely opportunity to highlight the significant lack of progress made by Member States” in implementing the Directive.¹⁷⁷ In a later document issued in 1998 (the Summary Report required by the Directive) the Commission summarized the reports submitted by Member States under Article 10 of the Directive, giving a brief description of measures enacted in the various States.¹⁷⁸

For nearly every requirement under the Directive, several—or even the majority—of the fifteen Member States failed to meet deadlines. Only four States, for example, enacted laws, regulations, and administrative provisions to comply with the Directive; most States failed to designate NVZs, although five had avoided this obligation by deciding to apply the Directive to their whole national territory.¹⁷⁹ Only one State met the deadline for communication of its code of good agricultural practice. Nearly all States now have codes; however, the Commission seems unconvinced that the codes comply with the Directive.¹⁸⁰

Nitrate Action Programs are a key Member State requirement under the Directive. Most importantly, Programs must require a balanced application of nitrogen to crops and must limit nitrogen application to 170 kg N/ha/year. Though Action Programs were to be effective by December 20, 1995, only Luxembourg met the deadline, and even its program failed to comply with the Directive.¹⁸¹ By July 30, 1997, only a few Member States had even notified the Commission of their plans, a failure that the Commission called “difficult to justify.”¹⁸²

Article 11 of the Directive required the Commission, in connection with its implementation report, to make proposals for revision of

¹⁷⁶ See The Implementation of Council Directive 91/676/EEC concerning the Protection of Waters against Pollution caused by Nitrates from Agricultural Sources, COM(97)473 final. References to the report in this Article are based on another document, drawn up on the basis of COM(97)473. See Implementation, *supra* note 42.

¹⁷⁷ See Implementation, *supra* note 42, at 5.

¹⁷⁸ Measures Taken, *supra* note 165.

¹⁷⁹ See Implementation, *supra* note 42, at 11–14.

¹⁸⁰ See *id.* at 11–12.

¹⁸¹ See *id.* at 15.

¹⁸² *Id.* The Commission noted that the Dutch program had been submitted December 22, 1995, and it used the derogation from maximum nitrogen quantities allowed by Annex III of the Directive. The Commission did not accept the derogation, and the Dutch program was withdrawn.

the Directive.¹⁸³ Late implementation of the Directive by so many Member States, however, made it impossible for the Commission to evaluate the effectiveness of the Directive.¹⁸⁴ But, as the Commission noted, "there is no evidence to suggest that the measures laid down in the directive will not have a significant effect on nitrate pollution when they have had the opportunity to take effect."¹⁸⁵

Unfortunately, as the Commission concluded in 1998, "it is already apparent that there is strong resistance to the requirements of the directive in certain quarters."¹⁸⁶ Some of the problems of Member State implementation may stem from problems in coordination between various ministries in Member States, especially when both environmental and agricultural ministries participate in implementation. Further, some Member States may lack basic information about the extent of nitrate pollution in their territory.¹⁸⁷ A study on implementation of EC water pollution policy, published in 1998, indicated that much needs to be accomplished in the area of nitrate pollution.¹⁸⁸ For example, in the French region of Brittany, where water pollution is especially serious, no infrastructure existed for dealing with manure from several million pigs. The action plan for NVZs was still being prepared.¹⁸⁹

One of the reasons for Member State reluctance to implement the Directive may be financial. As the EC Economic and Social Committee noted in its opinion on the proposal for the Nitrates Directive, "[t]he implementation of this Directive may impose a financial burden on some farmers in regions where soil nitrate content is already high for historical reasons."¹⁹⁰ The Commission itself recognized the economic effects of the Directive for agriculture: "The diffuse nature of nitrate pollution makes its reduction a challenge for Community environmental policies, a fact that is compounded by the principal

¹⁸³ See Nitrates Directive, *supra* note 118, art. 11, at 4.

¹⁸⁴ See Implementation, *supra* note 42, at 16.

¹⁸⁵ *Id.* at 17. This is the Commission's main rationale for its failure to propose revisions pursuant to Article 11.

¹⁸⁶ *Id.* at 5.

¹⁸⁷ See *id.*, at 19.

¹⁸⁸ See Special Report No. 3/98 concerning the implementation by the Commission of EU policy and action as regards water pollution accompanied by the replies of the Commission, 1998 O.J. (C 191) 2, 9.

¹⁸⁹ See *id.* at 9-10.

¹⁹⁰ Economic and Social Committee, Opinion on the proposal for a Council Directive concerning the protection of fresh, coastal, and marine waters against pollution caused by nitrates from diffuse sources, 1989 O.J. (C 159) 1, 1.

polluters, the agricultural industry, being particularly vulnerable to land-use changes which impact upon their economic viability.”¹⁹¹ Yet, as the Commission also noted, the polluter pays principle is important in the Community. And, for the Nitrates Directive, “this means that the cost of the measures necessary to change current practices to reduce pollution should be borne by the agricultural operators themselves.”¹⁹²

Whatever the explanation for Member State reluctance to implement the Directive, long-term environmental consequences follow. In commenting about the poor implementation of the Directive, one European Parliamentarian stated, “[e]ven if the present trend towards intensive animal husbandry is stopped and reversed now, it will take 20 to 30 years before the surface and ground waters of Europe are healthy again. In some areas it may take 40 to 50 years before an ecologically sound situation is restored.”¹⁹³

3. Litigation against Member States

When the Commission reported to the Parliament and Council in 1998, thirteen of the fifteen Member States were subject to legal proceedings, stemming from failure to implement the Directive or incorrect implementation.¹⁹⁴ Some Member States were subject to two legal proceedings. Indeed, by October 1998, only Sweden and Finland had implemented the directive correctly.¹⁹⁵ In Germany, Ireland, and Luxembourg, nitrate levels rose after 1991, and in some areas of Belgium and the Netherlands, groundwater contamination had reached

¹⁹¹ Implementation, *supra* note 42, at 5.

¹⁹² *Id.* at 8.

¹⁹³ Arthur Rogers, *Compliance With Current Nitrate Rules to Be Commission's Focus*, *Official Says*, 21 Int'l Env't Rep. (BNA) 1056, 1957 (1998) (quoting Patricia McKenna, spokesperson for the European Union's Environmental Committee).

¹⁹⁴ See Implementation, *supra* note 42, at 5. The Amsterdam Treaty allows the Commission to begin infringement proceedings against Member States that fail to comply with EC directives. See TREATY art. 226 (formerly art. 169). Moreover, in 1998, DG XI press releases indicated that 13 States were still subject to infringement proceedings in connection with the Nitrates Directive. See Commission acts against Spain, United Kingdom, Portugal, Finland and France to curb water pollution by nitrates, IP/98/331 (Apr. 6, 1998); Commission acts against Belgium, Germany and Luxembourg for their continuing failure to curb water pollution by Nitrates, IP/98/637, (July 7, 1998) <<http://europa.eu.int/en/comm/dg11/press/98331.htm>> and <<http://europa.eu.int/en/comm/dg11/press/98637.htm>>.

¹⁹⁵ See Rogers, *supra* note 193, at 1056; see generally COM(97)473, *supra* note 176; COM(98)16, *supra* note 165.

five times the EU limit of fifty mg/l.¹⁹⁶ As of January 2000, twelve Member States were still subject to legal proceedings either for not implementing the Directive at all or for implementing it incorrectly.¹⁹⁷ In October 1999, the Commission announced its intention to bring action against France, and in January 2000, against Greece.¹⁹⁸

In recent months, proceedings brought by the Commission against Spain and Italy have reached judgment in the Court of Justice. Each case reached the Court only after the Commission attempted to induce compliance by letter and reasoned opinion.¹⁹⁹ In the case against Spain, the Commission alleged that Spain had violated the Nitrates Directive by its failure both to establish codes of good agricultural practice and to designate nitrate vulnerable zones as required by the Directive.²⁰⁰ Spain argued that its delay in implementing the Directive could be explained by "technical difficulties," rather than an intention not to comply, and by the fact that the State and the autonomous communities had overlapping powers related to the Directive.²⁰¹ The Court noted that Spain's failure to fulfill its obligations is not excused by the fact that the failure was caused by technical difficulties rather than intention or negligence.²⁰² Further, circumstances in a States' internal legal systems do not justify failure to com-

¹⁹⁶ See Rogers, *supra* note 193, at 1058.

¹⁹⁷ See Directions, *supra* note 65, at 11. In July 1999, infringement proceedings against 12 States continued. See Water pollution by nitrates: Commission takes further steps against several Member States, (July 2, 1999) <http://europa.eu.int/rapid/gi/apcgi.ksh?p_action.gettxt=gt&doc=IP/99/450|0|RAPID&lg=EN>. In January 2000, 12 States were still subject to proceedings. Water pollution by nitrates: Commission takes further legal steps against Greece, Austria and Luxembourg, 1P/00/30, (Jan. 13, 2000) <http://www.europa.int/rapid/start/cgi/guesten.ksh?p_action.settxtsgt30/0/RAPIDlgE>. Austria and Luxembourg will receive supplementary reasoned opinions.

¹⁹⁸ See *New Legal Cases Announced Against Nine States for Environmental Infractions*, 22 Int'l Env't Rep. (BNA) 905, 905 (1999).

¹⁹⁹ See Case 71/97, Commission v. Spain, 1998 ECJ CELEX LEXIS 6430 (1998); Case 195/97, Commission v. Italian Republic, 1999 ECJ CELEX LEXIS 1393 (1999). In addition, Case 293/97, *The Queen*, ex parte *Standley*, involved implementation of the Directive in the United Kingdom. This decision is discussed *infra* at notes 340-64 and accompanying text.

²⁰⁰ See Case 71/97, 1998 ECJ CELEX LEXIS 6430, at *4 (¶ 1). Spain had also violated related requirements of the Directive, including its obligation to notify the Commission of its designation of NVZs and to establish codes of good agricultural practice. See *id.* at **10-11 (¶ 19).

²⁰¹ *Id.* at **7-8 (¶¶ 11-12).

