

# COMMISSION OF THE EUROPEAN COMMUNITIES

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Proposal for a  
COUNCIL DIRECTIVE

concerning  
the protection of fresh, coastal and marine waters against  
pollution caused by nitrates from diffuse sources

(presented by the Commission)

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**Part A. EXPLANATORY MEMORANDUM**

**I. Introduction**

The Commission is concerned about the rise in the level of nitrate in Community waters, both surface, coastal and groundwaters. This rise poses two major environmental problems. The first is in relation to the safety of drinking water supplies and the second is the eutrophication of inland and coastal waters.

The EC set a level for nitrate in drinking water supplies of 50 mg/L, Directive 80/778/EEC<sup>(1)</sup>, Should the level in supplies surpass this level the water must be treated or blended with clean supplies so that the level is reduced below the EC maximum. Treatment and blending can be extremely expensive and does not tackle the source of the problem. Furthermore treatment cannot always be easily used on small Community supplies.

The second major problem caused by nitrates, as well as phosphates, is eutrophication. Nitrate is particularly implicated in the eutrophication of marine waters and the subsequent occurrence of algal blooms. In recent years, such blooms have regularly occurred during the spring and summer months in the Baltic, North and Adriatic Seas. These blooms can cause great damage to the biota, particularly fisheries, and have a large negative effect on the touristic value of the affected areas.

There are two main diffuse sources of nitrates, the first is agriculture and the second is municipal wastewater discharges.

Nitrate pollution caused by agriculture arises because of certain land management practices, excessive land-application of animal manures and the over-use of chemical fertilizers.

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(1) O J No. L 229 of 30.8.80, p. 11

High levels of nitrate in aquifers and eutrophication problems, are occurring in specific areas in almost every Member State in the Community. Several Member States have already introduced national measures to deal with these problems. Other International bodies such as the North Sea Conference have also recognised the need for action. The June 88 seminar of Environmental Ministers in Frankfurt realised that the reduction of nutrients had so far been given insufficient attention.

The Commission has now prepared a proposal which addresses the need to control the inputs of nitrate to the aquatic environment. It lays down the framework for Member States to follow when devising programmes either independently or in collaboration with other States to deal with the problem. Member States must first identify areas which are likely to suffer nitrate pollution and in which measures should be imposed. These measures will include EC limits on the quantity of manure that can be applied to the land, limits of the application of chemical fertilizer set by national authorities, land management practices and a limit on the nitrate content of municipal wastewater discharges.

It is to be noted that the application of this directive may bear heavily on certain farmers in regions where nitrate content of soil is already high for historical reasons. In this context, to the extent to which measures are necessary which go beyond the requirements of good agricultural practice, the Commission recalls its recent Communication on Environment and Agriculture, in which it stated that Member States should inter alia be allowed to include in their programmes appropriate "technical and/or financial assistance to help farmers adapt to the new agro-economic context". Such provisions are subject to the usual Community rules.

## II. PRESENT SITUATION FOR NITRATE CONCENTRATIONS IN COMMUNITY WATERS AND PREDICTED TRENDS

Source when not otherwise given Report of the Water Supply Associations from countries of the European Communities (EUREAU) "The Problem of Nitrates" December 1984.

### The situation in Belgium

The River Meuse, which is an important source of raw water, has a nitrate concentration of 2 to 14 (average 6) mg/l nitrate at the Belgian/French border and of 9 to 16 (average 13) mg/l nitrate at the Belgian/Dutch border.

The average nitrate content for the groundwaters of the Ardennes and for the carbonaceous formation ranges between 10 and 15 mg nitrate/l (waters of the Brussels' Waterboard).

The nitrate content of the groundwater in the agricultural zones, south of Brussels, remains between the limits of 20 to 50 mg nitrate/l but is steadily increasing.

In the low-land and coastal area, with intensive agriculture together with cattle and pig breeding, the average nitrate content of the surface waters (small rivers) can reach 100 mg/l during winter periods and exceptionally values of 800 mg/l have been observed.

No indication of a trend in nitrate levels could be given<sup>(1)</sup>.

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(1) WHO Health Hazards from Nitrates in Drinking Water, Copenhagen 1985.

### The situation in Denmark

In Denmark the problems from nitrate occur where there is an absence of clay over aquifers used to abstract drinking water.

This situation occurs in the sandy moors of West Jutland and in the neighbourhood of Aalborg. In East-Jutland and on the Islands there have until now only been problems with single supply plants (wells), and with shallow borings where there is also a risk from direct pollution by surface-water.

Nitrate analysis from waterworks each supplying more than 10 000 m<sup>3</sup>/year (i.e. more than 99% of the drinking water in Denmark) have been examined<sup>(2)</sup>. For the country as a whole 8% of the investigated waterworks exceeded 50 mg nitrate/l either temporarily or permanently and 18% of them exceeded 25 mg nitrate/l.

### Trend in Denmark<sup>(3)</sup>

The Danish Environmental Protection Agency has stated<sup>(2)</sup> that the overall mean nitrate level in groundwater has tripled in thirty years from approximately 4 mg/l in the 1940's and 50's to the current value of 13 mg/l.

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(2) K. Overgaard, Ministry of Environment, Denmark, Trends in Nitrate Pollution of Groundwater in Denmark, Water Supply Vol. 3 Berlin 'A' pp. 195-203.

(3) Prof. J. J. Fried, Pollution of Groundwater by Nitrate, 1984 E.C. Contract U/83/206(598)

### The situation in France

The Minister of Health initiated a general inquiry into the nitrate content of water intended for human consumption in 1981. This inquiry was not just a data collection but was to provide an opportunity to establish and implement a consistent public health policy.

The inquiry was based on the results of analyses made in 1979, 1980 and the first quarter of 1981 (more than 100 000 analyses), and applied to the whole country, that is to more than 54 million inhabitants.

The water supply systems affected by high concentrations were more frequently rural units, 70% of which served less than 1 000 inhabitants. However half the populations supplied with water having a nitrate content in excess of 50 mg/l lived in 25 conurbations of more than 10 000 inhabitants. The distribution systems in which the average concentrations exceeded 50 mg/l were mainly supplied with groundwater and were predominantly in the north and west of the country.

The survey showed that over a million people were drinking water with a nitrate content of between 40 and 50 mg/litre. A total of 90% of the water exceeding the 50 mg/litre threshold came from groundwater aquifers.

