EUROPEAN COMMISSION

Brussels, 9.2.2010
COM(2010)47 final

REPORT FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT

On implementation of Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources based on Member State reports for the period 2004-2007

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1. INTRODUCTION

Council Directive 91/676/EEC (hereafter referred to as the Nitrates Directive) aims to protect waters against pollution caused or induced by nitrates from agricultural sources through a number of steps to be fulfilled by Member States: water monitoring (with regard to nitrate concentration and trophic status); identification of waters that are polluted or at risk for pollution; designation of vulnerable zones (areas that drain into identified waters); the establishment of codes of good agricultural practices and action programmes (a set of measures to prevent and reduce nitrate pollution) and the review at least every 4 years of the designation of vulnerable zones and action programmes.

Article 10 of the Nitrates Directive requires Member States to submit a report to the Commission every four years following its notification. This report should contain information pertaining to codes of good agricultural practice, designated vulnerable zones, the results of water monitoring and a summary of the relevant aspects of action programmes drawn up in relation to nitrate vulnerable zones.

The aim of the present report is to inform the European Parliament and the Council on the state of the implementation of the Nitrates Directive, in accordance with article 11. It is based on the information submitted by Member States referring to the period 2004-2007 and is accompanied by aggregated maps of nutrient pressures from agricultural sources, of water quality and of designated nitrate vulnerable zones included in the Staff Working Document **(**SEC(2010)118**)**. This is the first time that all 27 Member States have submitted a report[1]. It, therefore, deals principally with EU 27, but, also includes a comparison with the third reporting period for the former EU 15 and some new Member States. A comparison with the former reporting period is not possible for all New Member States for many of which this was the first report[2]. Reports were submitted in 2008-2009. Several Member States provided additional information during 2009, mainly regarding water quality data.

[1] Including Romania and Bulgaria, although not yet obliged. Bulgaria included also water quality data for the period 2000-2003

[2] Cyprus, Czech Republic, Estonia and Hungary reported in 2004 on the period 2000-2003.

2. EVOLUTION OF PRESSURES FROM AGRICULTURE SINCE THE LAST REPORTING PERIOD

The progressive reduction in mineral nitrogen fertilizer consumption, which started in the early 1990s, stabilized during the period 2004-2007 for the EU 15. At EU 27 level the nitrogen consumption shows a slightly increasing trend[3]. As compared to the last reporting period, the yearly total amount of mineral nitrogen fertilizer consumption remained stable around 9 million tons in the EU-15[4] whereas it has increased by 6%, from 11.4 to 12.1 million tons, in the EU 27.

Consumption of mineral phosphorus fertilizers reduced with 9% for EU the 15, while it decreased by only 1% for the EU 27 as compared with the last reporting period[4].

The decreasing trend in animal numbers noted in the last reporting period stabilised in the period 2004-2007. Comparison between 2003 and 2007[5] show that for EU 15 pig and poultry numbers -apart from laying hens- decreased, while goat sheep and cattle numbers slightly increased. Dairy cattle numbers increased with 7.6% in EU 15. For EU 27 similar trends are noticed; however a more pronounced decrease in poultry numbers- apart from laying hens- is noted.

The amount of nitrogen from animal husbandry spread annually on agricultural soils in the EU 27 has decreased from 9.4 to 9.1 million tons between 2003 and 2007 and from 7.9 to 7.6 for the EU15. There are large differences in pressure from agriculture between Member States[6]. Areas with a high nutrient pressure include among others the Netherlands, Belgium-Flanders and France-Brittany. Member States in Eastern Europe generally have lower pressures due to lower input of fertilizers and livestock density.

The contribution of nitrogen loads from agriculture to surface waters is decreasing in many Member States. Nevertheless, the relative contribution from agriculture remains high. In most Member States agriculture is responsible for over 50% of the total nitrogen discharge to surface waters. The share of nitrogen loads in river basins that comes from diffuse sources remains high in large parts of Europe[7].

3. WATER QUALITY, STATUS AND TRENDS

Monitoring networks

Adequate monitoring of waters is crucial for water quality assessment and requires a representative monitoring network throughout the territory for ground, surface as well as marine waters. Several Member States are integrating nitrate monitoring in monitoring networks established under the Water Framework Directive[8]. For the

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3 See figures 1A and 1B in the SWD

4 Based on OECD statistics for 2003-2007. The database has no info on Belgium and Ireland. Ireland provided own figures.

5 See table 3 in the SWD.

6 See maps 1 to 6 in the SWD.

7 See map 7 in the SWD.

8 Directive 2000/60/EC.

present reporting period 50% of the monitoring stations from 10 Member States were the same in the Nitrates Directive and Water Framework Directive databases.