²⁰² See *id.* at *9 (¶ 14-15).

ply with EC law.²⁰³ The Court held that Spain failed to comply with the Directive and ordered Spain to pay costs.²⁰⁴

Similarly, the case against Italy alleged that Italy failed to fulfill its obligations under the Directive, especially its obligation to designate NVZs.²⁰⁵ Italy admitted that it had identified no NVZs under Article 3 of the Directive, but asserted that it had submitted documentation of its efforts to implement Article 5 by establishing Action Programs.²⁰⁶ The Commission maintained that proper implementation of the Directive first required identification of NVZs because Action Programs are intended to combat nitrate pollution in those NVZs.²⁰⁷ The Court did not examine Italy's measures under Article 5, finding it clear from the record that the measures did not meet the deadlines under the Directive.²⁰⁸ The Court held that Italy had failed to fulfill its obligations under the Nitrates Directive and ordered Italy to pay costs.²⁰⁹

As these decisions suggest, Member States faced technical difficulties in implementing the Directive or simply failed to take the legal steps required by the Directive. To help illustrate the problems faced by Member States, this Article now focuses on the United Kingdom. The following discussion considers problems caused by agricultural nitrate pollution in the UK. The Article analyzes legal measures enacted for voluntary control of nitrates and for implementation of the Nitrates Directive in England.

IV. VOLUNTARY PROGRAMS TO CONTROL NITRATES IN ENGLAND

Nitrate pollution in the various EU Member States stems from different sources. In the United Kingdom (UK), one important source is agricultural: "an interaction between rainfall pattern and the quantities of mineralized nitrogen present in the soil after the harvest of other crops."²¹⁰ This diffuse nitrate pollution, like other farm pollution, has raised "particularly intractable administrative, compliance

²⁰³ See *id.* at *10 (¶ 17).

²⁰⁴ See *id.* (¶¶ 19–20). Although Spain argued that some autonomous communities did eventually adopt codes of practice and identify NVZs, settled case law prevented the Court from taking account of measures adopted after commencement of the case. See *id.* (¶ 18).

²⁰⁵ See Case 195/97, 1999 ECJ CELEX LEXIS 1393, at *2 (¶ 1).

²⁰⁶ See *id.* at *5 (¶ 15, 16).

²⁰⁷ See *id.* at *5 (¶ 13).

²⁰⁸ See *id.* at *7 (¶ 17).

²⁰⁹ See *id.* (¶¶ 19–20).

²¹⁰ Payne, *supra* note 56, at 70.

and enforcement difficulties.”²¹¹ In the past decade, the government of England has taken several positive steps to address the problem of nitrate pollution from agricultural sources, but those steps followed an initial reluctance to acknowledge or address the problem.

The EC Drinking Water Directive, enacted in 1980 and effective in 1985,²¹² established a maximum admissible nitrate (NO₃) concentration of fifty mg/l.²¹³ Previously, however, a higher limit of 100 mg/l had applied in England; even that level was advisory, and water with more nitrates was not considered polluted.²¹⁴ Thus, when the EC Drinking Water Directive took effect, some drinking water sources in England exceeded the maximum allowable nitrate concentration. Much of the excess nitrate reaching drinking water sources came from agricultural land. Water suppliers sometimes had to close high nitrate water sources or blend high and low nitrate water to meet the legal standard.²¹⁵

During the 1980s, various groups asserted that no scientific basis justified the lower nitrate standard, and that nitrate levels up to 100 mg/l posed health risks only to infants. The Fertiliser Manufacturers Association and the National Farmers' Union, as well as Regional Water Authorities, objected to the EC standard, while environmental groups and the government's Nature Conservancy Council supported the fifty mg/l limit.²¹⁶

In addition to debate about safe levels of nitrates, considerable scientific disagreement surrounded the identification of causes of rising nitrate pollution in the UK. Various researchers disagreed about the extent of nitrate pollution and nitrate leaching caused, for example, by application of inorganic fertilizers (especially in autumn), application of organic manures, use of intensive farming systems,

²¹¹ Susanne Seymour & Graham Cox, *Nitrates in Water: The Politics of Pollution Regulation*, in *RESTRUCTURING THE COUNTRYSIDE: ENVIRONMENTAL POLICY IN PRACTICE* 182 (Andrew W. Gilg ed., 1992).

²¹² See Council Directive 80/778, *supra* note 64, Annex I, at 11. For information on the replacement of this directive, see *supra* note 64.

²¹³ See *id.*, Annex I, at 18.

²¹⁴ See Seymour & Cox, *supra* note 211, at 183. The 100 mg/l limit was recommended by the World Health Organization (WHO) in 1970, but during the 1960s and 1970s WHO upper limits varied from 45 to 100 mg/l. See *id.*

²¹⁵ See JOHN ARCHER ET AL., *THE PILOT NITRATE SENSITIVE AREAS SCHEME, FINAL REPORT 4* (1998).

²¹⁶ See Seymour & Cox, *supra* note 211, at 184–85. These authors call the arguments of the water authorities “somewhat disingenuous” because in some areas, they had trouble meeting even the higher standard of 100 mg/l. See *id.* at 185.

ploughing of pastures and grass leys, and cultivation of nitrogen-fixing crops. The UK government, perhaps taking advantage of scientific disagreements, was slow to address increasing nitrate levels and tardy in implementing fully the EC Drinking Water Directive.²¹⁷ Eventually, despite initial skepticism, farmers and others recognized the health hazards of excessive nitrates and the agricultural contribution to that excess. Even today in rural water catchments in the UK, at least eighty percent of nitrates come from agriculture.²¹⁸

Beginning in the late 1980s, several government studies focused on the science of nitrate loss and possible practical solutions.²¹⁹ These studies and governmental discussions on nitrates led to the development of measures to reduce the concentration of nitrates from agricultural sources. The discussion that follows traces these developments, which culminated in enactment of measures prescribed by the Nitrates Directive.

A. Statutory Framework

In England, measures to reduce nitrate pollution fit within the general legal framework of water pollution control. The Rivers (Prevention of Pollution) Act 1951 marked the beginning of modern water pollution control. This law required River Board consent for industrial and sewage discharges. Several subsequent laws strengthened regulation and assumed control over estuaries, tidal waters, and some underground waters. The system was fragmented; though the Department of the Environment was responsible for water, regional water authorities often made policy decisions.²²⁰ Eventually, the Water Act 1989²²¹ centralized regulatory responsibility for water pollution in the National Rivers Authority (NRA), which formulated policy for water pollution in England and Wales.²²² The Water Resources Act 1991²²³ subsequently consolidated and replaced the 1989 water law. In a later development, the Environment Act 1995 abolished the NRA,

²¹⁷ See *id.* at 186–95.

²¹⁸ See ARCHER ET AL., *supra* note 215, at 4.

²¹⁹ See *id.* at 4–5. See, for example, the summary report, MAFF, SOLVING, *supra* note 25.

²²⁰ See SIMON BALL & STUART BELL, ENVIRONMENTAL LAW 299 (1991).

²²¹ See Water Act, 1989, ch.15 (Eng.).

²²² See BALL & BELL, *supra* note 220, at 298, 301.

²²³ See Water Resources Act, 1991, ch.57 (Eng.).

transferring its powers to the new Environment Agency, established April 1, 1996.²²⁴

In response to government discussion of nitrate problems, the Water Act 1989 included a flexible provision enabling the designation of Nitrate Sensitive Areas.²²⁵ The Water Resources Act 1991 included similar provisions among the "powers to prevent and control pollution."²²⁶ Those provisions are for "preventing or controlling the entry of nitrate into controlled waters as a result of, or of anything done in connection with, the use for agricultural purposes of any land."²²⁷ Section 94 authorizes designation of Nitrate Sensitive Areas, where required, through enactment of statutory instruments, as well as determination of activities that may or may not be carried out in the designated areas. Mandatory requirements may be imposed either with or without compensation. Section 95 authorizes voluntary management agreements between government and landowners or tenants (if owners consent) in designated areas, for which landowners or tenants may receive compensation. These provisions form the statutory authority for the early nitrate programs in England. In addition, specific environmental programs are implemented through regulations. These regulations are published in the form of Statutory Instruments (SIs), which are signed by the appropriate Minister (e.g., the Secretary of State for the Environment) and laid before Parliament.

Though these provisions were the first to authorize special areas for nitrate protection, the UK had experience in designating and contracting with farmers to maintain environmentally vulnerable areas.²²⁸ The Agriculture Act 1986 authorized creation of Environmentally Sensitive Areas (ESAs), one of the UK's early efforts to include environmental goals in agricultural policy.²²⁹ In ESAs, located primarily in large-scale pasture areas, farmers could agree to comply with specified

²²⁴ See Environment Act, 1995, §§ 2(1)(a), 2(3); William Howarth, *Legal Approaches to the Prevention of Agricultural Water Pollution in England and Wales*, 45 *DRAKE L. REV.* 197, 199 n.5 (1997).

²²⁵ See Water Act, 1989, ch.15 (Eng.), § 112. This section authorized voluntary areas, mandatory areas without compensation, and mandatory areas with compensation. See *id.*

²²⁶ Water Resources Act, 1991, ch.57 (Eng.), §§ 94–95.

²²⁷ *Id.* § 94(2).

²²⁸ See Grossman, *supra* note 18, at 1017–18; Margaret Rosso Grossman, *Farmers and the Environment under the Common Agricultural Policy of the European Union: The Agro-Environmental Measure in the United Kingdom*, 28 *U. TOLEDO L. REV.* 663, 683–84 (1997) [hereinafter *Farmers and the Environment*].

²²⁹ See Agriculture Act, 1986, ch.49 (Eng.).

management practices to protect vulnerable environments. In exchange for a multi-year management commitment under a signed agreement, farmers received annual payments; stricter environmental measures merited higher payments. Practices restricted to specific time periods or even prohibited in ESAs included, for example, mowing, plowing, reseeding, cultivating, and application of fertilizers. ESA schemes were supported in part by EC funding authorized in structural measures.²³⁰ They became a component of the agro-environmental measures authorized in Regulation 2078/92, accompanying the 1992 CAP reform.²³¹ Agro-environmental measures continue in an amended form in the rural development regulation enacted in connection with the Agenda 2000 CAP reform.²³² Experience with ESA programs thus formed a background for the development of Nitrate Sensitive Areas.