### Trend in France

As in Denmark, nitrate levels are on the increase. Between 1990 and 1995 they could exceed the maximum admissible concentration levels in enough of the network to affect 10 million people or almost 20% of the population, compared with 2% at present.

### The situation in the Federal Republic of Germany

Increased nitrate concentrations above about 25 mg/l nitrate occur in some regions, primarily in groundwaters, but rarely in surface waters. Predominantly they result from the kind of agricultural utilization of the soils and fertilizing practices. Local point sources of nitrate do not make an important contribution to the nitrate load of the groundwaters in the Federal Republic of Germany.

Especially affected are regions with light and permeable soils, the humus content of which is small, as well as regions with intensive agricultural utilization, special cultivation, intensified ploughing of pasture land and especially viniculture. Seriously affected are the Niederrhein region in North Rhine-Westfalia, regions in Niedersachsen and the split gravel level tract in Niederbayern. Further problems are experienced in the viniculture regions in Hessen, Rheinland-Pfalz, Baden-Württemberg and Main (Würzburg).

#### Surface waters

Mountain streams and streams in the central mountain chain contain on average 1 - 10 mg/l nitrate; streams in the plains average 20 mg/l nitrate. Large rivers such as the Danube, Main, Rhine and Ruhr contain on average between 10 and 20 mg/l nitrate; the higher loaded Neckar has 20 - 30 mg/l nitrate with a maximum concentration of 48 mg/l nitrate. In Lake Constance and in most of the reservoirs the nitrate concentration averages 5 mg/l with a maximum of 15 mg/l.

#### Groundwaters

The "Atlas of drinking water quality in the Federal Republic of Germany" states that in 1980 of 330 rural districts and "district-free (independent) communities", 29 districts and communities (9%) had a mean nitrate content of drinking water of 25 - 250 mg/l. An investigation in the years 1972 - 1980 of a

total of 856 different drinking waters, uniformly distributed over the Federal Republic of Germany, showed that 50 mg/l nitrate was exceeded in 5% of the drinking waters investigated. In viniculture regions 13% of the drinking waters investigated contained more than 50 mg/l. A report published by the "Landerarbeitsgemeinschaft" of the German Federal Republic in 1986 states that at present (data for 1982/83) about 20% of all the companies concerned have nitrate contents in drinking water over 25 mg/l. In the administrative district in Baden-Württemberg an inquiry showed that about 20% of approximately 15,000 separate water installations had nitrate contents higher than 50 mg/l.

#### Trend in the Federal Republic of Germany<sup>(1)</sup>

The data published by the German Federal Health Office (Bibidat) also show that nitrate levels are on the increase and already exceed 50 mg/l in many regions.

#### The situation in Ireland

Few problems with nitrate levels have been reported from Ireland but small increases in the nitrate content of a number of the larger rivers have been observed recently<sup>(2)</sup>. A spate of pollution incidents arising from silage storage have been reported in 1987.

#### The situation in Italy

Nitrate pollution of underground waters is now widespread in all those areas where there is intensive agricultural activity such as in certain restricted areas of the Marches, Emilia-Romagna and Piemont. The total population concerned does not exceed 100 000. In many cases, it is possible to reduce the concentration of

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(1) Prof. J. J. Fried, Pollution of Groundwater by Nitrate, 1984  
E.C. Contract U/83/206(598)

(2) A review of Water Pollution in Ireland. Water Pollution  
Advisory Council. An Foras Forbartha, June 1983.

nitrate in water as supplied for drinking to within the permitted limits through mixing with other waters, which have a low nitrate concentration.

The maximum value discovered is close to 100 mg/l, in the Marches, and this level is reached only in certain periods of the year.

#### The situation in Luxembourg

In general the average nitrate content of the groundwaters, most of which originate from the sufficiently protected sandstone-aquifer in the centre of Luxembourg, ranges between 10 - 40 mg/l of nitrate but for some of the wells situated in agricultural areas the nitrate content is steadily increasing.

The limit of 50 mg nitrate/l is reached or exceeded in about 10 communities, most of them small, with a total population of 1 800 (or 0.5% of the national population). All of these are rural communities with wells in cultivated areas. There are no better groundwater reserves available. As a general principle, effort is made to develop new water resources from more distant and protected areas and to blend such water with the unsatisfactory drinking water or to distribute it directly as drinking water. This frequently involves considerable cost to these small financially weak communities.

#### The situation in the Netherlands

##### Drinking water

Results of investigations all point towards a gradual increase in the nitrate concentration in drinking water in the Netherlands. The situation is summarized in the table below (Table 1).

Table 1 - Nitrate concentration in drinking water in the Netherlands (1981)

Nitrate concentration (mg/L NO <sub>3</sub> )	0-10	10-25	25-50
Frequency (%)	84.8	12.8	2.4
Total number of pumping stations : 257			

#### Surface water

Surface water, mainly derived from the rivers Rhine and Meuse is the source of 35% of the drinking water. The nitrate concentration in these rivers is approximately 15 mg/L.

#### Ground water

In the Netherlands 99.9% of the households are connected to the public water supply and 65% of the drinking water is derived from groundwater. The increase in the nitrate concentration in ground water is considered to be due to the dumping of slurry originating from intensive cattle breeding. Taking into account the amount of slurry dumped in the vicinity of the aquifer, the hydrogeology and the existence of aerobic and anaerobic conditions, it is estimated that 58 of the 240 aquifers will experience problems. Water from private wells contains much higher nitrate concentrations, up to 400 mg/L.

#### Trend in the Netherlands

No nitrate problem in surface waters but increasing trend in groundwaters has been observed<sup>(1)</sup>.

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(1) WHO Health Hazards from Nitrates in Drinking Water, Copenhagen 1985

The situation in Portugal

It is reported that generally there are no problems due to nitrogen although it is possible that local problems may exist.

The situation in Spain

In Spain there are large heavily irrigated areas with nitrate levels in groundwaters exceeding 100 mg/l. In Catalonia levels of 500 mg/l have been reported. There are also high nitrate levels in aquifers underlying dry land farming<sup>(2)</sup>.

The situation in the United Kingdom<sup>(3)</sup>

In the UK the highest nitrate concentrations occur in the more highly populated regions in Central and Southern England where rainfall is lower and agricultural activity is more intense.