The total number of sampling sites in the EU 27 is 31,000 for groundwater and 27,000 for surface waters. The number of sites in the EU 12 is substantially lower than in the EU 15 and amounts to 7,000 for groundwaters and 5,000 for surface waters. As compared to the previous reporting period, the number of groundwater sites in the EU 15 has increased from 20,000 to 24,000, while the number of surface water sampling sites remained stable at 22,000. The total number of common sites with the former reporting period, which facilitates trend calculations, amounts to 18,000 for groundwater and 14,000 for surface water.

The average groundwater sampling site density is 13.7 per 1000 km^2 with the highest density in Belgium, Malta and Denmark (99, 44 and 34 sites per 1000 km^2, respectively) and the lowest in Finland, Sweden and Lithuania (0.2, 0.4 and 0.8 sites per 1000 km^2, respectively). Most Member States have provided groundwater monitoring data for different depths ranging from 0-5 to more than 30 m. A Few Member States have provided information on monitoring frequency that ranges from 1 (the Netherlands) to 4 times per year (Belgium, France, Slovenia and Slovakia).

The average fresh surface water sampling site density is 7.4 per 1000 km^2 land area, with the highest density in Malta, Belgium and the United Kingdom (with 114, 29 and 36 per 1000 km^2, respectively) and lowest in Finland (0.5 sites per 1000 km^2). Most Member States with marine waters also have marine monitoring sites. Monitoring frequency for surface waters ranges from on average 7.4 times per year in Romania and up to 26 times per year in some monitoring sites in Germany and Slovenia.

Member States provided geo-referenced data regarding water quality based on which aggregated maps[9] of water quality could be drawn regarding nitrate pollution and trophic status of waters.

Groundwater

In the period 2004-2007, 15% of EU 27 monitoring stations had average nitrate concentrations above 50 mg nitrate per litre[10], 6% were in the range 40 to 50 mg nitrate per litre and 13% were in the range 25-40 mg nitrate per litre. Approximately 66% of the groundwater stations had a concentration below 25 mg nitrate per litre. For the EU 15 the figures are 17% above 50 mg per litre, 6% in the range 40 to 50 mg per litre, 15% in the range 25-40 mg per litre and 62% below 25 mg per litre[11]. Regions with high concentrations (above 40 mg per litre) are parts of Estonia, South-East of the Netherlands, Belgium-Flanders, the centre of England, several parts of France, Northern Italy, the North-East of Spain, South-East Slovakia, Southern Romania, Malta and Cyprus. Also many stations along the Mediterranean coast have relatively high values.

Trends in Groundwater Quality

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9 See maps 8-15 in the SWD.

10 50 mg NO_3-/l is the trigger value set in the Nitrates Directive.

11 See figure 2 in the SWD.

Most Member States that reported for the last period have compared the data from the current with that period, including some of the New Member States (Bulgaria, Cyprus, Estonia and Hungary[12]). Sweden did not provide trends since almost all their groundwater is below 25 mg nitrate per litre and because less monitoring points have been assessed for this reporting period. Trends could not be determined for Greece due to lack of data and for Poland, Lithuania, Latvia, Malta, Romania, Slovenia and Slovakia that reported for the first time.

Comparison with the data of the previous reporting period[13] shows that, at EU 15[14] level, stable and decreasing trends are prevalent (66% of the monitoring stations, of which 30% with decreasing trends). However, 34% of the monitoring stations still show an upwards trend. In the new Member States that have compared data with the former period (Bulgaria, Cyprus, Estonia and Hungary), 80% of the stations are stable, 11% of the stations show a decreasing trend and 9% show an increasing trend. The Member States with increasing trends in more than 30% of monitoring stations were Belgium, France, Spain, Portugal, Germany, Ireland, Italy and United Kingdom. However, with the exception of Ireland, these Member States show similar or even higher percentages of stations with improving quality. Trend analysis per water quality class[15] shows that in several Member States the share of points exceeding 50 mg per litre is still increasing including Belgium, Denmark, Greece, Spain, France, Ireland, Italy, the Netherlands and the United Kingdom. The share above 50 mg per litre decreased in Austria, Germany, Finland, Luxembourg and Portugal. However, data should be interpreted carefully as many Member States substantially increased the monitoring density which might influence the share of points per quality class.

Depth of groundwater

Deeper groundwater is less contaminated than shallow groundwater. The layer with the highest fraction of sites exceeding 50 mg nitrate per litre is between 5 and 15 m deep[16].