B. *The Pilot Nitrate Sensitive Areas Scheme*

Several factors led to enactment of the Pilot Nitrate Sensitive Areas Scheme in the UK. Nitrates posed a current legal issue because the UK was subject to a proceeding in the European Court of Justice alleging failure to meet the EC Drinking Water Directive 80/778 standard for nitrates.²³³ Further, the EC published a draft of the document that would eventually become the Nitrates Directive and would require the UK to enact measures to control nitrates from agriculture.²³⁴ In addition, recent government research on nitrates in agriculture included a theoretical study of ten geographic regions to

²³⁰ Several regulations applied over the years. These were consolidated in Council Regulation 2328/91, arts. 21–24, 1991 O.J. (L 218) 1, 14–15. *See also* Grossman, *supra* note 18, at 1017–18.

²³¹ *See* Council Regulation 2078/92, 1992 O.J. (L 215) 85.

²³² *See* Council Regulation 1257/1999 of 17 May 1999 on support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF) and amending and repealing certain Regulations, arts. 22–24, 1999 O.J. (L 160) 80, 90.

²³³ *See* Commission v. United Kingdom, Case C-337/89, 1992 E.C.R. I-6103. The Commission brought this case in October 1989, and the Court issued its decision in November 1992. In part, the case concerned the UK's alleged failure to comply with the maximum admissible concentration for nitrates in 28 water supply zones. In defense, the UK argued that its "failure to achieve the objective is due to extraneous factors relating in particular to techniques used in agriculture." *Id.* at I-6147. The Court held in part that the UK had failed to meet the Drinking Water Directive requirements as to nitrates. *See id.* at I-6152.

The UK continues to have difficulties with the Drinking Water Directive. *See, e.g.,* Commission v. United Kingdom, Case C-340/96, 1999 ECJ CELEX LEXIS 1059 (Apr. 22, 1999).

²³⁴ *See generally* Nitrates Proposal, *supra* note 60.

determine what methods might be most effective in controlling nitrates. Results of that study noted that the characteristics of the individual areas would determine the appropriate solution to the nitrate problem in each area.²³⁵ These areas would become the first Nitrate Sensitive Areas.

1. The Pilot Scheme

In 1990, the Ministry of Agriculture, Fisheries and Food (MAFF) initiated the Pilot Nitrate Scheme under authority of section 112 of the Water Act 1989.²³⁶ The Scheme was enacted by an SI, The Nitrate Sensitive Areas (Designation) Order 1990, which established a small-scale experimental program of ten Pilot Nitrate Sensitive Areas (NSAs).²³⁷ These NSAs included, in total, about 10,500 hectares in areas in England where nitrate concentrations in water exceeded, or could exceed, the EC standard.²³⁸ The Pilot Scheme, which was voluntary, was consistent with the Minister of Agriculture's statement in late 1988 that, if possible, restrictions on agricultural landuse should be voluntary, with compulsory powers reserved for necessity. Further, the Government believed farmers should receive compensation if they were subject to more stringent restriction of farming practices than the methods viewed as good agricultural practice.²³⁹ Farmers located

²³⁵ See Department of the Environment, *The nitrate issue* (1988), cited in M.B.M. Harryman, *Water Source Protection and Protection Zones*, in *AGRICULTURE AND THE ENVIRONMENT* 134 (J. G. Jones ed., 1993).

²³⁶ See Water Act, 1989, § 112 (Eng.).

²³⁷ See Nitrate Sensitive Areas (Designation) Order 1990, S.I. 1990, No. 1013, as amended by S.I. 1990, No. 1187; S.I. 1993, No. 3198 (raising premiums). This Order was repealed by S.I. 1995, No. 1708, reg. 3 (June 1, 1996).

²³⁸ See S.I. 1990, No. 1013.

²³⁹ See Harryman, *supra* note 235, at 135. This Government position seems to contradict the polluter pays principle:

For most pollution policy in this country, the 'polluter pays' principle applies to any control regime, both for cleaning up damage to the environment, and for measures that satisfy environmental objectives. In the case of nitrate the Government recognizes that the situation is exceptional, and there are special circumstances that do not and cannot apply to other forms of water pollution. Firstly, nitrate is a natural and necessary prerequisite for agriculture, and without it plants cannot grow. Secondly, it has been the policy over many years to encourage agricultural production and with it the use of fertilizers. Thirdly, nitrate leaching is a function of the agricultural process of which fertilizers application is but a part; it may arise from activity some considerable time ago. . . . It is these exceptional circumstances that have led the Government to conclude that some agricultural measures to control nitrate levels in water should attract compensation.

in NSAs and farmers' organizations were closely involved in the development of the measures to be followed under the program.²⁴⁰

The Order designated ten Pilot NSAs by name and established their boundaries by reference to official maps kept at MAFF, but reproduced with the SI.²⁴¹ Eligible farmers within the identified NSAs could apply to enter into a contract with the Minister of Agriculture, Fisheries and Food.²⁴² For agreeing to follow the obligations set out in the Designation Order and in the contract, farmers received annual per-hectare payments, determined by the severity of the land-use restrictions and the NSA in which the land was located.²⁴³ Payment levels reflected the income lost through restricted farming practices.²⁴⁴ Each agreement gave MAFF employees access to the farmer's land to monitor compliance and assess the effectiveness of nitrate control measures.²⁴⁵

The Pilot Scheme offered two types of land management measures: the basic scheme and the premium scheme.²⁴⁶ The basic scheme focused on reducing nitrate leaching during fall and winter through four main requirements: application of nitrogen fertilizer to each field at or below the economic optimum; an annual limit of 175 kg N/ha from organic fertilizer; prohibition of autumn application of slurry or poultry manure; and use of approved autumn-winter cover crops on bare land.²⁴⁷ In addition, the basic scheme imposed other requirements, including no removal of woodland or hedgerows without replanting an equivalent amount, no conversion of grassland to arable (except in crop rotation), limited increase in organic nitrogen that comes from outside the NSA, and record-keeping for fertilizer applications.²⁴⁸ Producers of pig and poultry in permanent housing had to follow a plan for storage, handling, transport, and disposal of

Id.

²⁴⁰ See ARCHER ET AL., *supra* note 215, at 11–12.

²⁴¹ See S.I. 1990, No. 1013, art. 3.

²⁴² See *id.* art. 4. The Minister may enter an agreement with a landowner or with a tenant who has the landowner's written consent. Normally, farmers must enter a basic scheme agreement for all of their land within the NSA; tenants may enter land owned by one landlord, even if they farm other land owned by landlords who refuse to give consent.

²⁴³ See *id.* art. 7 & Schedule 4. Some payment levels were increased by S.I. 1993, No. 3198.

²⁴⁴ See ARCHER ET AL., *supra* note 215, at 9–10.

²⁴⁵ See S.I. 1990, No. 1013, art. 6.

²⁴⁶ See *id.* art. 2 & Schedules 1 & 2.

²⁴⁷ See *id.* Schedule 1; see also MAFF, SOLVING, *supra* note 25, at 30.

²⁴⁸ See S.I. 1990, No. 1013, Schedule 1.

slurry or poultry manure. Payments for compliance with the basic scheme ranged from £55 to £95/ha/year; payments for pig or poultry producers were based on additional storage capacity and distance of manure conveyance.²⁴⁹

The premium scheme imposed more intrusive management obligations in exchange for significantly higher payments. Only farmers who had entered all their land in the basic scheme were eligible to enter land in the premium scheme. Depending on the NSA where a farmer's land was located and the extent of participation, premium scheme payments could be as high as £380/ha/year, and this amount was raised to £455 in 1993.²⁵⁰

The premium scheme reduced nitrates at the expense of production by requiring the conversion of arable land to grassland, with restrictions on cultivation and seeding. Beyond these basic obligations, farmers could choose different levels of grassland treatment. In descending order of severity, the converted grassland could be unfertilized and ungrazed, grazed, or grazed with limited application of nitrogen. Alternatively, a farmer could choose grassland with woodland, planting trees under the conditions of another program, the Farm Woodland Scheme. A farmer could enter only part of his or her land into the premium scheme, as long as any strip of land was at least fifteen meters wide.²⁵¹

2. Nitrate Advisory Areas

In addition to the ten NSAs in the Pilot Scheme, farmers in nine Nitrate Advisory Areas (NAA), a total of 20,100 hectares, received free advice on good agricultural practices but no compensation.²⁵² Advisors visited all farms within each NAA; farmers received written advice about changes in practice to reduce nitrate loss, with recommendations for nitrogen fertilizer application. Follow-up visits in these areas indicated that while some farmers used more nitrogen than recommended amounts, most farmers followed the recommendations or used less fertilizer. Though some farmers perceived an economic risk from reduced fertilizer inputs, most farmers followed the advice for

²⁴⁹ See *id.* Schedule 4.

²⁵⁰ S.I. 1993, No. 3198, Schedule. Payments were increased because, after the 1992 CAP reform, the cost of complying with the premium scheme had increased. See ARCHER ET AL., *supra* note 215, at 15–16.

²⁵¹ See S.I. 1990, No. 1013, Schedule 2.

²⁵² See MAFF, PILOT NITRATE SCHEME, NITRATE ADVISORY AREAS 2 (1990).

many changed practices (e.g., green cover and delayed application of manure or slurry) on a majority of land in the Nitrate Advisory Areas.²⁵³

3. Impact of the Pilot Scheme

The Pilot Nitrate Scheme was open for application only in 1990 and 1991. By May 31, 1991, 86.2% of land in the NSAs had entered the scheme, and the important pig (six) and poultry (five) units in the NSAs also joined. Only 14.3% of participating land was entered in the more stringent premium scheme.²⁵⁴ Farmers' representatives were skeptical about this enthusiastic response, attributing high participation to a "knee-jerk response in fear of compulsory restrictions had the scheme failed."²⁵⁵ To Government officials, however, the high level of participation indicated that "farmers acknowledge the problem of nitrate leaching into our water sources and, by joining the Scheme, that they want to do something about it."²⁵⁶

MAFF monitored the Pilot Scheme, collected and analyzed data, and in a 1998 report evaluated its effect on farming practices and nitrate levels.²⁵⁷ The most important cropping change was use of autumn cover crops: sowing cover crops early (late August through early September) maximized the reduction in nitrate leaching.²⁵⁸ Under the basic scheme, the reduction in nitrogen fertilizer application was thirteen percent, and the average reduction in manure application was forty-two kg manure N/ha, which reduced the risk of leaching significantly.²⁵⁹ The Scheme reduced nitrate concentrations in water draining from fields in the NSAs (in about half, to below the limit of fifty mg/l); soil-level nitrate leaching was reduced in nine NSAs. Water at boreholes did not show reduced amounts of nitrates. The Pilot Scheme lasted only five years and, as the report noted, the reality that "aquifer response times can only be measured in decades remains a major frustration."²⁶⁰ The Scheme did, however, prove the feasibility

²⁵³ See MAFF, SOLVING, *supra* note 25, at 31–32.