Surface Waters

The mean concentration of nitrate in surface waters varies considerably within the UK, but generally there is a higher concentration in rivers in Central and South East England. In some areas substantial increases in nitrate concentrations have occurred over the last 30 to 40 years, and up until 1976 the long-term trends showed rises at varying rates. Since then, however, trends have become less certain and values have in general remained fairly constant. Surface waters provide about 70% of the public water supplies in Britain, and over 90% in some areas of Scotland and Wales, where nitrate levels are lowest.

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(2) Sahuquillo A. E.C. Workshop on Groundwater Protection against pollution by nitrates, Varese 1985.

(3) Nitrate in Water - Department of the Environment's Nitrate Coordination Group Report (DOE Pollution Paper No. 26), November 1986.

## Groundwater

A considerable amount of reliable data on groundwater has been collected since 1970. Concentrations of nitrate in groundwater vary significantly from one area to another. Some show very little increase or even a decrease in concentrations over recent years, but mainly display an overall rising trend. Unconfined aquifers in areas of arable farming are particularly at risk and in regions of lowest rainfall nitrate concentrations in some such waters already exceed 100 mg/l and others will do so in the long term. Groundwaters in confined aquifers show little indication of rising nitrate levels. Groundwaters provide about 30% of the public water supply in Britain.

### Trends in the UK

The evidence for predicting future trends in surface water is not clear cut; although since 1976 there appears to have been a levelling off of nitrate concentrations. So far as groundwaters are concerned, the available evidence suggests that there will be a continuing slow rise in nitrate concentrations in most unconfined aquifers though in theory concentrations would eventually reach an equilibrium. Precise prediction is difficult, but in areas of lowest rainfall (parts of Eastern and Central England) many groundwater nitrate concentrations are likely in the long-term to exceed 100 mg NO<sup>3</sup>/L. In other parts of Britain, with the exception of the highest rainfall areas of the West, a large number of groundwater sources in unconfined aquifers are currently estimated as likely to reach equilibrium concentrations in the range of 50-100 mg NO<sup>3</sup>/L.

**III. USAGE IN THE COMMUNITY OF GROUNDWATER AS SOURCE OF DRINKING WATER<sup>(1)</sup>**

The drinking water supplies in the Community are based to a large extent on groundwater, as follows:

	<u>% of drinking water from groundwater source</u>
Belgium	76
Denmark	99
France	68
Federal Republic of Germany	73
Republic of Ireland	20
Italy	88
Luxembourg	73
Netherlands	65
Spain <sup>(2)</sup>	40
Portugal <sup>(3)</sup>	70
United Kingdom	32

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(1) Merkel Dr. W. EC Workshop on Groundwater Protection against pollution by nitrates, Varese 1985.

(2) Information from Spanish Ministry of Public Works and Urban Planning, Directorate General for Waterworks - 26.11.86

(3) Direct Communication Portuguese Ministry of Environment

#### IV. HEALTH HAZARDS FROM NITRATES IN DRINKING WATER

The EC Limit of 50 mg/l of nitrate in drinking water in directive 80/778/EEC was set on the basis that it would provide satisfactory protection of human health.

The WHO Working Group on Health Hazards from Nitrates in Drinking Water set up specifically to review the nitrate situation concluded in its report dated 24 May 1984, that drinking water containing no more than the recommended level of 10 mg/l nitrate nitrogen (44 mg/l of nitrates) is of satisfactory quality for bottle-fed infants to avoid the risk of methaemoglobinemia.

In many rural and isolated habitations relying on small private water sources, the degree of control and frequency of sampling may not be adequate to ensure sufficient protection. Although ion exchange cartridges have been developed for fixing to domestic taps, to remove nitrate, there are health risks in using them<sup>(1)</sup>. The majority of cases of methaemoglobinaemia have occurred in areas where no mains water supply has been available; some protection of these districts is therefore necessary. The measures contained in the attached proposal for a Council Directive on the protection of freshwaters from pollution accordingly aim to give protection by proposing steps to prevent the waters from becoming enriched with nitrogen over the level of 50 mg nitrate/l (Articles 2, 3 and 4).

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(1) Department of the Environment. Central Directorate of Environmental Protection. "Nitrate in Water" Pollution Paper No. 26, HMSO 1986.

## V. EUTROPHICATION OF COMMUNITY WATERS

Eutrophication is the term used for the increase in concentration of nutrients in surface water leading to the excessive growth of algae and aquatic plants. Eutrophication phenomena is well known for still fresh waters such as lakes, man-made reservoirs, slow-flowing rivers and canals, and also in shallow coastal waters such as the Baltic and Wadden Sea. Algae require about 10 times by weight as much nitrogen as phosphorus for normal growth. In most fresh water bodies the amounts of nitrogen available compared with those of phosphorus exceed this ratio, so that phosphorus is very often the nutrient that controls algal growth.

There have been changes in the composition and overall level of algae plancton in the Community's seas. This is due to increased nutrient levels, particularly nitrates, which have led to the marine eutrophication. Under some circumstances the decay of large algae blooms leads to a decrease in oxygen which in some situations cause serious mortalities in the bottom fauna as well as fish death. They can also cause serious effects on fishfarms and the mussel fishery, killing the fish or contaminating the mussels so they cannot be used for consumption. The most current examples are the algae blooms in May and June of 1988 affecting fishfarms in Sweden and Norway and the blooms which affected the Adriatic which had devastating effects on the tourist industry. The noxious algae blooms seem to be more and more frequent and the latest events show that it is not only shallow coastal areas being affected but also parts of the open sea.

The ecological impact of eutrophication can be dramatic. Lakes, reservoirs, rivers and coastal waters are often significant tourist attractions providing recreation and tourist amenities but the uncontrolled growth of algae and aquatic plants decreases transparency of the water and their eventual decomposition leads to deoxygenation of water, the decline or disappearance of fish life, adverse effect on the use for fisheries and impairment of aesthetic qualities.