Fresh surface water

In the period 2004-2007, 21% of EU 27 surface water monitoring stations showed average nitrate concentrations below 2 mg per litre and 37% between 2 and 10 mg per litre. The concentration averaged between 40 mg per litre and 50 mg per litre in 3% of the stations and above 50 mg per litre also in 3% of the stations. For the EU 15 the figures are 24% below 2 mg per litre, 30% between 2 and 10 mg per litre, 4% between 40 mg and 50 mg per litre and also 4% exceeding 50 mg per litre.

Member States with the highest proportion below 2 mg/l were Sweden (97%), Bulgaria (76%), Finland (59%) and Portugal (50%). Member States with the highest proportion exceeding 50 mg/l were Malta (43%), Belgium (10%) and the United

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12 Czech Republic did not provide water quality data in the report submitted for 2000-2003, which made trend analysis not possible.

13 See figure 3 in the SWD.

14 Except Sweden for the above mentioned reasons.

15 See table 1 in the SWD.

16 See figure 4 in the SWD.

Kingdom (7%)[17].
Particularly England, Flanders and Brittany show high values above 40 mg/l. In the new Member States, parts of Czech Republic and Hungary and a few areas in Poland show elevated nitrate concentrations in surface waters (above 25 mg/l)[18]

Trends in fresh surface water quality

As compared with the last reporting period, the nitrate concentration is decreasing or stable in 70% of the monitoring points for EU 15. France (18%) has the highest proportion of stations with improving quality[19] while Greece[20] (41%) and Luxembourg (30%) have the highest proportion of stations with declining water quality[21]. Italy and Belgium have a relatively high proportion of stations with improving quality (10% for Italy, 13% for Belgium), but a similar proportion with a declining quality. Regions with a relatively large fraction of strongly increasing nitrate concentrations also include the west of England, Greece and the eastern part of the Po delta in Italy[22]. However, the latter shows also a relatively large fraction with a strongly decreasing trend. Of the new Member States that have reported trends, Cyprus (26%) has the highest proportion of improving trends, whereas Estonia (10%) has the highest proportion of declining trends[23]. Trend analysis per water quality class[24] shows that the share of points exceeding 50 mg per litre is still increasing in several Member States, particularly in Belgium and United Kingdom. The share above 50 mg per litre decreased in France and Italy while several EU 15 Member States show no values above 50 mg per litre for surface waters (Austria, Germany, Greece, Finland, Ireland, Luxembourg Portugal and Sweden). However, data should be interpreted carefully as changes in monitoring density might influence the share of points per water quality class.

Trophic state surface waters

Member States used different criteria to assess the trophic status of fresh surface waters, which makes it difficult to compare trophic status of waters between Member States. Chlorophyll-a, total nitrogen, total phosphorus and orthophosphate are often used parameters and 17 Member States have reported on the trophic status of their waters using one or more of these parameters. In 40% of the reported EU-stations[25] on trophic status the surface water is defined as oligotrophic or ultra-oligotrophic, while in 33% of the stations the water is defined as eutrophic or hypertrophic. Malta and Hungary have the highest proportion of hypertrophic waters and Bulgaria and Latvia the highest proportion of oligotrophic waters[26].
Not all Member States having marine waters reported on their quality, which makes

17 See figure 5 in the SWD.
18 See maps 11, 12 and 14 in Chapter I of the SWD.
19 Decrease in nitrate concentrations of at least 5mg per litre.
20 Greece provided an updated dataset, however due to late submission it could not be considered, first delivered data are presented.
21 Increase in nitrate concentrations of at least 5mg per litre.
22 See map 13 in the SWD.
23 See figure 6 in the SWD.
24 See table 2 in the SWD.
25 EU 27 minus Cyprus, Denmark, Estonia, Greece, Italy, France, Luxembourg, the Netherlands, Poland. and United Kingdom due to lack of or incomplete data.
26 See figure 7 in the SWD.

an evaluation at European level rather difficult within the context of this reporting exercise.

4. DESIGNATION OF NITRATE VULNERABLE ZONES

Member states are required to designate as vulnerable zones all areas of land in their territory that drain into polluted waters or waters at risk of pollution if no action is taken. At least every four years Member States are required to review, and, if necessary, revise nitrate vulnerable zones on the basis of results of water monitoring. Member States may, in stead of designating specific zones, also opt to apply an action programme throughout the entire territory. Austria, Denmark, Finland, Germany, Ireland, Lithuania, Luxembourg, Malta, the Netherlands and Slovenia have adopted a whole territory approach.