²⁵⁴ See ARCHER ET AL., *supra* note 215, at 15.

²⁵⁵ Catherine Paice, *UK Farmers' Representatives Skeptical Over Successes of the Pilot Nitrate Sensitive Areas Scheme*, ESTATES GAZETTE, July 27, 1991, at 76.

²⁵⁶ MAFF, High Final Uptake for Pilot Nitrate Sensitive Areas Scheme, News Release 196/91, June 20, 1991 (quoting then-Agricultural Minister John Gummer).

²⁵⁷ See generally ARCHER ET AL., *supra* note 215.

²⁵⁸ See *id.* at 2, 38.

²⁵⁹ See *id.* at 2, 21.

²⁶⁰ *Id.* at 39.

of inducing farmers to make "practical changes" that were "effective in reducing nitrate losses from agricultural land."²⁶¹

Though some disagreement about the success of the Pilot Scheme existed,²⁶² Pilot NSAs were integrated into the NSA scheme enacted in 1994, in connection with the UK's implementation of the agro-environmental regulation accompanying the 1992 CAP reform. Lessons from the Pilot Scheme and the compulsory measures to be required under the Nitrates Directive helped to shape the parameters of the new Nitrate Sensitive Areas program.²⁶³

C. Nitrate Sensitive Areas

Nitrate Sensitive Areas formed part of the UK implementation of Council Regulation 2078/92, the agro-environmental measure enacted as part of the Mac Sharry CAP reform in 1992.²⁶⁴ This Regulation authorized EC aid for farm practices "compatible with the increasing demands of protection of the environment and natural resources and upkeep of the landscape and the countryside."²⁶⁵ The Regulation required Member States, including the UK, to design multi-annual programs to encourage sustainable agricultural practices. Though Member State programs were mandatory, farmer participation was voluntary. Participants received payments, financed in part by the EC, for carrying out specified environmental practices. The UK used the opportunity provided by Regulation 2078/92 to continue several programs it had already initiated and to enact new measures to encourage environmentally friendly practices.²⁶⁶

Thus, as part of its implementation of Regulation 2078/92, England launched twenty-two new Nitrate Sensitive Areas in July 1994, adding 35,000 hectares to the Pilot NSA Scheme.²⁶⁷ Enacted after extensive consultations, the new NSAs protected groundwater sources

²⁶¹ ARCHER ET AL., *supra* note 215, at 3.

²⁶² See Staci J. Pratt et al., *A Comparison of US and UK Law Regarding Pollution from Agricultural Runoff*, 45 *DRAKE L. REV.* 159, 184-85 (1997).

²⁶³ See ARCHER ET AL., *supra* note 215, at 3.

²⁶⁴ See 1992 O.J. (L 215) 85. For details of the regulation, see Grossman, *supra* note 18, at 1033-48.

²⁶⁵ Council Regulation 2078/92, preamble, 1992 O.J. (L 215) at 85.

²⁶⁶ On UK implementation of the regulation, see *Farmers and the Environment*, *supra* note 228, at 681-94.

²⁶⁷ See Nitrate Sensitive Areas Regulations 1994, S.I. 1994, No. 1729, amended by S.I. 1995, No. 1708; S.I. 1995, No. 2095; S.I. 1996, No. 3105; S.I. 1997, No. 990; S.I. 1998, No. 79; S.I. 1998, No. 2138. For details see *Farmers and the Environment*, *supra* note 228, at 688-90.

where nitrate concentrations exceeded, or threatened to exceed, fifty mg/l.²⁶⁸ These NSAs were regions that policymakers thought likely to be identified as NVZs under the 1991 EC Nitrates Directive. In 1995, the ten Pilot NSAs were re-launched as part of the 1994 scheme, making a total of thirty-two NSAs, covering about 45,000 hectares of land.²⁶⁹ All of these NSAs are located within areas later identified as NVZs.²⁷⁰

1. Obligation under NSA Contracts

Farmers who chose to participate in the NSA program made a voluntary commitment for five years and, as under the Pilot Scheme, entered into a contract with MAFF.²⁷¹ Participants must follow several conditions on all land located in the NSA that forms part of their holdings. First, they must limit application of organic manure (if any is allowed) to the quantity that contains no more than 250 kg total N/ha/year. Second, they may not apply manure within fifty meters of drinking water sources (for humans or dairy cattle) or within ten meters of any watercourse.²⁷² In addition, farmers must keep records of nitrogen application and maintain certain environmental and landscape features,²⁷³ including hedgerows, field trees, water bodies, and historical or archaeological features.²⁷⁴

As with Pilot NSAs, farmers could choose either the basic scheme or one of the premium schemes (arable or grassland). The basic scheme requires several farm practices for all participants. These practices include time periods when no inorganic nitrogen fertilizers may be applied, restrictions on application of inorganic nitrogen fertilizer produced outside the NSA or holding, cover crop requirements (both for sowing and removing), restrictions on housing and supplementary feed for animals on the land, and prohibitions on converting

²⁶⁸ See MAFF, Minister Launches New Nitrate Sensitive Areas, News Release 258/94 (July 1, 1994).

²⁶⁹ See S.I. 1995, No. 1708, reg. 2(9), Schedule 1 (incorporating the Pilot NSAs in the NSA scheme).

²⁷⁰ See MAFF/IB Departmental Report 1999, ¶ 4.53, (visited May 20, 1999) <<http://www.maff.gov.uk>>.

²⁷¹ See S.I. 1994, No. 1729, Nitrate Sensitive Areas Regulations 1994, reg. 4, *amended by* S.I. 1995, No. 1708; S.I. 1995, No. 2095; S.I. 1996, No. 3105.

²⁷² See S.I. 1994, No. 1729, reg. 7 & Schedule 2, *as amended*.

²⁷³ See MAFF, NITRATE SENSITIVE AREAS SCHEME: EXPLANATORY BOOKLET 18-19 (1994).

²⁷⁴ See S.I. 1994, No. 1729, Schedules 3 & 4, *as amended*.

permanent grassland within the NSA to arable production.²⁷⁵ Then, within the basic scheme, farmers had to choose either restricted rotation or standard rotation low-nitrogen arable cropping. Restricted rotation limits nitrogen fertilizer to 150 kg N/ha in twelve months (or less, if crops require less) and prohibits potatoes or vegetable brassica crops. Standard rotation, which pays farmers less than restricted, limits nitrogen similarly, but in one twelve-month period under the contract, the limit is increased to 200 kg N/ha.²⁷⁶ The basic schemes carry payments from £65 to £105/ha/year.²⁷⁷

The premium schemes restrict farm practices more severely, but offer higher payments—up to £625/ha/year in 1998, for the most restrictive regime. The premium arable scheme requires crop production to cease and to be replaced by grassland. Cultivation and seeding of grassland are restricted, with no legumes permitted. Further, farmers must maintain other permanent grassland on their holdings.²⁷⁸ Several options for arable conversion exist. Most stringent are unfertilized, ungrazed grassland and species-rich (native species) grassland, also with no fertilizer or grazing. Under another option, unfertilized grassland can be grazed at a sustainable level, with supplemental feed allowed only when necessary for the health or welfare of animals. Further options involve grassland that is grazed, with limited application of nitrogen fertilizer and grassland with woodland, in compliance with the Farm Woodland Scheme, with no nitrogen or grazing. A final alternative entails complete set-aside, with no nitrogen or grazing, one annual cutting of grass, and no productive use of the land.²⁷⁹

The premium grass scheme applies to land already in grass. Under that scheme, farmers must restrict application of nitrogen fertilizer and may cultivate only with MAFF approval. Livestock grazing must be sustainable, at a maximum of 1.4 livestock units/ha, with supplemental feed only to protect animals' health or welfare.²⁸⁰ This scheme, which does not involve cessation of arable farming, pays £250/ha/year.²⁸¹

²⁷⁵ See *id.* Schedule 3, as amended.

²⁷⁶ See *id.* Nitrogen content of organic nitrogen fertilizer (e.g., manure) is assessed on the basis of available nitrogen content.

²⁷⁷ See *id.* Schedule 6, as amended.

²⁷⁸ See *id.* Schedule 4.

²⁷⁹ See *id.* The last two options were added by S.I. 1995, No. 1708, reg. 2(10), Schedule 2 (woodland) and S.I. 1995, No. 2095, reg. 2(7)(c) (set-aside).

²⁸⁰ See S.I. 1994, No. 1729, Schedule 5.

²⁸¹ See *id.* Schedule 6.

As the examples above indicate, payments under the various NSA alternatives depend on the severity of the land-use restrictions. Furthermore, payment levels vary among the NSAs, presumably reflecting the cost of applying the required practices in the different NSAs. The least burdensome option, the basic scheme with standard rotation, earned only £65/ha/year, almost ten times less than the £625 payable for conversion of arable land to ungrazed, unfertilized grassland. Payment amounts have been changed occasionally in amendments to the 1994 Statutory Instrument.²⁸²

2. The Impact of NSAs

The NSA Scheme is now severely limited. It is available only for land already under contract by 1998 and for certain applications made prior to September 30, 1998.²⁸³ In practice, the Scheme was closed to new applicants on July 29, 1998, after a government spending review.²⁸⁴ Participation in the Scheme was high—about seventy-one percent of eligible land. During 1998–1999, about 25,000 hectares were enrolled in the scheme, with another 3000 hectares added during the 1998 enrollment period. Soil monitoring showed good results, with reduced nitrate leaching.²⁸⁵ Reduced nitrate loss under the NSA program will help to improve groundwater. Because the NSA Scheme operates through five-year contracts, it will end gradually as the contracts terminate. Early contracts have already concluded, beginning in September 1999. Termination of the NSA scheme causes environmental concern because its benefits may be lost if land-use practices change when farmers are no longer paid for their environmental efforts. Farmers who no longer receive compensation for arable reversion to grassland, for example, may decide to plow the land, which will cause increased nitrate leaching.²⁸⁶ Because the NSAs are located in NVZs, however, farm practices must comply with the requirements of the NVZ Action Program, discussed below.²⁸⁷

The NSA program was a response to EC Regulation 2078/92, rather than to the EC Nitrates Directive. It was enacted, however, in the knowledge that the Nitrates Directive required implementation in

²⁸² Amendments are listed *supra*, note 267.