Eutrophication may also cause problems for drinking water supply. For a number of reasons it tends to cause a deterioration of quality and make water treatment more difficult and costly. The problems encountered include: rapid clogging of filters by diatoms and algae; disturbance of flocculation treatment by organic substances; persistent and unpleasant taste and odour; discoloration due to manganese, iron or ammonia in abnormal concentrations; and the risk of increased bacterial growth in drinking water due to the fouling of the distribution networks and to the high nutrient content. In order to counteract a number of these problems eutrophied water is often highly chlorinated during treatment and distribution. High levels of both chlorine and organic substances lead to significant concentrations of toxic organochlorine compounds which are very undesirable in drinking water and some of which are carcinogenic.

The industrial, agricultural and urban development experienced by most Member States in the 1950s and 1960s, led to an increase in eutrophication. As a result, efforts have been focussed on the "cleaning up" of important water bodies by controls on point discharges to them from industrial and domestic sewage. It now seems clear that equal effort needs to be put into controlling diffuse inputs from agricultural land.

**VI. CONSUMPTION OF FERTILIZER**

Consumption of nitrogen fertilizer for the Twelve has risen from 1,709,805 metric tonnes in 1953 to 8,875,559 tonnes in 1982. Table 2 shows the consumption figures for nitrogen fertilizers for the Twelve from 1953 to 1982, while Table 3 shows the rise in kg/ha of average application rates in the Community.

**Table 2: Consumption of Nitrogenous Fertilizers in the Ten and the Twelve from 1953 to 1982 in metric tonnes of plant nutrient**

	B-L	DK	FR	FRG	GR	IRL	IT	NL	UK	E-10	E-12
1953/54	100321	78528	295300	440000	37321	12037	209024	172900	245900	1557741	1709805
1963/64	161642	152795	790672	746513	115933	34695	374984	289700	584000	3250934	3670813
1973/74	179225	365148	1833083	1100841	244293	130200	672178	411974	874400	5811342	6667521
1982/83	197000	391392	2123000	1464524	408000	296000	967833	456718	1560000	7937867	8875559

Source - FAO Fertilizer Yearbooks

**Table 3: Average application rates of Nitrogenous Fertilizers in the ten and the Twelve from 1955 to 1982 in Kg per hectare of Plant Nutrient for Arable and Grassland excluding Rough Grazing**

	B-L	DK	FR	FRG	IRL	IT	NL	UK	GR	E-10	E-12
1955	49.53	28.67	14.52	35.20	2.90	14.62	82.08	19.00	4.79	19.18	15.47
1965	88.92	63.70	31.62	67.15	6.80	27.44	141.39	56.10	15.05	41.22	32.86
1975	113.00	116.03	62.78	97.36	32.60	50.06	221.65	84.63	33.64	70.95	57.07
1982	129.45	136.37	80.20	124.12	63.43	66.77	231.44	125.03	49.76	93.00	73.58

Source - FAO Fertilizer Yearbooks

**VII. ACTION TAKEN TO REDUCE THE DIFFUSE INPUTS OF NITROGEN TO THE ENVIRONMENT BY MEMBER STATES**

**BELGIUM**

**1. French Speaking Regions**

Currently there are no regulations regarding the use of chemical fertilizers. The approach to protecting water from fertilizer pollution involves:

1. An increase in awareness of soil composition;
2. Official advisor's recommendations for better use with regard to:
  - Fertilizer amounts used,
  - Proper fertilizer application

**Animal manures**

There are no regulations on animal manure but regulations and organizational assistance are expected in the medium term to improve production, storage, transfer and use of effluent from intensive livestock farming.

**2. Flemish region**

The use of nitrogenous fertilizers is limited to 400 kg N per hectare. The animal population is limited to 4 adult cattle equivalents per hectare and permission is required for the storage of slurry in both underground and above-ground silos within a radius of 2 km of groundwater collection points as well as for the use of raw fodder silos (ground and trench silos).

The spreading of nitrogenous fertilizers (including slurry) is banned from September 1 to January 31 within a 2 km radius of groundwater collection points.

Newly built animal housing is required to contain 6 month's manure storage capacity. Since February 1987 there is a flexible limitation on the size of indoor livestock units which have no outdoor grazing facilities.

The Flemish government is preparing an order concerning animal manures. It is proposed that:

1. The Minister of the Environment will be empowered to decide when, how much and how slurry may be applied. Definite proposals for specific limits in these areas have not as yet been drawn up.
2. The Minister will place a manure levy on each farming unit based on the number of animals and the production of manure per hectare.
3. Provision will be made for the extension of one or more manure depots to act as intermediaries between manure surplus and manure deficit areas.

#### DENMARK

##### Chemical Fertilizers

At present there are no laws, regulations or controls on the use of nitrogen from chemical fertilizers, except for some areas which are protected as nature reserves, border on special lake areas or are sensitive areas for groundwater collection.

A Ministry of Agriculture Notice (No. 655 of 9 October 1987) introduced a requirement that all farmers must establish fertilization programmes for their land. There is also a

requirement that 45% of the farm area must in 1988 have vegetation on it in the autumn months up to October 20. This proportion is to increase to 55% in 1989 and to 65% in 1990.

#### Animal manures

The use of animal manure is regulated by the Agricultural Notice No. 668 of October 14, 1987. The main features are as follows:

1. After a transitional period, storage capacity for farmyard manure shall generally be sufficient for 9 months.

2. Herd density may not exceed the following limits:

Cattle farming; 2.3 Animal units per ha.

Pig farming; 1.7 Animal units per ha.

Arable farming, 1.7 Animal units per ha.

If the animal population exceeds these limits, agreements on the disposal of manure must be made with neighbouring establishments.

3. For liquid manures the following rules apply:

- Manure spread on bare fields must be ploughed-in within 12 hours of application.

- Manure may not be spread on areas without vegetation which are frozen or snow covered.

- Spreading is not permitted on areas without vegetation between harvest and November 1.

- Spreading may not take place at weekends closer than 200m from residential areas.

- There must be no run-off into watercourses etc.

4. Local authorities may add special rules to the above if they consider that the use of farmyard manure is giving rise to nuisance.

#### FEDERAL REPUBLIC OF GERMANY

There exists in the Federal Republic of Germany a collection of legislative texts and regulations oriented, either directly or indirectly, to the protection of the environment and in particular the protection of water.

##### 1. Water Management Law

The law on the management of water foresees the possibility of instituting "water protection zones" in which certain operations could be forbidden or subject to restrictions (for example: the prohibiting - for a limited duration - of the spreading of chemical fertilizers).