Of the EU 27 area, 39.6%[27] has been designated as vulnerable zone, including the area of Member States that apply a whole territory approach. As compared to the previous reporting period the total area in the EU 15 designated as vulnerable zone or subject to whole territory approach has increased by 1%, representing now 44.6% of the total EU 15 area. Notably Portugal, Belgium and Italy have increased their vulnerable zone area during the period 2004-2007. Spain also increased designation during 2008-2009.

5. ACTION PROGRAMMES

Member States are required to establish one or more action programmes that apply to designated vulnerable zones or to the whole territory if they have chosen the whole territory approach. Those action programmes should include at least the measures as referred to in the annexes II and III of the Nitrates Directive and that relate to, among others, periods during the year when fertilisation is prohibited, minimum required storage capacity for livestock manure, the limitation of land application of fertilisers and land application near waters or on slopes.

All Member States have established one or more action programmes on their territory and have provided in their reports information regarding newly established action programmes and modifications following the required periodical review.

Several Member States have used the possibility foreseen by the Nitrates Directive to design and implement different action programmes on individual nitrate vulnerable zones or parts of zones including France, Portugal, Spain, United Kingdom, Belgium, Italy, Poland and Romania.

Most action programmes cover required measures; however, some need further reinforcement in order to sufficiently protect water quality against nitrogen pollution. Main insufficiencies relate to storage provisions, balanced fertilisation and establishment of periods during which fertilisation is banned.

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[27] Based on data for the year 2007, see table 4 figure 8 and map 16 in the SWD.

The Nitrates Directive limits the land application from livestock manure to 170 kg N/ha per year in designated zones to which action programmes apply. This application standard is established in almost all action programmes.

The storage capacity for manure has increased further during this last reporting period. Nevertheless, insufficient storage capacity for manure is among the most cited difficulties which Member States encounter during the implementation of action programmes. Storage capacity should be sufficient in order to cover the periods when manure application is prohibited or impossible due to climatic conditions. Lack of financial resources among farmers is cited as hampering the construction of new storage facilities.

The majority of farmers subjected to control showed a high compliance with the measures of the action programmes. However, the following difficulties in implementing the action programmes were reported:

- Accurate record keeping by farmers regarding manure and fertilizer application

- Low awareness level by farmers, especially in case of small holdings. Many such farmers have difficulties in understanding the measures of the action programmes due to a lack of knowledge

A number of Member States (e.g. Austria, the Netherlands) report that the overall awareness by farmers regarding the natural environment has changed in a positive way, resulting for instance in an improved handling of manure and fertilizers.

Chapter III of the Staff Working Document refers to some examples of progress made in action programmes for several Member States.

The Commission is also aware of an increased interest in manure processing initiatives. In several Member States, in particular the regions with intensive livestock production and high nutrient surpluses, livestock manure is being processed in order to generate end products that are easily transportable for export or products with a changed nutrient ratio that allows better nutrient management resulting in reduced nutrient surpluses. The processing techniques range from simple separation into a liquid and solid fraction to more advanced techniques such as drying, composting or incineration of solid fractions and biological treatment, membrane filtration and physico-chemical techniques for liquid fractions. The techniques are often combined with digestion processes in biogas installations for energy production. The establishment of several large cooperative initiatives in which large groups of farmers invest commonly in manure processing installations is also of interest. Such initiatives now exist notably in Spain, the Netherlands and Belgium.

It should also be mentioned that there exists an increased interest among livestock farmers for the application of adapted feeding techniques such as low N diets, multiphase feeding with adapted feed depending on growth stage and advanced feeding management that improves the overall efficiency of feed use in the animal. Advanced feed processing techniques contribute to improved feed conversion efficiency and reduced nutrient excretion.

6. DEROGATIONS

The Nitrates Directive allows for the possibility for a derogation in respect to the maximum amount of 170 kg nitrogen per hectare per year for livestock manure, provided that it is demonstrated that the directive's objectives are still achieved and that the derogation is based on objective criteria such as long growing seasons, crops with high nitrogen uptake, high net precipitation or soils with a high denitrification capacity. Derogations require a Commission Decision following the opinion of the Nitrates Regulatory Committee, which assists the Commission on implementation of the directive. Appropriate designation of nitrate vulnerable zones and action programmes fully in conformity with the directive are prerequisites to any derogation and the derogation applies only for the duration of the action programme. A list of derogations granted until December 2009 is provided in the Chapter II of the Staff Working Document.