²⁸³ See S.I. 1998, No. 2138, reg. 2.

²⁸⁴ See Letter from Chris Jennings, MAFF, Rural and Marine Environmental Division (June 2, 1999) (on file with author) [hereinafter Jennings Letter].

²⁸⁵ See MAFF/IB, *supra* note 270, ¶¶ 4.50–.53.

²⁸⁶ See Jennings Letter, *supra* note 284.

²⁸⁷ See *infra* notes 321–29 and accompanying text.

the UK in the near future. Indeed, NVZs, required under the Nitrates Directive, were identified only after the NSA program was effective.

V. THE NITRATES DIRECTIVE IN ENGLAND

England implemented the Nitrates Directive through several legislative measures and ministerial documents.²⁸⁸ Most important are the Statutory Instruments that designate Nitrate Vulnerable Zones,²⁸⁹ establish the Farm Waste Grant Scheme,²⁹⁰ and set up the Action Program for NVZs.²⁹¹ In addition, The Water Code, a ministerial document, plays an important role.²⁹² Farmers in NVZs receive clearly-written publications to explain compliance with required practices.²⁹³

Years of controversy accompanied implementation of the Nitrates Directive. Studies and disagreements of the 1980s mentioned in connection with voluntary nitrate programs are, of course, also the history of the Nitrates Directive implementation.²⁹⁴ In the early 1990s, the Department of the Environment and MAFF issued consultation papers, which considered scientific methods for identifying nitrate-

²⁸⁸ Implementation of EC measures in the UK involves England, Wales, Scotland, and Northern Ireland. England and Wales often implement measures jointly, but Wales is now in the process of making its legislation more independent. Scotland normally enacts independent, but often similar, programs. See *Farmers and the Environment*, *supra* note 228, at 682. Many recent UK regulations are available at <<http://www.hmsso.gov.uk>>.

For implementation in Scotland, see The Action Programme for Nitrate Vulnerable Zones (Scotland) Regulations 1998, S.I. 1998, No. 2927 (S. 171). Scotland has just one NVZ, designated in Protection of Waters Against Nitrate Pollution (Scotland) Regulations 1996, S.I. 1996, No. 1564.

For Northern Ireland, see Action Programme for Nitrate Vulnerable Zones Regulations (Northern Ireland) 1999, S.R. 1999, No. 156; Protection of Water Against Agricultural Nitrate Pollution Regulations (Northern Ireland) 1996, S.R. 1996, No. 217, amended by S.R. 1999, No. 3.

²⁸⁹ See The Protection of Water Against Agricultural Nitrate Pollution (England and Wales) Regulations 1996, S.I. 1996, No. 888.

²⁹⁰ See The Farm Waste Grant (Nitrate Vulnerable Zones) (England and Wales) Scheme 1996, S.I. 1996, No. 908.

²⁹¹ See The Action Programme for Nitrate Vulnerable Zones (England and Wales) Regulations 1998, S.I. 1998, No. 1202.

²⁹² See MAFF & WELSH OFFICE AGRICULTURE DEPARTMENT, THE WATER CODE—CODE OF GOOD AGRICULTURAL PRACTICE FOR THE PROTECTION OF WATER (PB 0587, revised October 1998) [hereinafter THE WATER CODE].

²⁹³ See, e.g., MAFF, GUIDELINES FOR FARMERS IN NVZs (PB 3277, 1998) [hereinafter GUIDELINES]; MAFF, MANURE PLANNING IN NVZs (PB 3577, 1988) [hereinafter MANURE PLANNING].

²⁹⁴ See *supra* notes 163–209 and accompanying text.

polluted waters and the land areas to be designated NVZs.²⁹⁵ In 1994, MAFF issued a more general consultation document outlining its proposals for designating NVZs and requesting public comment.²⁹⁶ That document described nitrate leaching and the Directive, mentioned potential impact of the Nitrates Directive on farmers in vulnerable zones, and explained the methods used to identify NVZs.²⁹⁷ Annexes to the document summarized farmer obligations in NVZs and mapped proposed NVZs.²⁹⁸

MAFF received more than 500 written comments to its consultation document, which was intended in part to "discover any inadequacies in the proposed zone boundaries or in the identification of the zones themselves."²⁹⁹ A response published by the Government outlined public concerns and addressed objections. As a result, boundaries for many of the proposed NVZs were altered.³⁰⁰ Further, the response established an Independent Review Panel to determine whether the policy on designating NVZs was "reasonably and justly executed."³⁰¹

The Review Panel, in turn, compiled a report which reviewed and evaluated objections submitted to twenty-nine of the proposed NVZs, as well as more general objections.³⁰² Many submissions focused on methods of testing water and the definition of NVZ boundaries. Nearly all comments on NVZ designations focused, at least in part, on the role of non-agricultural nitrate pollution sources in identifying NVZs, an issue later litigated in the European Court of Justice.³⁰³ Ob-

²⁹⁵ See DEPARTMENT OF THE ENVIRONMENT, MAFF, WELSH OFFICE, CONSULTATION PAPER: METHODOLOGY FOR IDENTIFYING SENSITIVE AREAS (URBAN WASTE WATER TREATMENT DIRECTIVE) AND METHODOLOGY FOR DESIGNATING VULNERABLE ZONES (NITRATES DIRECTIVE) IN ENGLAND AND WALES (March 1993). A 1992 document preceded this paper and focused on the way to identify the waters to be protected. See *id.* at 2.

²⁹⁶ See MAFF ET AL., CONSULTATION DOCUMENT: DESIGNATION OF VULNERABLE ZONES IN ENGLAND AND WALES UNDER THE EC NITRATE DIRECTIVE (91/676) (May 1994) [hereinafter MAFF, CONSULTATION]. Also in 1994, the Worldwide Fund for Nature called on the UK to enact even stricter nitrate legislation than required by EC legislation. See 17 Int'l Env't Rep. (BNA) 355, 355 (1994).

²⁹⁷ See MAFF, CONSULTATION, *supra* note 296, at 2-8.

²⁹⁸ See *id.* Annexes 1 & 2.

²⁹⁹ MAFF ET AL., GOVERNMENT RESPONSE TO THE CONSULTATION ON THE DESIGNATION OF NITRATE VULNERABLE ZONES IN ENGLAND AND WALES 11 (1995).

³⁰⁰ See *id.*

³⁰¹ *Id.* at 18.

³⁰² See T. ETHERTON ET AL., REPORT OF THE INDEPENDENT REVIEW PANEL ON NITRATE VULNERABLE ZONES 21 (1995) [hereinafter PANEL REPORT].

³⁰³ See *infra* notes 340-64 and accompanying text (discussing the *Standley* decision).

jectors also claimed that NVZ designation would result in "lower profits, a fall in land values, and substantial compliance costs," without government compensation.³⁰⁴ Among others, the National Farmers' Union (NFU) and the Country Landowners' Association raised objections before the panel. After final designation of NVZs, the NFU criticized the decision in farmers' magazines and played a role in litigation contesting several NVZ designations.³⁰⁵

A. Designation of Nitrate Vulnerable Zones

After this careful consultation and consideration of public opinion, England and Wales designated sixty-eight NVZs through regulations in a Statutory Instrument effective April 17, 1996.³⁰⁶ The regulations formally establish the sixty-eight NVZs, which are listed by name in a Schedule to the SI.³⁰⁷ Boundaries for the NVZs are established on "areas . . . coloured pink" on official maps held by the Secretary of State for the Environment (England) and the Secretary of State for Wales.³⁰⁸ Designations are to be reviewed, and revised if necessary, every four years.³⁰⁹ The regulations prescribe procedures for monitoring the nitrate concentration and eutrophic state in freshwaters, as required by the Nitrates Directive.³¹⁰ The regulations also establish parts of The Water Code as the document intended to meet the Nitrates Directive requirement for a Member State code of good agricultural practice.³¹¹

The SI that designates the sixty-eight NVZs also recognizes the Nitrates Directive requirement that Member States enact Action Programs, which logically follow designation of NVZs. Thus, the Minister of Agriculture, Fisheries, and Food and the Secretary of State for En-

³⁰⁴ PANEL REPORT, *supra* note 302, at 21.

³⁰⁵ See, e.g., *Nitrate Vulnerable Zones*, W. MIDLANDS FARMER, May 1996, at 13; Liz Mason, *NFV Say NVZ Decision is "Extremely Disappointing,"* FARMERS W., Mar. 29, 1996.

³⁰⁶ See generally *The Protection of Water Against Agricultural Nitrate Pollution* (England and Wales) Regulations 1996, S.I. 1996, No. 888.

³⁰⁷ See *id.* Schedule 1.

³⁰⁸ *Id.* reg. 3(1).

³⁰⁹ See *id.* reg. 3(2). The first review is nearly complete, but publication of the consultation document was delayed by the *Standley* case, discussed *infra*. See Jennings Letter, *supra* note 284.

³¹⁰ See S.I. 1996, No. 888, reg. 4 & Schedule 3; Nitrates Directive, *supra* note 118, art. 6.

³¹¹ See *id.* reg. 5. This regulation refers to the 1991 edition of The Water Code and was revoked in 1998 by reg. 9 of the Action Program, S.I. 1998, No. 1202. The 1998 edition of The Water Code refers to the Nitrates Directive. See generally *THE WATER CODE*, *supra* note 292.

vironment were instructed to publish the required Action Programs for NVZs "as soon as practicable," with implementation by December 19, 1999.³¹² Action Programs must include provisions listed in Schedule 4 of the SI, which restates the requirements listed in Annex III to the Nitrates Directive.³¹³ In addition, Action Programs must include applicable provisions from The Water Code and other requirements identified by the Secretary of State for the Environment and the Minister of Agriculture, Fisheries, and Food, acting jointly.³¹⁴ More than two years elapsed, however, before enactment of the Action Program in England.