The law on the management of water considers that liquid manure, chemical fertilizers and silage are to be considered to be dangerous substances for water.

##### 2. Federal law on protection against emissions

This law governs the registration and the control of all installations used for the raising of livestock, with a view to protection of the environment from their emissions. It fixes limits exceeding those with which the installations must be in accordance and contains certain other requirements.

### 3. Law on waste

The law on waste applies, in particular, to liquid manure, chemical fertilizers and animal manures which exceed the "normal amount with regard to the fertilization of agricultural land".

It authorises the competent authorities to regulate the spreading of liquid manure and animal manure.

#### FRANCE

An action programme has been adopted to help in the preventive struggle against nitrate water pollution caused by farming. Its main purpose is to improve farm practice in order to reduce nitrate leaching and to provide complete information on this topic to agricultural advisors and farmers. Emphasis is placed on promoting rational fertilizing which means using only the necessary amount of nitrogen on crops and at the right time.

The Ministers for Agriculture and for the Environment adopted an action programme in October 1987 to ease the problems of intensive farming. The programme refers to the following areas:

1. Quality of excreta (e.g. Avoiding dilution)
  
2. Storage: Nationally the minimum legal storage capacity for slurry is 45 days. The ideal limit in Brittany would be about six months, because of rain conditions. The target in practice should be a minimum of 4 months. For manure, the goal is better collection of liquid and solid manure, from uncovered work areas.

### 3. Manuring:

- Better combination of chemical fertilizers and livestock manure.
- Better manuring through manuring warnings.
- Better monitoring of manuring plans.
- Better techniques and equipment

### 4. Transport and/or Processing:

- Advertisements supply and demand for slurry and other excreta through minitel.
- Study processing routes -either moist (compost) or dry (granulation) routes - for poultry excreta with a view to transportation.
- Study pig slurry processing routes.

## GREECE

### Chemical Fertilizers

In relation to chemical fertilizers, there are no specific laws, regulations or administrative provisions at this time. The Ministry of Agriculture organizes a series of educational seminars which recommend amounts of chemical fertilizers for application to crops. It also encourages the use of organic fertilizers such as animal and poultry wastes in a controlled manner.

Regulation No. 8181/87 of the Ministry of Public Health deals with conditions for installation and proper operation of animal farms. It also covers rules and measures for proper management and treatment of solid and liquid wastes prior to their disposal.

There is no specific requirement for nitrogen or other mineral removal prior to disposal, except that of preferring land disposal for direct disposal of liquid wastes to water.

The future orientation of policy with regard to agriculture and the environment will be concerned with:

1. The integration of livestock farms in plant production systems which recycle wastes to the land and reduce the need for chemical fertilizers;
2. Education and participation of farmers in attempts to protect the environment in order to make the application of laws and regulations easier and more efficient;
3. The expansion of livestock and poultry farms in number and size in accordance with the requirements for protection of the environment.

#### LUXEMBOURG

In general, national and district administrations prefer to establish zones of protection around the water springs tapped, as well as to restrict or prohibit activities that may cause underground or surface water pollution within these zones.

Environmental problems related to intensive farming - particularly of pigs - are addressed in the Grand Ducal Regulation of March 18, 1982. Among other things, the Regulation specifies conditions for storage and spreading of solid and liquid manure from pig units.

Recommendations from Ministries of Agriculture and the Environment regarding the spreading of liquid manure are also in existence.

## IRELAND

### Chemical Fertilizers

There are no statutory regulations limiting the use of chemical fertilizers. While the use of these fertilizers, particularly nitrogen, has risen substantially over the past twenty years this was from a very low base and the present usage is not considered to be a cause for serious concern relating to the environment.

The Irish research and advisory services have studied and have made recommendations on the proper use of fertilizers for different farm enterprises. These recommendations are conveyed to farmers in the course of educational and advisory work.

### Animal manures

A comprehensive and integrated programme of measures to combat water pollution, particularly from agricultural activities has been established. The main features of the programme are as follows:

1. Increase in the power of local authorities to serve notices regulating practices (such as silage making and animal manure spreading) which, in their opinion, pose a risk of pollution.
2. Task forces have been established in each county and have carried out or are carrying out surveys of farms for the purpose of identifying potential sources of water pollution. Follow-up action is taken where necessary.

3. All farmers are circulated with brochures containing advice, guidelines and recommendations for the prevention of pollution.
4. Regulations exist to restrict the scale of agricultural development which can be undertaken without planning permission.
5. Grant aid is available under the Farm Improvement Scheme for the storage of farm wastes and for machinery used for spreading.

## ITALY

### Animal Manure

In Italy rules on this subject are laid down in the National Law No. 319/76, called the "Law on the control of water pollution". This law distinguishes between two classes of farm.

- industrial-type farms, i.e. farms without farmland or without enough farmland for the spreading of excrement;
- agricultural-type farms, i.e. farms with enough land for muck spreading.

Farms in the first class come under the National law, while those in the second class are subject to the regulations which each Region adopts.

Three types of disposal of excrement are allowed:

- disposal in surface waters - this method requires treatment of the effluent in proper facilities;

- disposal in public drains with purification facilities;
- spreading over farmland.

The industrial-type farms generally choose the first method, the agricultural type farms nearly always the third method.

Agricultural-type farms must have a slurry/manure storage capacity covering at least three months' production.

The spreading of excrement is allowed provided that the quantities applied are useful to agricultural production and do not contain poisonous substances liable to build up in food or which are not bio-degradable.

On land where spreading is allowed, the greater quantity of excrement applied must correspond to a livestock burden not exceeding 4 tonnes per hectare.

The local authorities may reduce this quantity where the chemico-physical and hydro-geological characteristics of the land so require.

#### THE NETHERLANDS

##### Chemical Fertilizers

The use of chemical fertilizers is not regulated in the Netherlands due to the lack of suitable control means. The only exception being a proposal for banning the use of chemical fertilizers in water catchment areas.

The policy is thus more oriented towards stimulating effective use rather than towards the fixing of norms.

### Animal Manure

Given the fact that production of manure has increased from 44 million tons in 1950 to 94 million tons in 1986, measures to prevent further increases have recently been taken to solve the problem of surpluses, to limit the periods of spreading and to fight against ammonia releases.