7. FORECAST ON WATER QUALITY

Many Member States provided elements on assessment methods (trend analyses and simulation models), for the evaluation of trends in agricultural pressure and/or water quality evolution. No information was provided by Cyprus, France, Greece, Latvia, Malta, Portugal, Romania and Slovenia. Ireland did not provide simulation models, but cited measures and developments as likely to impact positively on water quality in future.

As in the last reporting period, only a few Member States provided quantitative data on the time scale during which either a stabilization of pollution or a recovery of the water quality is forecasted to be achieved. Many Member States point out the difficulties in making such a forecast, mostly referring to uncertainties regarding climate and transport processes in soils and the fact that other measures beyond agricultural measures have been taken to improve water quality.

In general, despite the achieved improvements in water quality, it will still take several years to decades before full recovery of water quality can be achieved as a result of the implementation of the action programmes and modification of the agricultural practices. In the few cases where a timescale of a substantial restoration of water quality is provided, it ranges from 4-8 years (Germany and Hungary) to over several decades for deeper groundwaters (the Netherlands).

8. INFRINGEMENT PROCEDURES

The implementation of the Nitrates Directive is still incomplete, mainly relating to insufficient designation of nitrate vulnerable zones and non conformity of action programmes. The Commission is in continuous discussion with all Member States as to attain compliant implementation and has currently 3 open infringement cases. The case against Spain relates to designation of vulnerable zones and content of action programmes, the ones against France and Luxembourg relate to the action programmes.

9. LINKS WITH OTHER EU POLICIES

The Nitrates Directive has close links with other EU policies in the field of water, air, climate change and agriculture. Experiences of implementation and more advanced scientific insights in synergistic effects of measures in nitrate action programmes, indicates the value of full implementation of the policies. A recent study[28] on integrated measures in agriculture to reduce ammonia emissions has shown important benefits for air and the remission of green house gas emissions through the implementation of the Nitrates Directive. Further details on policy links are referred to in Chapter 4 of the staff working document**.**

10. CONCLUSIONS

This reporting exercise includes for the first time all 27 Member States. All new Member States, have established monitoring networks, designated vulnerable zones and established action programmes.

Regarding water quality, for groundwater, 66% of the monitoring stations show stable or decreasing nitrate concentrations. However, in 34% of the stations an increase in nitrate pollution was still observed and 15% of stations showed nitrate concentrations above the quality threshold of 50 mg per litre. Within groundwater bodies, shallow levels showed higher nitrate concentrations than deeper levels. The highest proportion of contaminated water lies between 5 and 15 metres below the surface.

For fresh surface water, 70% of the monitoring stations show stable or decreasing nitrate concentrations. In 3% the concentration is exceeding 50 mg per litre while in 21% the concentration is below 2 mg per litre. In 33% of the stations monitoring trophic status, the water is defined eutrophic or hypertrophic. The pressure from agriculture with respect to surface water nitrate pollution has decreased in many Member States, although still, agriculture contributes largely to nitrogen loads to surface waters.

A further increase in the area of vulnerable zones as compared to the former reporting period is observed in the EU 15. Designated zones increased from 43,7% to 44,6 % of the EU 15 territory, while 39,6% of the EU 27 territory is designated, including the territory of Member States that apply an action programme on the whole territory. However, water quality data show that, in several regions, for both EU 15 as EU 12, further increases in designation are necessary according to the criteria set out in the Nitrates Directive.

The quality of action programmes further improved as compared with the last reporting period in the EU 15; however, it is still often driven by infringement procedures. All new Member States established action programmes, but several programmes need further improvement in order to attain full compliance with the requirements of the Nitrates Directive, particularly the provisions that relate to storage construction, balanced fertilisation and establishment of periods during which land application is banned. Availability of information and training services to

[28] Commission report 'Integrated measures in agriculture to reduce ammonia emissions', Alterra, 2007

farmers and efficient control programmes are essential in order to ensure effective implementation of programmes in the field.

In intensive livestock regions an increased interest in manure processing techniques is observed, allowing more efficient nutrient management often combined with production of energy from biogas production. The efficient nutrient management is playing a role in reducing farm costs.

Experiences of implementation and advanced scientific insights in synergistic effects of measures in nitrate action programmes suggest that nitrogen policies require an integrated approach by considering the whole nitrogen cycle and that implementation of the Nitrates Directive brings substantial benefits notably in terms of reductions in ammonia and greenhouse gas emissions as well in the wider field of water protection under the Water Framework Directive. More attention to this aspect of nitrogen management will be necessary in future, as well as an adequate and continuous support from the scientific community at both National and European level.

The Commission will continue to work with Member States to improve implementation with the common aim to protect waters. It will continue to take legal action where it considers necessary.