B. Farm Waste Grants

Compliance with the Nitrates Directive was expected to have significant economic implications for farmers in NVZs.³¹⁵ Indeed, the cost of compliance led to some objections to NVZ designations in England. In partial response to farmers' economic concerns, the Farm Waste Grant Scheme authorizes government grants to pay twenty-five percent of the capital costs of improvements for agricultural businesses.³¹⁶ Grants under the Scheme support expenditures, not to exceed £85,000, incurred between April 16, 1996 and April 17, 2003. Grants can be made for building, replacement, or improvement of facilities for handling and storage of manure, slurry and silage effluent; fixed disposal facilities for slurry and silage effluent; or facilities to separate clean and dirty water, thus reducing the need for slurry storage.³¹⁷

³¹² S.I. 1996, No. 888, reg. 6.

³¹³ See *supra* notes 134–48 and accompanying text.

³¹⁴ See S.I. 1996, No. 888, reg. 7 & Schedule 4.

³¹⁵ The 1995 estimate of the capital cost of the proposed Action Program in NVZs was £10,000,000, with a recurring annual cost (including interest on the capital costs) of £3,000,000. Estimated costs varied within the dairy, beef, pigs, and poultry sectors. About 8000 farmers (including 150 in Wales) are subject to NVZ measures. Compliance costs for those farmers included costs of meeting the nitrogen loading threshold, additional storage, and transport of manures. See DEPARTMENT OF THE ENVIRONMENT ET AL., EC NITRATE DIRECTIVE (91/676): MEASURES TO APPLY IN NITRATE VULNERABLE ZONES IN ENGLAND AND WALES, AND DRAFT REGULATIONS TRANSPOSING THE DIRECTIVE 8, 10–17 (1995).

³¹⁶ See The Farm Waste Grant (Nitrate Vulnerable Zones) (England and Wales) Scheme 1996, S.I. 1996, No. 908. The Farm Waste Grant Scheme was enacted to comply with EC programs to improve the efficiency of agricultural structures. See *id.* explanatory note 1.

³¹⁷ See *id.* reg. 3.

Farmers are eligible for waste grants under the Scheme if several conditions are met. Land on which the farm business is carried out must be situated, at least in part, in one of the NVZs, and expenditures must result in environmental benefit to the NVZ. Expenditures designed to increase productive capacity of an agri-business do not receive government support under the Scheme.³¹⁸ Moreover, the Government has discretion to withhold grants for specific causes. A grant can be withheld, for example, if "the work . . . is likely to destroy or damage the natural beauty and amenity of the countryside to an extent which cannot be justified by any resulting agricultural benefit."³¹⁹ Farmers are entitled to a hearing before a grant under the Scheme is withheld for cause.³²⁰

C. The Action Program

The Action Program, like the order designating NVZs, was enacted only after significant consultation. Even before NVZs were designated, MAFF published a consultation paper on measures to apply in NVZs and invited public comment.³²¹ This consultation paper explained practices proposed for NVZs and estimated the costs from proposed requirements. A later consultation paper invited comment on revised Action Program measures, draft Action Program regulations, and provisions that would make up the code of good agricultural practice.³²²

Finally, the Action Program for Nitrate Vulnerable Zones, required both by the Nitrates Directive and by the 1996 SI designating NVZs, was enacted in May 1998 and became effective December 19, 1998.³²³ Enforced by the Environment Agency, these regulations set out the farm practices designed to protect water in NVZs, and authorized measures to ensure that farmers implement the required practices.

³¹⁸ See *id.* reg. 4.

³¹⁹ *Id.* reg. 6(1)(e). Other reasons also justify withholding a grant: other available sources of funding for the project, frustration of purpose of previous assistance, false or misleading information, or excessive expenditure. See *id.* reg. 6(1).

³²⁰ See *id.* reg. 6(2).

³²¹ See DEPARTMENT OF THE ENVIRONMENT ET AL., *supra* note 315.

³²² See generally DEPARTMENT OF THE ENVIRONMENT, TRANSPORT AND THE REGIONS ET AL., EC NITRATE DIRECTIVE (91/676/EEC): DRAFT REGULATIONS ESTABLISHING THE ACTION PROGRAMME MEASURES TO APPLY IN NITRATE VULNERABLE ZONES IN ENGLAND AND WALES (1997).

³²³ See The Action Programme for Nitrate Vulnerable Zones (England and Wales) Regulations 1998, S.I. 1998, No. 1202.

The heart of the Action Program is the following: "The occupier of any farm all or part of which is in a nitrate vulnerable zone shall ensure that the action programme set out in the Schedule hereto is implemented in relation to any land comprised in the farm and in the nitrate vulnerable zone."³²⁴ Thus, the Schedule details the practices required for management of farms (or parts of farms) located in NVZs.³²⁵ These include practices required in Annex III of the Nitrates Directive, as well as measures contained in The Water Code. After defining some significant terms, the Schedule lists fifteen provisions, most of which govern application of fertilizers, storage of manure, and record-keeping. The following measures, described without detail, are examples: nitrogen fertilizer cannot be applied in excess of crop requirements; chemical fertilizers cannot be applied in fall and early winter; organic manure cannot be applied during fall months; organic fertilizer amounts are limited, consonant with the Nitrates Directive (170 kg N/ha/year maximum, from 2002); chemical and organic fertilizers must be applied to avoid surface water; manure storage capacity must be adequate for the longest period when land application is prohibited; and detailed records of fertilizer application are required and must be kept for five years.

The Action Program authorizes government agents to enforce these requirements. The occupier of any farm located in an NVZ must permit employees of the Environment Agency to enter the land to monitor implementation of the Action Program or to assess its effectiveness in reducing nitrate pollution of waters. The Agency has the right to take samples, install and maintain equipment, and examine records required by the Action Program.³²⁶ If a violation of one of the Action Program requirements has occurred, the Environment Agency can serve notice to the violator and require compliance with the Action Program, provided the violator has at least twenty-eight days to take the required action.³²⁷ The person served with notice of a violation may appeal to the Secretary of State, who must hold a hearing at the appellant's request.³²⁸ Breaches of some measures prescribed in the Action Program are criminal offenses. Criminal penalties apply for breaches of the requirements to follow the landuse measures im-

³²⁴ *Id.* reg. 3(a).

³²⁵ *See id.* Schedule.

³²⁶ *See id.* reg. 6.

³²⁷ *See id.* reg. 4.

³²⁸ *See* S.I. 1998, No. 1202, reg. 5.

posed by the program, to follow specific orders in a notice served after failure to comply, and to allow and assist in monitoring.³²⁹

D. *The Water Code—Code of Good Agricultural Practice*

Even before the Nitrates Directive requirement of a code of good agricultural practice took effect, MAFF published *A Code of Good Agricultural Practice for the Protection of Water*³³⁰ for England and Wales. Though that 1991 Code included practices designed to reduce nitrate leaching, it was not tailored to the Nitrates Directive. Thus in 1998, MAFF published a revised version (*The Water Code*).³³¹ Compliance with *The Water Code* is voluntary for most farmers, but farmers in the NVZs must comply with mandatory measures included in *The Water Code*, as well as in the Action Program.³³²

The Water Code briefly summarizes laws controlling pollution and provides practical advice that is clearly written and illustrated. Concerning nitrogen, *The Water Code* recommends practices in several contexts: farm waste management planning, slurries, fertilizers, and nitrate and phosphorus. In the chapter titled "Nitrogen and Phosphorus," *The Water Code* identifies several paragraphs on organic manures and inorganic nitrogen fertilizer as the provisions that comply with the Nitrates Directive obligation to enact a code of good agricultural practice.³³³ The good practices outlined in *The Water Code* are also incorporated into the NVZ Action Program.³³⁴

³²⁹ See *id.* reg. 8.

³³⁰ MAFF AND WELSH OFFICE AGRICULTURAL DEPARTMENT, CODE OF GOOD AGRICULTURAL PRACTICE FOR THE PROTECTION OF WATER (PB 0587, July 1991) [hereinafter 1991 CODE]. A MAFF survey from 1996 indicated that more than half of farmers did not know that codes for environmental management existed, and many farmers ignored important environmental practices. Only 44% of farmers knew about the water code, and even fewer had a copy. See *Farmers Lag Behind in Implementing Good Environmental Practices Codes*, 19 Int'l Env't Rep. (BNA) 571 (1996).

³³¹ See THE WATER CODE, *supra* note 292. MAFF also revised its other codes in 1998, and although those codes have relevance to nitrates, *The Water Code* is intended to meet the Nitrates Directive requirements. See generally THE AIR CODE (PB 0618, October 1998); THE SOIL CODE (PB 0617, October 1998); THE WATER CODE, *supra* note 292.

³³² See THE WATER CODE, *supra* note 292, at 70.

³³³ See Nitrates Directive, *supra* note 118, art. 4; THE WATER CODE, *supra* note 292, ¶¶ 283–94 (though an apparent misnumbering on p. 70 lists other paragraphs). These paragraphs are stricter than the parallel provisions in the 1991 Water Code. See 1991 CODE, *supra* note 330, ¶¶ 283–94.

³³⁴ See S.I. 1998, No. 1202, Schedule.

These paragraphs of *The Water Code* identify specific practices with helpful explanations and hints for carrying out the practice. Practices directed toward application of organic manures require farmers to use a maximum of 250 kg N/ha in twelve months and to apply nitrogen when it can be used by the crop.³³⁵ Nitrogen should not be applied to flooded or frozen fields, and it should be spread accurately.³³⁶ Further, rules govern application of inorganic nitrogen fertilizer. Farmers should calculate their fertilizer needs, avoid applying extra fertilizer, and apply fertilizer only when the crop can use it. They should avoid application on flooded or frozen fields and avoid application to watercourses. *The Water Code* also requires record-keeping.³³⁷

E. MAFF Information for Farmers

Farmers in NVZs must comply with the provisions in the Action Program without compensation. To make this task easier, MAFF prepared materials to educate farmers about their responsibilities under the Action Program. Brief descriptions of two publications illustrate government efforts to facilitate farmer compliance.

Guidelines for Farmers in NVZs summarizes rules that farmers in an NVZ must follow and provides additional information about complying with the rules.³³⁸ The booklet gives examples of the various calculations needed to determine manure and fertilizer limits and provides a record sheet for tracking fertilizer applications. Farmers can request free government advice about compliance.