Those measures can be summarized as follows:

- extension of regulations prohibiting the increase of animal manure production (in force since 1986);
- codes of practice for the use of animal manure;
- supervision and registration of animal manure production with a view to calculating taxes and instituting further controls;
- fixing periods during which animal manure spreading is forbidden.

### PORTUGAL

Currently there is no legislation related to the use of chemical fertilizers by farmers. Similarly, no specific legislative controls exist in the use of animal manures.

### SPAIN

#### Chemical Fertilizers

No national laws exist which control the use of chemical fertilizers by farmers. This is also the situation in the autonomous regions of Spain.

### Animal Manures

No national or regional laws exist in Spain, specifically related to monitoring and regulating intensive livestock farming and the use of animal manures.

Intensive farming continues to be regulated by general legislation.

### UNITED KINGDOM

#### Chemical Fertilizer

A major research and advisory effort has been mounted in recent years aimed at eliminating wasteful over-application of nitrogen. Guidance on fertilizer applications is set out in advisory publications, including those which form the "Code of Good Agricultural Practice" which has a quasi-statutory status under the Control of Pollution Act 1974. Extensive Government and privately funded research is continuing into methods of maximising plant uptake of fertilizer nitrogen, so reducing the residual amount available in the soil for leaching as nitrate.

#### Animal Manure

A wide range of research has been carried out into the efficient application of manure, slurry and other farm effluents to land, aimed at ensuring that the risk of pollution is minimised. The advisory effort based on research results centres upon four main elements:

- reducing the quantities of effluents which need to be stored and disposed of, for example by separating clean and dirty water collection and drainage systems;

- improving the conditions of storage, for example by determining appropriate tank and lagoon designs and volumes, and developing new materials for silage clamp floors;
- improving techniques for safe disposal of wastes to land, such as low rate pumping and spraying systems, and new spreader designs; and guiding farmers as to safe areas, weather and soil conditions when spreading can take place.
- emphasizing the need to increase the utilisation of plant nutrients.

All four elements are covered in advisory literature, including the Code of Good Agricultural Practice. In addition, a full advisory and design service on the control and disposal of wastes is available to farmers individually.

### VIII. PROPOSED COMMUNITY ACTION

The adoption, by certain Member States, of legislation on intensive stock farming has conferred some urgency to propose a common action not only with a view to protecting the environment but also to avoid distortions of competition.

The aim of the proposal is to prevent the concentration of nitrate reaching a level at which it could interfere with the legitimate uses of the water or could lead to eutrophication. Community waters have many and varied uses. They act not only as a source of drinking waters but also are a valuable touristic resource, a medium of transportation, a source of recreational activity, they support fisheries and even have a worth for their own intrinsic beauty. The proposal is designed to control the various diffuse sources of nitrate pollution such that they do not impare these and other legitimate uses of Community waters.

Problems with nitrate pollution are not expected to occur in all Community waters, freshwaters, groundwaters, estuarial, coastal and marine waters. Certain areas are at far greater risk than others. The proposal therefore concentrates on introducing measures for these vulnerable areas. Member States are asked to designate such areas (Article 3) based on criteria laid out in Annex I.

These criteria relate to:

- a) the concentration of nitrate in waters used as sources for drinking water supplies, and
- b) the potential for waters to become eutrophic<sup>(1)</sup>.

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(1) The term eutrophication has been defined in Article 2 such that it only relates to waters which are nitrogen limited. Waters which are eutrophic and phosphorus limited are not covered by this proposal.

Where waters cross national boundaries, provision is made for Member States to co-operate in designating the appropriate vulnerable areas.

Within the vulnerable zones Member States will need to take a number of measures. The disposal of animal manure poses a great problem for a number of Member States particularly because manure is often regarded by the farmer as a waste product rather than a nutrient source. This proposal lays down the maximum quantity of different animals' manure that can be applied to the land. It also requires Member States to establish rules covering the method of application of manures and the capacity of storage facilities.

Furthermore, Member States are required to establish land application rates for chemical fertilizer on the basis of ensuring compliance with Article 1, taking into account the rates at which different crops take up nitrogen from the soil and the amount of nitrogen in the soil including that which has been applied by the application of other types of fertilizers such as sewage sludge, animal manures, etc.

For those vulnerable zones which have been designated due to the problems of eutrophication, Member States will have to ensure that sewage treatment works discharging to waters flowing to or in these zones will treat their effluent such that the concentration of nitrate is less than 10 mg/l.

In addition, Article 4.3 lists a series of measures which Member States should also consider.

In order to decide which areas should be vulnerable zones and track the progress that is being achieved, Member States will have to carry out regular monitoring. The details of the monitoring and the related analyses methods are outlined in Annex 4. Results of the monitoring will be sent to the Commission which will prepare a report at three yearly intervals.

From time to time there may be a need to update the technical provisions of the directive. The proposal provides for the setting up of a regulatory Committee which will consider the measures which are being proposed.

The timetable for the adoption and implementation of the directive is shown in figure 1.

Fig. 1

Notification of Directive .....  
+ 2 years ..... Designate Vulnerable Zones ..... Monitor waters .....  
Article 3 para 1 ..... Article 5  
Annex 4, 1a & c  
+ 4 years ..... Take necessary measures ..... Make report .....  
Article 4 ..... Article 9  
Annex 5  
+ 6 years ..... Revise designations ..... Monitor waters .....  
Article 3, para 4 ..... Article 5  
Annex 4, 1, b, c,  
+ 8 years ..... Make report .....  
Article 9, Annex 5

**Part B. Proposal for a Council Directive concerning the protection of fresh, coastal and marine waters against pollution caused by nitrates from diffuse sources**

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community, and in particular Article 130 S;

Having regard to the proposal from the Commission;

Having regard to the Opinion of the European Parliament;

Having regard to the Opinion of the Economic and Social Committee;

Whereas the fourth programme of action of the European Communities on the Environment<sup>(1)</sup> indicated that the Commission intended to make a proposal for a Directive on the control and reduction of water pollution resulting from the spreading or discharge of livestock effluents and the excessive use of fertilizer;

Whereas, Council Resolution 88/C209/02 of 28 June 1988 requests the Commission to submit this proposal as soon as possible;

Whereas the programme also provides that the Commission should pay special attention to pollution which affects more than one Member State at once;

Whereas there is a need for the benefit of Community agriculture for certain nitrogen containing fertilizers and manures to be used;