Another publication, *Manure Planning in NVZs*, provides guidelines for livestock farmers and for arable farmers who import manure.³³⁹ The publication helps farmers to determine whether they have enough land to spread manure, whether they have enough storage for slurry, and how much less chemical fertilizer is needed because of manure applications. Spaces for simple step-by-step calculations ensure that farmers can make accurate calculations. The booklet also provides helpful charts, including standard figures for the total annual nitrogen produced by various livestock types and monthly slurry production for specific animal types, as well as sample forms to aid in farm record-keeping.

³³⁵ THE WATER CODE, *supra* note 292.

³³⁶ See *id.* ¶¶ 283–88. For brevity, explanations here omit detail provided in the Code.

³³⁷ See *id.* ¶¶ 289–94.

³³⁸ See GUIDELINES, *supra* note 293.

³³⁹ See MANURE PLANNING, *supra* note 293.

VI. NITRATES LITIGATION: THE STANDLEY DECISION

In April 1999, the European Court of Justice interpreted the Nitrates Directive in a case that developed from a challenge to the UK designation of NVZs.³⁴⁰ H.A. Standley and other farmers demanded annulment of two NVZ designations in UK court.³⁴¹ The High Court of Justice of England and Wales, Queen's Bench Division,³⁴² referred the case to the Court of Justice for a preliminary ruling under EEC Treaty Article 177.³⁴³ The High Court's resolution of the farmers' challenge to the UK designation of NVZs turned on the construction of the Nitrates Directive and on its validity in light of EU environmental principles.

The two NVZs challenged in the proceeding had been designated, along with sixty-six others, in the Statutory Instrument, Protection of Water Against Agricultural Nitrate Pollution (England and Wales) Regulations 1996.³⁴⁴ Designation of NVZs in England and Wales focused on identification of "tightly defined catchments of polluted waters."³⁴⁵ A Department of Environment official explained:

As a first step bodies of water were identified . . . which were either heavily polluted or showed the clear potential to be heavily polluted by nitrates. Secondly, the known areas of land draining into those waters (and not any areas of land draining into the rivers upstream of those waters) were identified. Thirdly, having regard in particular to the land use and other characteristics of the areas of land and the bodies of water in question, an assessment was made as to

³⁴⁰ See *Ex parte Standley and Others*, Case 293/97 (Apr. 29, 1999), [1999] 2 C.M.L.R. 902 (also available at <<http://curia.eu.int/jurisp>>).

³⁴¹ The NVZs were those affecting land draining into the River Waveney and the Rivers Blackwater and Chelmer. See *id.*

³⁴² See *Ex parte Standley*, CO/2057/96; *Ex parte Metson*, CO/2064/96 (May 7, 1997). Both cases are also available on Lexis, ENGEN library.

³⁴³ See EEC TREATY art. 177 (now TREATY art. 234). Article 234(b) gives the Court of Justice jurisdiction to give preliminary rulings concerning the "validity and interpretation of acts of the institutions of the Community . . ." A Member State court can request a Court of Justice ruling. For more information about the process of preliminary rulings, see Court of Justice of the European Communities, Information Note on References by National Courts for Preliminary Rulings, available on the EU website at <<http://curia.eu.int>>.

³⁴⁴ See S.I. 1996, No. 888 (Mar. 21, 1996), effective Apr. 17, 1996, discussed *supra* notes 306-314 and accompanying text.

³⁴⁵ *Standley*, ¶ 13, [1999] 2 C.M.L.R. at 924.

whether agricultural sources were making a *significant contribution* to the levels of pollution detected.³⁴⁶

In the main proceeding, the plaintiffs, who owned or farmed land in the challenged NVZs, argued that establishment of Action Programs to restrict agricultural use would cause “immediate and long-term economic harm in terms of land values and of income from their farming businesses.”³⁴⁷ Supported by the National Farmers’ Union, they asserted that the Nitrates Directive required Member States to designate NVZs only if pollution from agricultural sources caused (or could cause) the nitrate content in surface fresh water to exceed the fifty mg/l threshold for nitrates. Any other interpretation, plaintiffs argued, would violate important EC environmental principles—the principle of proportionality, the polluter pays principle, and the principle that environmental damage should be rectified at source—as well as the fundamental right to property. Respondents, the Secretary of State for the Environment and the Minister of Agriculture, Fisheries and Food, asserted that the NVZ designation required only that nitrates from agricultural sources in that area make a “significant contribution” to nitrate pollution.³⁴⁸ It would be impossible, respondents argued, for Member States to determine whether nitrates solely from agriculture exceed the fifty mg/l threshold, and further, neither the Directive nor its annexes requires that determination.³⁴⁹

Because the proceeding in the UK court “raised matters of general interest relevant to all farmers affected by the interpretation of the Directive and its implementation by national authorities,”³⁵⁰ the High Court of Justice referred two questions to the EU Court of Justice for a preliminary ruling.³⁵¹ The first question focused on the standard for NVZ designation, and the second on the validity of the Nitrates Directive.

³⁴⁶ Affidavit of Paul Bristow, Head, Water Quality Division, Department of the Environment, quoted in *Standley*, ¶ 13 (emphasis added), [1999] 2 C.M.L.R. at 924.

³⁴⁷ *Standley*, ¶ 15, [1999] 2 C.M.L.R. at 925.

³⁴⁸ *See id.* ¶ 18, at 925.

³⁴⁹ *See id.*

³⁵⁰ *Standley*, ¶ 20, [1999] 2 C.M.L.R. at 925.

³⁵¹ The High Court judge indicated he could not resolve the primary issue of construction of the Directive with complete confidence. Further, he noted other reasons for the referral, including the Court of Justice’s advantage in construing an EC instrument, the need for uniform interpretation of the Directive, lack of EC authority, the pitfalls in entering an unfamiliar area, an issue of EC law that will resolve the case, no relevant disputed facts connected with the main issue, and the likelihood that the referral would not prolong the litigation. *See Standley*, CO/2057/96; *Metson*, CO/2064/96.

A. Standard for NVZ Identification

The Court of Justice first addressed the standard for identification of waters affected by pollution under Articles 2(j) and 3(1) and Annex 1 of the Directive and the resultant designation of NVZs under Article 3(2). The question before the Court was whether waters should be identified if nitrogen from agricultural sources makes a "significant contribution" to the concentration of nitrates. The Court also addressed what constitutes a significant contribution. In answering the first question, the Court noted that the Directive does not require Member States to determine precisely what proportion of pollution in waters comes from agricultural nitrates, nor must the cause of pollution be exclusively agricultural.³⁵² Language in the Nitrates Directive itself compels this conclusion. The Directive requires Member States to take into account "nitrogen contributions originating from agricultural and other sources" in establishing Action Programs.³⁵³ Moreover, States may enact Action Programs for their entire territory, even when pollution from agricultural sources does not exceed the nitrate standard.³⁵⁴ Thus, to limit identification of waters affected by pollution to areas where agricultural sources alone exceeded the nitrate standard would conflict with Article 5 of the Directive. Further, exclusion of areas where agricultural sources make a significant contribution to nitrate pollution, but do not exceed the standard by themselves, would contravene the "spirit and purpose" of the Directive.³⁵⁵ The Directive incorporated public health standards for nitrate pollution, and levels that exceed the standard are harmful to public health, regardless of source.

Therefore, the Court concluded, the Directive applies when "the discharge of nitrogen compounds of agricultural origin makes a significant contribution to the pollution."³⁵⁶ Moreover, Member States may apply the Directive more broadly than required. The Court did not specify when agriculture makes a significant contribution to pollution. Because the Directive is intended to protect the environment,

³⁵² See *Standley*, ¶¶ 29–30, [1999] 2 C.M.L.R. at 927. Identification of waters under art. 3(1) of the Directive uses criteria from Annex 1, and Paragraph A.1. of Annex 1 does not require a precise determination of the sources of nitrates.

³⁵³ See Nitrates Directive, *supra* note 118, art. 5(3)(a).

³⁵⁴ See *id.* art. 3(5).

³⁵⁵ *Standley*, ¶ 33, [1999] 2 C.M.L.R. at 928.

³⁵⁶ *Id.* ¶ 35, at 928.

rather than harmonize Member State laws, States have wide discretion in identifying waters affected by pollution and designating NVZs.³⁵⁷

B. *Validity of the Directive*

The second question focused on the validity of the Directive under the principle of proportionality, the polluter pays principle, the rectification at source principle, and the fundamental right to property. Standley argued that if, as the Court held, NVZs could be designated where agriculture made only a significant contribution to pollution, an Action Program imposing responsibility for the pollution only on farmers (rather than on all polluters) would violate the principle of proportionality. Moreover, to require farmers alone to bear the whole financial burden of reducing nitrate concentrations would violate the polluter pays principle, as well as the related principle that environmental damage should be rectified at its source. Finally, Standley argued that the right to property is infringed if farmers bear the entire burden of the remedy when others have contributed to nitrate pollution.³⁵⁸

In addressing these arguments, the Court emphasized the flexibility that Member States enjoy under the Directive. Action Programs, for example, must consider scientific and technical data related to nitrogen from agricultural and other sources, as well as environmental conditions; mandatory measures under the Programs must consider characteristics of the NVZs, and manure limits may be tailored to the NVZs if objectives of the Directive are not prejudiced; codes of good agricultural practice should consider conditions in the different regions. These and other flexible provisions ensure that Member States will apply the Directive without violating the principle of proportionality.³⁵⁹

The Court noted that both the polluter pays principle and the principle of rectification at source are closely related to the principle of proportionality. In designing their Programs, Member States must take account of sources of pollution other than agriculture. Significantly, the Directive does not require farmers to assume the burden of eliminating pollution they did not create, and therefore does not violate the polluter pays principle or the rectification at

³⁵⁷ See *id.* ¶¶ 38–39, at 928–29.

³⁵⁸ See *id.* ¶¶ 41–51, at 929–30.

³⁵⁹ See *id.* ¶¶ 46–50, at 930.

source principle.³⁶⁰ Nor does the Directive violate the right to property. That right is not absolute but may be restricted in the general Community interest, if the restrictions “do not constitute a disproportionate and intolerable interference.”³⁶¹ Mandatory measures imposed by Member State Action Programs are intended to protect public health and therefore do not impair the right to property.³⁶²

Thus, the Court answered the questions presented by the High Court of Justice of England and Wales. The Directive requires that surface freshwaters be identified as waters affected by pollution. Lands draining into those waters and contributing to their pollution are to be identified as NVZs, when the Member State determines that nitrogen from agricultural sources makes a “significant contribution” to the concentration of nitrates. Further, the Court rejected the farmers’ claims that the “significant contribution” standard for identifying nitrate pollution and designating NVZs under the Nitrates Directive interfered with EC environmental principles and the fundamental right to property.³⁶³

The Court of Justice decision—that NVZs should be identified when agricultural activities make a significant contribution to the concentration of nitrates—already may have encouraged more stringent enforcement of the Nitrates Directive. In late October 1999, the Commission announced its decision to bring France before the Court of Justice for failure to respect the Nitrates Directive. The Commission noted that “France has failed to take enough account of those waters in respect of which agricultural inputs are not preponderant but are nonetheless significant.”³⁶⁴

CONCLUSION

The Nitrates Directive uses the environmental authority of the European Community to protect vulnerable waters from nitrate pollution caused by application of excess organic and inorganic fertilizers to agricultural land. The Directive is one of the first environmental measures to regulate agriculture directly and to apply EC environmental principles to agricultural activities. The Directive, through im-

³⁶⁰ See *Standley*, ¶¶ 51–53, [1999] 2 C.M.L.R. at 930–31.

³⁶¹ *Id.* ¶ 54, at 931.

³⁶² See *id.* ¶ 56.

³⁶³ See *id.* at 932.

³⁶⁴ Nitrates Directive: Commission takes further legal step against France, Press Release, IP/99/813, (Oct. 29, 1999) <http://europe.eu.int/rapid/start/cgi/guesten.ksh?p_action.gettxt=gt&doc=IP/99/813/0/RAPID&lg=En>.

plementation in Member States, applies the polluter pays principle and the principles of rectification at source and preventive action to agricultural production.³⁶⁵ In so doing, it helps to apply the important integration principle, that is, to integrate environmental considerations into agricultural practices.³⁶⁶

Nonetheless, as this Article indicates, implementation of the Directive has not been particularly successful. Member States have been tardy in enacting measures to implement the Directive, and those measures often fail to implement the Directive correctly. Farmers often object to the new manure and fertilizer management responsibilities required to control nitrates in groundwater and surface waters. The discussion of voluntary nitrate programs and implementation of the Nitrates Directive in England shows how agricultural, political, and regulatory complications have accompanied nitrates regulation.

Although England provides a helpful example of the process of controlling nitrates, the regulation of water pollution from agricultural nitrates in England is perhaps less contentious than in some other areas. Member States with intensive livestock production on small land areas have faced serious difficulties in implementing the Nitrates Directive. In those States, (e.g., the Netherlands and Denmark) the nitrates problem is closely related to the structure of agricultural production.

Denmark has high livestock density per hectare, exceeded only by the Netherlands and Belgium. Herd sizes have increased as animal production becomes more concentrated, and recent years have seen significantly higher pig and poultry numbers.³⁶⁷ Moreover, agriculture has affected both surface and ground waters. In agricultural areas, nitrate concentration in surface waters is five times higher than in natural areas, and groundwater under farmland also shows high nitrogen content. Much of the nitrogen that leaches from or runs off agricultural land comes from excessive use of manure.³⁶⁸ Beginning as early as 1985, Denmark enacted various nitrate policy initiatives focusing on storage facilities, limits on livestock density, use of green plant cover, and limits on fertilizer use. In fact, environmental regulation imposes a significant financial burden on Danish farmers.³⁶⁹ Despite numerous laws and regulations, as well as an Action Plan for the

³⁶⁵ See TREATY art. 174.

³⁶⁶ See *id.* art. 6.

³⁶⁷ See OECD, ENVIRONMENTAL PERFORMANCE REVIEWS: DENMARK 154 (1999).

³⁶⁸ See *id.* at 157, 159.

³⁶⁹ See *High regulatory costs for Danish farmers*, AGRA EUROPE (Oct. 22, 1999), at N/1.

Aquatic Environment, Denmark still struggles to implement the Nitrates Directive.³⁷⁰ The Directive's 170 kg N/ha limit on manure application seems to be difficult for Denmark to achieve,³⁷¹ especially for dairy operations. The Danish government withdrew its initial notification of plans for implementation in 1997 because the Commission intended to reject the plans. A new plan, submitted to the Commission in June 1998, asks for permission to exceed the nitrates limit for some dairy cattle holdings.³⁷² As late as Summer 1999, the Commission had not approved the Danish plan.

In the Netherlands, intensive pig production causes severe nitrate problems. Regulation of manure has a long and difficult history in the Netherlands,³⁷³ and numerous laws and ministerial regulations govern various aspects of manure production, record-keeping, storage, application, transport, and other issues.³⁷⁴ Manure policy was implemented in phases, beginning in 1987 with a manure quota and norms for use. In the second phase, farmers faced stricter use norms; in the third phase, up to the year 2000, a balance of nitrogen application and take up is governed through a complex mineral bookkeeping system (MINAS) for calculating nitrogen loss.³⁷⁵ Tension exists between the Dutch manure policy, with a bookkeeping system that focuses on loss of nitrogen, and the Nitrates Directive, with its focus on maximum nitrogen use. The Dutch government withdrew its proposed Action Program in 1996 and has not implemented the Directive correctly.³⁷⁶ The European Commission sent a reasoned opinion, dated August 3, 1999, to the Netherlands; this is the last step before a

³⁷⁰ See Ministry of Environment and Energy, Danish EPA, Agreement Relating to Action Plan for the Aquatic Environment II (Feb. 1998). This plan is intended to reduce nitrogen leaching and is an element of Danish implementation of the Nitrates Directive.

³⁷¹ See NEIL HAWKE & NADIA KOVALEVA, *AGRI-ENVIRONMENTAL LAW AND POLICY* 273 (1998).

³⁷² See Danish EPA, Notification to the Commission from the Danish Government (1998).

³⁷³ For information on manure regulation from the 1980s, see Wim Brussaard & Margaret Rosso Grossman, *Legislation to Abate Pollution from Manure: The Dutch Approach*, 15 N.C.J. INT'L L. & COM. REG. 85 (1990).

³⁷⁴ The Wet herstructureren varkenshouderij, a law intended in part to reduce manure production by reducing pig numbers by 25%, was struck in February 1999 by the Rechtbank in The Hague. The law failed to compensate pig producers for their loss of pig production places. See *Nederlandse Vakbond Varkenshouders v. Staat der Nederlanden*, 1999 MILIEU EN RECHT 79 (May).

³⁷⁵ See Marleen van Rijswijk, *Mest als voorbeeld van een (diffuse) bron van waterverontreiniging*, 84 HET WATERSCHAP 628 (1999).

³⁷⁶ See Measures Taken, *supra* note 217, at 35.

Court of Justice infringement procedure. A September 1999 letter to the national legislature from the Ministers responsible for agriculture and the environment suggests further changes in policy to alleviate the manure surplus and to implement the Nitrates Directive correctly.³⁷⁷ In December 1999, the same Ministers acknowledged to the legislature that failure to implement the Directive could lead to a lawsuit in the European Court of Justice.³⁷⁸ Moreover, a Dutch court held that the government of the Netherlands did injustice by failing to implement the Directive and ordered implementation by 2002.³⁷⁹

Thus, in addition to the reluctance of some Member States to implement the Nitrates Directive, structural problems connected with intensive livestock production make correct implementation of the Directive difficult in some Member States. Nonetheless, if these problems of implementation can be solved, the Directive promises to reduce nitrate pollution from agricultural sources. Efforts in various Member States to implement the Directive have already resulted in reduced nitrate concentrations.

EC Member States have far less agricultural land than the U.S., and intensive livestock production on small land areas exacerbates the nitrates problem, making strict regulation necessary. In recent years, however, U.S. livestock operations have increased in size and intensity, raising serious concerns about the management of livestock waste. Moreover, agricultural activity, especially livestock and poultry production, is recognized as a significant source of the nitrogen (and other) pollution that impairs U.S. ground and surface waters.³⁸⁰ Both the federal government and various states are actively involved in

³⁷⁷ See Letter from L.J. Brinkhorst and J.P. Pronk, KAB 992933, Sept. 10, 1999, (visited Sept. 28, 1999) <<http://www.minlnv.nl/infomart/parlemnt/1999/par99179.htm>>. The new plan would allow farmers to keep their animals only if they could prove that they had sufficient land to spread the manure or if they had entered manure contracts with arable farmers. See *id.* at ¶ 4. After a brief positive reaction, farmers seemed to reject this plan. See *New Dutch plan for pig reduction*, AGRA EUROPE, Sept. 10, 1999, at N/1; *Dutch farmers reject new pig reduction plan*, AGRA EUROPE, Sept. 17, 1999, at N/3. The plan is expected to lead to reduction in farm numbers; many pig farmers expect to stop farming. See *Dutch pessimistic about the future*, AGRA EUROPE, Oct. 1, 1999, at N/4.

³⁷⁸ See Letter from L.J. Brinkhorst and J.P. Pronk, KAB 996158, Dec. 3, 1999, (visited Feb. 15, 2000) <<http://www.minlnu.nl/infomart/parlemnt/1999/par99255.htm>>.

³⁷⁹ See *Officials Acknowledge Legal Threat Posed by Failure to Meet EU Nitrate Directive*, 23 Int'l Env't Rep. (BNA) 21 (1999). The decision, which the government appealed, was the first to require the State to take measures to comply with an EC environmental directive. See *id.* at 22.

³⁸⁰ See GAO, ANIMAL AGRICULTURE: WASTE MANAGEMENT PRACTICES 3-4 (GAO/RCED-99-205, July 1999).

planning methods, or enacting laws and regulations, to manage intensive livestock operations in an environmentally sound way.³⁸¹ The experience of the EC and its Member States in implementing the Nitrates Directive may provide helpful guidance as federal and state regulators design programs to govern the environmental effects of concentrated livestock operations in the U.S.

³⁸¹ See, e.g., USDA & USEPA, Unified National Strategy for Animal Feeding Operations, Mar. 9, 1999, (visited Nov. 19, 1999) <<http://www.epa.gov/owm/finafost.htm>>.