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(1) O J No. C 328, 7.12.1987, p. 1

Whereas the reform of the Common Agricultural Policy set out in the green paper of the European Commission "Perspectives for the Common Agricultural Policy" identifies excessive use of fertilizers as an environmental risk, the necessity for common action to control the problems arising from intensive livestock production and the need for agricultural policy to take more account of environmental policy;

Whereas certain zones draining to waters vulnerable to pollution from nitrogen compounds require special protection;

Whereas the essential objective of all provisions relating to land application of nitrogen compounds must be the protection of human health and the environment against harmful effects caused by the storage, and the distribution to land, of nitrogen compounds, and by certain land management practises;

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;

Whereas the second programme of action of the European Communities on the Environment<sup>(1)</sup> provides that the Commission will submit to the Council proposals relating to the reduction of nuisances arising from intensive stock-rearing and regarding limits on the spreading of wastes on cultivated land;

Whereas it is necessary to specify reference methods of measurement for nitrogen compounds to ensure sufficient comparability of the measures and results;

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(1) O J No. C 139, 13.6.1977, p. 1

Whereas technical and scientific progress may make necessary the rapid adaptation of certain technical requirements, and in order to facilitate the introduction of the measures required for this purpose, a procedure should be laid down establishing close co-operation between Member States and the Commission;

Whereas the Commission should report regularly on the implementation of this Directive by the Member States;

HAS ADOPTED THIS DIRECTIVE:

Article 1

This directive applies to the application to land of nitrogen compounds, land management practices and the treatment of municipal sewage and has the objective of avoiding:

- a) the concentration of nitrate in freshwaters, both surface and ground, reaching a level at which it could interfere with the legitimate uses of these waters.
- b) the eutrophication of surface, estuarial, coastal and marine waters.

Article 2

For the purposes of this Directive:

- (a) 'groundwater' means all water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil;
- (b) 'freshwater' means naturally occurring water having a low concentration of salts, which is often acceptable as suitable for abstraction and treatment to produce drinking water;
- (c) 'nitrogen compound' means any nitrogen containing substance except for gaseous molecular nitrogen;
- (d) 'livestock' means all animals kept for use or profit;
- (e) 'fertilizer' means any substance containing a nitrogen compound or nitrogen compounds utilized on land to enhance growth of vegetation; it may include livestock manure (including the residues from fish farms) and sewage sludge;
- (f) Chemical fertilizer means any fertilizer which is specifically manufactured;

- (g) 'livestock manure' means natural waste products excreted by livestock or a mixture of litter and natural waste products excreted by livestock, whether the livestock is grazed on the land or raised in intensive livestock units or in fish farms;
- (h) 'land application' means the addition of materials to land whether by spreading on the surface of the land; injection into the land; placing below the surface of the land; or mixing with the surface layers of the land; or discharge into ditches or on-site watercourses;
- (i) 'eutrophication' means the enrichment of water by nutrients, the limiting factor being nitrogen, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms and to the quality of the water concerned.
- (j) 'vulnerable zones' means zones designated by a Member State in accordance with article 3 (1).

### Article 3

1. Member States shall, within a two year period following the notification of this Directive, designate all zones vulnerable to water pollution from nitrogen compounds. These vulnerable zones are to be identified according to the criteria in Annex 1.
2. When any waters flow into vulnerable zones in a Member State from another Member State, the first Member State shall notify the second Member State and also the Commission of the relevant facts within a two year period following the notification of this Directive.
3. In such cases the Member State of origin shall take action to designate the relevant area of land in its territory as vulnerable zones as provided for in paragraph 1 above and shall

take action as provided in Article 4 of this Directive as if the waters on its territory were, as the case may be, in the conditions described in Annex 1 (i), (ii) or (iii).

4. Member States shall review and if necessary revise the designations as appropriate and at least every three years to take into account changes and factors unforeseen at the time of the previous designation and shall notify the Commission of the details of any revision in the list of vulnerable zones.

#### Article 4

1. With respect to the vulnerable zones and within a four year period following notification of this directive or within one year after each further designation, Member States shall for the purposes of realising the objectives specified in Article 1:

- a) take necessary measures to ensure that, for each farm or livestock unit, the amount of livestock manure applied to the soil will not exceed the amount produced by the number of animals fixed in Annex 2. In vulnerable zones where special circumstances require a greater period of time for the achievement of these limits, the Commission may agree on a later deadline on receipt of an application by the Member States.

- b) establish rules which should cover:

- i) periods when the land application of livestock manure is prohibited;

- ii) the land application of livestock manure to sloping ground;

- iii) the land application of livestock manure to water-logged, flooded and frozen or snow-covered ground;

- iv) the minimum distance to be left between water courses and the area onto which manure is applied;
- v) the capacity of storage vessels for manure; this capacity must exceed that required for storage of manure throughout the longest period during which the land application of manure in the vulnerable zone is not allowed, except where it can be demonstrated to the competent authority that, any quantity of manure in excess of the actual storage capacity, will be disposed of in a manner which will not cause harm to the environment.
- vi) the construction of storage vessels including measures to prevent seepage of liquid into the ground and drainage by rainwater from buildings or surface water run-off, into the storage vessels.

2. In the same zones and within the same period and for the same purposes as in paragraph 1 above Member States shall:

a) Establish maximum land application rates for chemical fertilizers based on:

- i) the rate of uptake of nitrogen by the cultivated crops;
- ii) the amount of nitrogen in the soil, including inter alia that supplied by the land application of manure;

b) Establish rules which should cover:

- i) periods when the land application of chemical fertilizer is prohibited;
- ii) the land application of chemical fertilizer to waterlogged, flooded and frozen or snow-covered ground;

- iii) the minimum distance to be left between watercourses and the area on which chemical fertilizer is applied;
3. In the same zones and within the same period as in paragraph 1 above, Member States will consider taking further measures including those outlined in Annex 3, in order to fulfil the objectives in Article 1.
  4. Member States shall ensure that municipal sewage, from a permanent population of 5000 or greater, discharging directly or indirectly into areas designated as vulnerable zones under Article 3, Annex I (iii), shall be treated in such a way as to ensure that the total nitrogen content of the resulting effluent shall be 10 mg/l or less.
  5. Member States shall ensure that records are kept of the respective total quantities of nitrogen from artificial fertilizer and animal manures applied in the vulnerable zones per year, total area in hectares of the zones and numbers and types of livestock per hectare in the zones.
  6. For areas outside the vulnerable zones, Member States should consider incorporating in guidelines of good agricultural practice, the rules established under paragraph 1(b) and 2(a) and (b), the livestock rates in Annex 2 and the measures outlined in Annex 3.

#### Article 5

1. Member States will monitor their waters in accordance with Annex 4.
2. The reference methods of measurement set out in Annex 4 to this Directive shall be used.

Article 6

The technical requirements contained in the annexes to this directive may be amended by the Commission in the light of scientific and technical progress. The procedure laid down in Article 8 shall be used to effect such amendment.

Article 7

- a) A Regulatory Committee, hereinafter called "the Committee", is hereby set up to bring about the amendments provided for in Article 6; it shall be composed of the representatives of the Member States and chaired by the representative of the Commission.
- b) The Committee shall equally assist the Commission on any matter which the Commission may submit to the Committee. The Committee acts in those circumstances in an advisory capacity and proceeds without voting.
- c) The Committee shall adopt its own rules of procedure.

Article 8

1. Where the procedure laid down in this Article is to be followed, the matter shall be referred to the Committee by its chairman, either on his own initiative or at the request of a representative of a Member State.
2. The representative of the Commission shall submit to the Committee a draft of the measures to be taken. The Committee shall deliver its opinion on the draft measures within a time limit which the chairman may lay down according to the urgency of the matter. The opinion shall be delivered by the majority laid down in Article 148 (2) of the Treaty in the case of decisions which the Council is required to adopt on a proposal

from the Commission. The votes of the representatives of the Member States within the Committee shall be weighted in the manner set out in that Article. The chairman shall not vote.

3. (a) The Commission shall adopt the measures envisaged if they are in accordance with the opinion of the Committee.
- (b) If the measures envisaged are not in accordance with the opinion of the Committee, or if no opinion is delivered, the Commission shall without delay, submit to the Council a proposal relating to the measures to be taken. The Council shall act by a qualified majority.
- (c) If, within three months of the proposal being submitted to it, the Council has not acted, the proposed measures shall be adopted by the Commission.

#### Article 9

Member States shall within four years of notification of this directive and every four years thereafter submit a report to the Commission containing the information outlined in Annex 5 and any other relevant information required by the Commission at least six months before such a report becomes due.

#### Article 10

On the basis of the information received pursuant to Article 9 the Commission shall publish periodic reports at four yearly intervals. If it sees fit, the Commission shall submit proposals to the Council in the light of these reports.

#### Article 11

The Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive within two years of its notification. They shall forthwith inform the Commission thereof.

Article 12

This directive is addressed to Member States.

Annex 1

Vulnerable zones are those areas of land which drain directly or indirectly into one or more of the following waters:

- (i) surface freshwaters intended for the abstraction of drinking water which could contain more than 50 mg/L nitrate if protective action is not taken.
- (ii) groundwaters intended for the abstraction of drinking water which contain more than 50 mg/L nitrate or could contain more than 50 mg/L nitrate if protective action is not taken.
- (iii) natural freshwater lakes, other natural freshwater bodies, estuaries, coastal waters and seas which are found to be eutrophic or which in a short time may become eutrophic if protective action is not taken.

Annex 2

Maximum number of manure producing animals per hectare of Land  
available for manure spreading

Animals	Maximum number of animals per hectare (1)
Dairy Cows	2
Young Stock or beef cattle,	4
Fattening pigs	16
Sows with piglets	5
Turkeys, ducks	100
Laying hens	133
Young hens, 0-16 weeks	285

(1) Numbers are not cumulative

Annex 3

Measures to be considered in the elaboration of action programmes referred to in article 4.3

1. The restriction or banning of the ploughing in of vegetables.
2. Prevention of downward water movement beyond the crop root systems in irrigation systems.
3. The use of crop rotation systems and catch crops.
4. Covering of the soil by a crop or other vegetation for as long as possible.
5. The setting aside, or re-forestation, of agricultural land.
6. The diversification of agriculture.
7. The continuous training and education of farmers and producers.
8. Scientific and agronomic research on the behaviour of nitrogen in the soil and on crops.

Annex 4

Monitoring Frequency

1. For the purpose of designating and revising the designation of vulnerable zones, Member States shall:
  - a) Within two years following notification of the directive, monitor the nitrate concentration in freshwaters over the period of one year:
    - (i) at surface water sampling stations which are representative of the catchment basins of Member States, at least monthly and more frequently during the spring flood;
    - (ii) at sampling stations which are representative of the groundwater aquifers of Member States, at least monthly.
  - b) Repeat the monitoring programme outlined in 1 a) at intervals of at least four years, except for those sampling stations where the nitrate concentration in all previous samples has been below 25 mg/l and no new factor likely to increase the nitrate content has appeared, in which cases the monitoring programme need only be repeated every six years.
  - c) Review the eutrophic state of their surface, estuarial and coastal waters every three years.
2. For designated vulnerable zones Member States will draw up suitable monitoring programmes in order to assess the effectiveness of measures outlined in Article 4.

3. Reference methods of measurement

a) Fertilizer (excluding livestock manures)

Method of measurement of nitrogen compounds must be carried out in accordance with Council Directive 77/535/EEC on the approximation of the laws of the Member States relating to methods of sampling and analysis for fertilizers<sup>(1)</sup>.

b) Freshwaters

The nitrate concentration of freshwaters will be measured in accordance with Article 4 paragraph 3 of Council Decision 77/759/EEC<sup>(2)</sup>

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(1) O J No. L 213, 22.8.1977, p. 1

(2) O.J. No. L 334, 24.12.1977

Annex 5

The report to the Commission shall contain :

- a) a map showing the location of the designated vulnerable zones, distinguishing between existing and new zones and indicating, in each case, the paragraph in Annexe 1 under which the zone was designated;
- b) a map showing the location of all sampling points;
- c) the results of the monitoring carried out under Article 5 and in accordance with Annex 4;
- d) the rules describes in Article 4, paragraph 1 (b);
- e) the maximum application rates as described in Article 4, paragraph 2 (a) and rules described in Article 4, paragraph 2 (b).
- f) the records maintained in accordance with Article 4 paragraph 5.